BIOPOLITICS AT 50 YEARS

Founding and Evolution

Edited by Dr. Tony Wohlers
and Dr. Amy Fletcher

RESEARCH IN BIOPOLITICS

VOLUME 13

BIOPOLITICS AT 50 YEARS

RESEARCH IN BIOPOLITICS

Series edited by Dr Albert Somit and Dr Steven A. Peterson

This volume edited in memoriam by Tony Wohlers and Amy Fletcher

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RESEARCH IN BIOPOLITICS VOLUME 13

BIOPOLITICS AT 50 YEARS: FOUNDING AND EVOLUTION

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In Memory of Steven A. Peterson
1947–2021

As a professor and researcher, Steven A. Peterson inspired and shaped the minds of generations of students and scholars. As a fellow human being and friend, who cared deeply about others, his kind soul touched the hearts of many. Because of his engaging intellect and kind personality, those who had the privilege of meeting him will always remember him. We are not only left with many and profound memories of who Steven was but are also in awe of his many and lasting accomplishments throughout his professional career. As a prodigious scholar who appreciated and pursued interdisciplinary collaboration, Steven published more than 25 books and 125 articles during his academic career. Moreover, he was a pioneer and one of the Founding Scholars of biopolitics, as illustrated by his instrumental role in establishing the Association for Politics and the Life Sciences. Indeed, Steven was a giant in biopolitics and part of a fellowship of noteworthy scholars that included Albert Somit, Glendon Schubert, Robert Heineman, James Schubert, Robert Blank, and Stephen Wasby. In addition to his profound and lasting impact on shaping and steering biopolitics as a discipline, we must not forget Steven's successful administrative and leadership roles, especially with respect to his position of Professor of Politics and Public Affairs and Director of the School of Public Affairs at Pennsylvania State University Harrisburg – a position he held from 1997 until his retirement in 2015. Following his retirement, Steven not only remained connected to the university as an emeritus professor but continued championing biopolitics and guiding the publication of Biopolitics at 50 Years: Founding and Evolution. We dedicate this volume to him.

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INTRODUCTION

Tony Wohlers and Amy Fletcher

The number of Founders in the 1960s was small – but their willingness to use biology as a foundation for studying biopolitics was a major first step toward establishing a vital new subfield in political science. James C. Davies arguably anticipated biopolitical research in *Human Nature in Politics* (1963), in which he briefly suggested that biosocial variables such as nutrition might have political effects on individuals (using Abraham Maslow as a takeoff point for the analysis). Lynton Caldwell (1964) wrote an article for the *Yale Review* in which he argued that the environment should become a focus for public policy (he was later one of the key advocates for the Environmental Impact Statement as a means of forcing governments and legislators to consider the environment in a serious and sustained way). In 1967, Roger Masters entered the ranks of the Founders, with essays on the rediscovery of human nature (1967) and on the biological factors that may help to explain revolts (1969). Albert Lepawsky (1967) argued that the gap between medical science and political science was problematic and needed to be addressed. He noted that there should be a future for "medical politics."

In 1968, Albert Somit published an article in the then *Midwest Journal of Political Science* in which he argued that ethology and psychopharmacology, in different ways, strongly suggested the value of using biology in the study of politics. In hindsight, it is apt that the late 1960s, which combined social disruption, an extraordinarily divisive war between the United States and Vietnam, and the emergence of LSD as an experimental drug with great influence on the counterculture, would provide the context within which a new biopolitical focus might emerge. In that same era, Michael Haas argued that biology was relevant for considering national aggressiveness (1968). He also noted (1969) that biopolitics could be a perspective for understanding mortality rates. Robert Stauffer (1969) argued that malnutrition and disease undermined countries' ability to achieve a high level of development. Elliott White, a prolific author of biopolitics works, maintained that intelligence and an array of individual differences should be factored into analyses of political socialization (White, 1969).

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A. N. Shinn (1969a, 1969b) wrote two works on the use of psychophysical scaling in political analysis. He presaged later work by the Stony Brook group on this research framework.

In the 1970s and early 1980s, we begin to see an efflorescence in the work of the study of biopolitics with more researchers becoming more prolific. The pioneers of the 1960s set the stage for this evolutionary development. Some of the Founders continued to play a leading role afterward, such as James C. Davies, Keith Caldwell, Roger Masters, Albert Somit, and Elliott White. But others came onto the scene – including senior people in the discipline. Among these were Larry Arnhart, Robert Axelrod, Carol Barner-Barry, Robert Blank, Vincent Falger, Heiner Flohr, Odelia Funke, Sam Hines, Bill Kitchin, Jean Laponce, Glen Schubert, Jim Schubert, Tatu Vanhanen, John Wahlke, Meredith Watts, and Tom Wiegele, among others (for a bibliography of contributions by all in biopolitics as of 1988, see Somit & Peterson, 1990).

Newly minted PhD students from the 1970s and 1980s also became contributors to the enterprise. They were the first set of biopolitics practitioners trained for the subject in graduate school programs such as that at X and Y (examples of key programs). A number of these entrants into the field of biopolitics began to provide an impetus for the further development of the study of biology and politics. The first PhD in biopolitics was Peter Corning in 1970. Others in the 1970s: Gerald Cory (1974), Steven Peterson (1974), Stephen Weiner (1974), and Marvin Potes (1979). In the 1980s, the productivity of graduate schools in generating biology and politics PhDs increased. Those who were more visible in their later careers included Peter Corning, Steven Peterson, Joe Losco, Mark Emmert (and who has also served as President of the NCAA), and Fran Moran.

A brief word about each of those attaining their PhD in the 1970s. Peter Corning's dissertation at New York University was approved in 1970 and his title speaks of the ambition of this work: "Theory of Evolution as a Paradigm for the Study of Political Phenomena" (Corning, 1971a). He followed this up with a publication in *World Politics* one year later (Corning, 1971b). Gerald Cory received his PhD from Stanford University in 1974, with his dissertation "Biopsychological Approaches to Political Science" (Cory, 1974). Steven Peterson's PhD was granted by the State University of New York at Buffalo in 1974; his dissertation: "Biological Bases of Student Protest" (Peterson, 1974). Stephen Weiner received his PhD from the University of Maryland in 1974. It was entitled "Toward the City-State: An Ethological Approach to the Problem of Political Violence" (Weiner, 1974). Marvin Potes, Kent State University, 1979, authored "The Functional Analogy as a Concealed Metaphor: A Critical Analysis of the Use of Biological Analogy in Biopolitics" (Potes, 1979).

The discipline of biopolitics stands on the intellectual shoulders of its pioneers and those who continued shaping the discipline throughout the 1970s and beyond. The scope of biopolitics and scholarly focuses within have remained dynamic. This volume of biopolitics reflects the scholarly dynamic and vibrancy of the discipline. The term biopolitics has been used several times before (e.g., Morley Roberts in the early part of the twentieth century). Today, though, the

relevant differentiation is between two strands of thought. The first approach refers specifically to the biological study of politics that seeks to draw theories and insights from the natural sciences, including biology and neuroscience. This school is represented today by Politics and the Life Sciences Journal, and two professional organizations, the Association of Politics and the Life Sciences and the International Political Science Association Research Committee #12. The second approach draws heavily from Michel Foucault's orientation toward biopolitics, including the concept of biopower, over which power is exerted over many aspects of people's lives. Breaking with the naturalist and social scientific interpretation of biopolitics, the French historian and philosopher sought to discover "the meeting between biological sciences and policy sciences in [a] general conception of power" (Lemm & Vatter, 2017, p. 40). For Foucault, biopolitics concerns fundamental transformations in the order of politics, particularly between the State and its citizens, and in terms of the State's responsibility to manage the population in the service of state survival and the public good:

> For the first time in history… biological existence was reflected in political existence… But what might be called a society's "threshold of modernity" has been reached when the life of the species is wagered on its own political strategies. For millennia, man remained what he was for Aristotle: a living animal with the additional capacity for a political existence; modern man is an animal whose politics places his existence as a living being in question. (Foucault, 1980, pp. 142–143)

Volume 13 of *Biopolitics at 50 Years* includes chapters that reflect both of these analytical frameworks. Such intellectual pluralism is rare, as the social scientific and Foucauldian frameworks became antagonistic positions in the culture and methodological wars that roiled political science (and other affiliated disciplines) beginning in the 1990s. The editors of this volume, in consultation with Steven Peterson, decided to include and link chapters from both the Foucauldian and social scientific perspectives. We argue that it is sensible and productive to have a "conversation" between these two perspectives in one volume. In addition, we are even willing to suggest that there may be a family resemblance between the two although fundamental methodological principles and worldviews do not always align. In an era when even Wikipedia recognizes multiple definitions of biopolitics, perhaps it is time for a dialogue – if not a rapprochement – between scholars working in both of these frameworks.

Finally, there may be academic and interpersonal value for interaction, as one notable event in the history of biopolitics reveals. At an American Political Science Association meeting in the later 1980s, Albert Somit and Steven Peterson organized a biopolitics panel regarding the major contributions of biopolitics to Political Science. On the day of the panel, two or three new people of the Foucauldian school joined established biopolitics panelists and scholars (many of whom are discussed above). As the social scientific panelists presented, this team looked quite perplexed. When they presented, the "regulars" were gob smacked and a clash of cultures ensued. It was as if there were a chasm between the two camps and, unless you were there, it can be hard to understand how divisive and

high stakes these debates could become in the context of both the Foucauldian wave that was sweeping through academia at that time, as well as the coterminous imposition of rational choice in the discipline of political science. Though such debates on methods, worldviews, and frameworks remain consequential, we believe that there is value in engaging the two biopolitical camps in one place and building a scholarly bridge between them to enrich the conceptual scope of biopolitics. With that in mind, let us turn to a brief overview of the contributions to this volume.

More than half a century has passed since the emergence of biopolitics as a distinct academic endeavor in the political science discipline. Since its emergence in the 1960s, biopolitics has attracted a strong fellowship of scholars committed to establishing and accelerating momentum through a wide range of scholarly activities. An ever-growing number of publications, conference presentations, and panels dedicated to biopolitics are testimony to that momentum. As a result, biopolitics not only survived, but as suggested by Albert Somit and Steven Peterson, established itself as a *beachhead* within the political science discipline bolstered by distinct scholarly discourses and organizational structures. As with any discipline that continues to evolve, this journey toward the biopolitics beachhead was neither easy nor linear. Accordingly, the chapter by Albert Somit and Steven Peterson takes the reader on a journey – a journey that alludes to the struggles in biopolitics and traces the major thematic research outputs from then to now, while highlighting the formal organizations that support the study of biopolitics. The journey concludes with an important discussion that focuses on where biopolitics is headed and specific disciplinary needs to ensure its sustainability and vibrancy for the next 50 years.

Inspired by the biopolitics pioneers like Albert Somit and his 1968 article on biology and political science in the Midwest Journal of Political Science and drawing on an extensive interdisciplinary career, Peter Corning offers a truly long-term perspective on the role of politics in the evolution of socially organized species and a call for action. This chapter on politics in evolution for the first 5 million years and the next 100, reviews the dynamic complexity of evolution through the synergism hypothesis and the evolution of political systems in humankind. An understanding of the past is critical to assess our future. While useful, the synergism hypothesis has fundamental shortcomings that cannot account for humankind's recent cultural evolution and the existential challenges our species is facing ranging from detrimental impacts of climate change and ever-increasing extremes of unequal concentration of wealth. Accordingly, Peter Corning offers an alternative for our species to survive – the creation of a global superorganism with global governance in favor of a system that emphasizes competition and the maximation of self-interest.

As we continue our journey of biopolitics from a systems perspective, it is investable to encounter debates regarding the biological foundations of political life and what a biopolitical science would look like. Aristotle's *Politics* and the fundamental principles that describe how societies evolve and human beings, enabled through logos, live together as political animals in groups offer a point of departure to delve into these fundamental debates. Drawing on the principles of

what governs and defines human societies and weaving together the postulates of contemporary research to establish the biohistorical dimension of the evolutionary emergence of human political behavior, Kenneth Blanchard argues that the development of a genuine biopolitical science must contain these principles. Almost two and a half millennia after the articulation of the principles that govern human societies and 50 years after the biopolitics pioneers appeared on the political science stage, Kenneth Blanchard leaves us with an opportunity to confirm Aristotle's propositions, while paving the way for the emergence of a genuine biopolitical science.

The great Greek philosophers and their attempts to enlighten our understanding of human nature remains an important theme. We know that such an understanding requires a multidimensional perspective. Drawing on a four-part framework of analysis that is based on the evolution of the brain and its mental capacities and considering the individual, social, rational, and metaphysical perspectives of human nature, James Rutherford applies a multidimensional framework of human nature within the context of medical ethics, United States constitutional democracy, and legal philosophy. Based on the four-part multidimensional understanding of human nature, the conclusions offered by James Rutherford are far reaching. The application of the multidimensional framework provides us with an opportunity to not only increase understanding of human nature, but also bring cohesion to a fragmented field of philosophy, including moral, political, and legal philosophy.

We continue our journey by focusing on another systems perspective, while turning to the first of two essays in the tradition of Foucault. The pandemic caused by COVID-19 continues to have major domestic impacts ranging from a wide range of societal reactions and lockdown measures to implications for economic stability and civil liberties. From a global systems perspective, the pandemic has also changed the nature of international relations by shifting its core focus from geopolitics to global biopolitics, as illustrated by strategies that seek to balance the protection of human lives relative to multiple risks, threats and dangers to the physical existence of populations. Acknowledging that the international and global perspectives of the pandemic has not received sufficient scholarly attention, Andrey Makarychev's chapter focuses on the biopolitics of COVID-19 and its interaction with various facets of the international system, foreign policy, and world politics from a Foucault perspective. In pursuit of filling this research gap, Andrey Makarychev not only reveals and explains transformative trends in international relations and global politics due to the pandemic, but also illustrates the challenges faced by the liberal international order.

The remaining five chapters of this volume turn to the implications of biology for policy processes and aspects of various factors that influence behaviors and subsequently raise issues related to public policy and the role of interdisciplinary approaches within biopolitics. Rebecca Harris begins with a basic but important assertion. Policy processes and the subsequent quality and success of policies are constrained by our own limitations as biological beings. Hard-wired into our biological existence, specific aspects of human nature are particularly important

to understand the relationship between human behaviors and policy processes, including the way humans think as well as the effect of interpersonal relationships, emotions, and status competition. As Rebecca Harris draws on a wide range of neuroscience research to understand the concrete implications of human nature for policy processes, she not only broadens our understanding beyond the traditional models used to understand policy processes, but also leaves us with a nuanced understanding as to why it is difficult for policy to succeed.

We remain in the realm of public policy. Accordingly, Roger Masters suggests that many of the problems faced in our society can be explained by the destructive nature of chemicals on normal brain chemistry, thereby increasing rates of violent crime, substance abuse, and learning disabilities. The quantitative research focuses on understanding the implications of toxicogenomics for human behavior and the subsequent need for both public policies and interdisciplinary approaches to better address the negative impact of toxicants. Arguing that there is a relationship between the neurotoxicology and dysfunctional behavior, Roger Masters focuses on the impact of various toxins on educational failure, violent crime, and other dysfunctional behavior or disease in relation to lead, heavy metals, and multiple toxicants at Superfund sites. The quantitative analysis reveals probable relationships between toxicants and dysfunctional behavior or disease, thereby paving the way for not only designing and implementing relevant public policies to address the negative effects, but also developing interdisciplinary linkages to understand causation, prevention, and treatment of toxicant related behavior and disease.

Our brain chemistry and subsequent behaviors are also influenced by hormones. Building on research that examines the relationship between hormones and political behavior, Seyoung Jung lays the foundation for understanding role and effects of a specific neuropeptide hormone, oxytocin (OT), in relation to political attitudes and behaviors. With the goal to advance the field of biopolitics by focusing our attention on OT as a useful tool to do so, Seyoung Jung offers the relevant background to understand what OT is and the methods of studying its effects from an interdisciplinary perspective that spans from biology and psychiatry to economics and psychology. The examination of the emerging studies across these disciplines reveals the potential impacts of OT on certain behaviors and attitudes that are relevant within the context of politics. Accordingly, the chapter offers new opportunities to advance research in the biopolitics discinpline through the context-dependent nature of OT.

Within the context of a comparative public policy perspective, we turn to another fascinating study whose thematic anchor goes back to the year of 1987. That year, a New Jersey couple went to court to obtain custody of Baby M delivered by a surrogate mother. Medically assisted reproduction has been around for centuries, but it did not raise any major regulatory, legal, or ethical concerns until the technological invention of gamete cryopreservation in the mid-1950s, the first successful in-vitro fertilization by the end of the 1970s, and the application of the pre-implantation genetic diagnosis of the mid-1980s. Within the context of reproductive technologies and based on a comparative

case study of Germany, France, and the United States, Sandra Reineke examines the respective bioethics laws, which, on a continuum, range from very restricted to non-restricted policy approaches. In addition to describing the relevant international bioethics frameworks as well as the ethical, and policy framework devised by the United States, Sandra Reineke offers a detailed examination of the respective surrogacy policies in France and Germany by considering these countries' unique cultural, historical, and legal legacies.

The remaining chapter draws upon the Foucauldian tradition. Başak Akar examines vaccine and immunization policy in Turkey across over a sixty-year time frame, as illustrated by the implementation of 11 national health plans or Five-Year Development Plans. Moving beyond the traditional examination of healthcare policies from a privatization, performance, and effectiveness perspective, Başak Akar offers a neoliberal governability understanding of vaccine and immunization based on the analysis of Turkey's Development Plans published by the government between 1963 and 2019. The Foucauldian discourse analysis presents a new perspective on critical public policy and illustrates the transformative conceptualization of biopolitics depending on the level of government and actors involved. Specifically, the results of the content analysis of the Development Plans illustrate the impact of neoliberal governmentality in terms of removing the state from its central regulatory function of producing know-how and vaccines, while inviting multiple non-government actors into the political realm.

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POLITICAL SCIENCE AND BIOLOGY: THEN, NOW, AND NEXT

Albert Somit and Steven A. Peterson

ABSTRACT

Biology and Politics (or Biopolitics) has been a part of the political science firmament since the 1960s. Over time, it has become less an odd outlier in the discipline and more a tolerated (and sometimes respected) part of the enterprise. After about 50 years of existence, this is a proper time to reflect on where biopolitics has been, where it is now, and where it might go as an academic endeavor. Indeed, some have said that the best step would for biopolitics to no longer be seen as a special, narrow part of political science – but a part of every field in the discipline, integrated into the larger world of the study of politics.

THEN

> At about five o'clock in the morning of June 8, 1880, John W. Burgess, Professor of Political science and Constitutional Law at what was then called Columbia College, was awakened in his Paris "sleeping room" by someone pounding on the door. Responding to the summons, he was confronted by a messenger bearing a cable. Suddenly wide-awake, Burgess tore open the envelope and read the terse communication, "Thank God, the university is born. Go ahead." Those two sentences told the now exuberant professor that the Trustees of Columbia College had finally adopted his proposal for establishing a graduate school of political science and that he could proceed with his plan for engaging its faculty. The Trustees' action was a great personal triumph for Burgess. It was also to prove epochal for Columbia, for graduate education in the United States, and for American political science. Only the latter, of course, directly concerns us here.

So, according to one history, American Political Science was born (Somit & Tanenhaus, 1967). The new discipline grew at a respectable pace, mirroring the post-World War II explosion of college enrollments. By a century later, the

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American Political Science Association (established 1903) had over 13,000 members, three official journals, and an annual meeting. Alongside, but nominally independent of the national organization, were four regional associations, all with journals and annual meetings. In addition, there was a sizable handful of associations, devoted to the various "fields" (public administration, comparative government, political philosophy, international relations, etc.) broadly recognized within the profession.

The post-World War II explosive growth in undergraduate and graduate students led, of course, to a need for qualified faculty. As of 2020, well over 100 universities were offering Political Science PhD programs. As of that date, we should add, the profession had embraced the invidious practice of periodically rank ordering the doctoral granting departments, the discipline's leading scholars, and, it seemed, whatever else that lent itself to a defensible differentiation of academic status.

In short, political science had almost everything that could be asked of a real science. We say, "almost everything" because it lacked what David Easton termed an "overarching theory," Kuhn called a "paradigm," and less formal commentators simply described as a "Big Idea." That lack was widely recognized and over the decades hopeful advocates had advanced an apparently endless number of possible candidates – power, decision making, socialization, the influentials, systems theory, structural-functionalism, and rational choice, to mention only a few. All were hailed, and enthusiastically adopted. Regrettably, many failed and were, more or less quietly, abandoned.

The failure to agree on a Big Idea was in large part due to the acceptance of Emile Durkheim's dictum that "human social behavior was socially acquired," i.e., that meaningful social behavior was learned, not innate. In short, that social scientists need not, and in fact, should not concern themselves with possible biological behavioral influences. This taboo, an understandable reaction against the horrendous consequences of Social Darwinism run amuck, was incorporated in what became the Standard Social Science Model (SSSM) (human action – including politics – is the result of culture and learning) accepted across the social sciences (e.g., see Somit & Peterson, 2013).

"Biopolitics" is the name given the attempt by rebel political scientists, beginning in the mid-twentieth century, to challenge the long dominant SSSM. This disciplinary insurgency had several sources. Among them were: a growing dissatisfaction with the then current state of the discipline; persuasive evidence from psychopharmacology and evolutionary psychology that biological factors do play a role in shaping how we behave; and, from primatology and ethology, the not always welcome news of behavioral similarities between our species and that of other social primates, which could only be explained by a close genetic (biological) affinity (Somit, 1968; Schubert & Somit, 1982; Wahlke, 1979).

Probably most important, however, was the availability of a "Big Idea," the "paradigm" for which the profession had been searching with increasing urgency since its inception. We refer, of course, to "neo-Darwinism," a powerful scientifically solid restatement of evolutionary theory capable of explaining how and why species evolve the behaviors they display and the morphological features that

make those behaviors possible (Dobzhansky, 1972; Mayr, 1963; Simpson, 1944). We discuss this theory in a bit more detail in a later section.

This belated interest in biopolitics can be traced most directly to the 1960s. Several different events/publications during this decade serve as the baseline for subsequent developments. In 1964, Lynton Caldwell published a piece in the *Yale Review* on environmental policy (Caldwell, 1964). In 1963, James C. Davies (1963) published his book, *Human Nature in Politics*, that suggested biological components to human political behavior. Finally, in 1967, at a meeting of the Southern Political Science Association in New Orleans, Albert Somit crossed the Rubicon, urging political scientists to look at the biological bases of political behavior. Which of these starting points one might embrace? It is clear that the 1960s marked the beginning of an interest in the linkage between biology and politics. We can safely refer to that as the founding decade for biopolitics (for other histories, see Goetze, 2013; Hines, 1982; Somit & Peterson, 2013; Sprinkle, 2017).

Biological factors have since become increasingly recognized within the discipline of political science. One index of this can be assessed using two successive versions of a handbook of political science. In *A New Handbook of Political Science*, published in 1996, there is no reference to biology as a relevant field for political science (Goodin & Klingemann, 1996). In the next version, *The Oxford Handbook of Political Science*, published in 2009, the lead essay speaks of one possible candidate for "the next big thing" in the study of political science as the use of evolutionary models (Goodin, 2009, pp. 25–27). And the index to this massive volume contains a number of references to evolutionary theory's relevance in several other chapters. Relevant, too, is the reality that citations to the Alford, Funk, and Hibbing (2005) article on genetic influences on political behavior was one of the most downloaded articles from the *American Political Science Review*.

It is, therefore, appropriate to assess the state of biopolitics after five decades. Such efforts have been made before. Roughly, one decade in the life of the field, one of us assessed the state of biopolitics (Somit, 1972). At one point, the author noted that new perspectives/theories in political science need to make a mark within about a decade or they may disappear. Examples alluded to included group theory, systems theory, and structural functionalism. The prediction for biopolitics? "If [biopolitics] does survive, it will have to yield something substantial in the way of results within the next seven or eight years" (Somit, 1972, p. 232).

In 1998, there was a new evaluation of the field after three decades (Somit & Peterson, 1998). Biopolitics, after all, had survived much longer than the prognostication mentioned above. The conclusion? As an organizational enterprise, biopolitics had done well and had been generating research for about three decades and had a robust organizational structure (Association for Politics and the Life Sciences, International Political Science Association Research Committee # 12 [Biology and Politics], and a journal – *Politics and the Life Sciences*).

But the question lingered. What impact did biopolitics have on the discipline after three decades? Our assessment was less than positive (Somit & Peterson, 1998, p. 569):

> A quite different conclusion is compelled, however, when we turn to the second, and, perhaps, weightier criterion – intellectual impact on the discipline. By this standard, only one (albeit reluctant) verdict is possible: as of this writing, biopolitics must be viewed as basically unsuccessful.

We observed that the research output of this specialty had not penetrated deeply into the discipline and had not much effect on knowledge generation within political science. With that in mind, this essay steps back and asks: Where, then, is biopolitics after five decades? An astonishing accomplishment, given the judgment after the first decade. But have matters improved since the evaluation in 1998?

In the 1960s and early 1970s, one boost to this nascent movement was the commitment by several political scientists with widely respected records. If one were a graduate student or assistant professor, then, it was encouraging to have a set of seasoned professionals with significant disciplinary recognition as a support network. And these "stars" were willing to help junior scholars. Some examples: Glendon Schubert, Albert Somit, Fred Kort, James Davies, Roger Masters, Keith Caldwell, and John Wahlke, among others. In addition, several distinguished foreign scholars weighed in on the value of biopolitics: William McKenzie, Heiner Flohr, Peter Meyer, Jean Laponce, Jerzy Wiatr, Rudolph Wildenmann, and Tatu Vanhanen.

There were challenges in the earlier years. It was not rare to hear discussants and audience members at professional meetings muttering "social Darwinism" and "racism" and "eugenics" in comments about biology and politics papers. Over time, those standard questions disappeared and are seldom heard now.

What have been trends in the literature? We divided the period from 1982 through 2019 using publications in *Politics and the Life Sciences* by 5-year periods (see Table 1). The final period is an exception, since only 2% years of data were coded. One observation: The first-time frame is an anomaly. There was a special issue on "Teaching Biology and Politics," and it offered a fairly large number of essays that were long enough to qualify for inclusion in the analysis. We categorized these essays as "self-reflection." That was the dominant designation (49% of essays) in the 1982–1986 frame. After that: 21% was biopolicy; 15% ethology, evolution, genetics; 10% focused on the case for biopolitics; 3% represented physiology and neuroscience; 3% were oriented toward research. Finally, metaphor had no examples.

For 1987–1991, the dominant subarea was biopolicy – with 59% of the articles. Physiology/neuroscience accounted for 28%; ethology, evolution, and genetics came in at 7%, as did self-reflection. Biopolicy, as we shall see, remained dominant for some time thereafter. For 1992–1996, most numerous articles were in biopolicy (66%). Ethology and evolution were tied with Physiology and neuroscience at 14% each. Bringing up the rear – methods at 7%. No other category was present during this time. From 1997 to 2002, biopolicy remained

Table 1. Trends in Biopolitics by Subarea.

	1982–1986	1987–1991	1992–1996	1997–2001	2002–2006	2007–2011	2012–2016	2017–2019	Total
Case for biopolitics	4	0	0	0	0	0	0	0	4
Ethology, evolution, genetics	6	2	4	1	10	18	8	9	58
Physiology	0	5	4	1	2	10	5	5	32
Neuroscience	1	3	0	1	1	1	2	4	13
Methods	1	0	2	0	0	0	0	0	3
Biopolicy	8	17	19	22	11	13	15	4	109
Metaphor	0	0	0	0	0	0	0	0	0
Self-reflection	19	2	0	0	0	1	1	0	23
Total	39	29	29	25	24	43	31	22	242

dominant (88% of articles). Physiology/neuroscience was a very distant # 2–8%, followed by Ethology/evolution at an even more distant 4%. No other category was represented.

The time period between 2002 and 2006 marks a turn. Once more, biopolicy was first, with 46% of articles. Ethology/evolution came in second, with 42%, while physiology/neuroscience was last at 13%. From 2007 to 2011, ethology/evolution was first, with 42% followed by biopolicy at 30%. Then physiology/neuroscience registering 26%. There was one article representing self-reflection (2%). As we move to 2012–2016, biopolicy was leading once again at 48%. Then, ethology/evolution followed at 26% and physiology/neuroscience at 23%. Last was self-reflection at 3%. Finally, for 2017–2019 (issue #1), ethology/evolution registered 41% of articles as did physiology/neuroscience. Biopolicy trailed with 18%. No other category was represented.

The findings are straightforward. One way of expressing the totals over time is to count the number of times each field has been represented in the total universe of articles – counting these from 1982 through issue # 1 of 2019. The total column in Table 1 exhibits the counts. Accordingly, 45% of all articles are classified as biopolicy. Next is ethology and evolution (24%) followed by physiology and neuroscience (19%). Self-reflections make up 10% of the total. Other categories are only lightly represented in the count. Over time, biopolicy articles are obviously heavily represented in Politics and the Life Sciences. Later, however, ethology/evolution became more prevalent, as did the physiology/neuroscience category. Based on these trends, we begin to see the hegemony of biopolicy decline between 2002 and 2006.

NOW

Neo-Darwinism

The basic components of neo-Darwinism are surprisingly simple (see Mayr, 1963 for a classical exposition). First, more offspring are born than can survive, creating a struggle or existence, given the limitations on population that any species' environment can support. Second, there are variations among organisms. Some of these variations increase odds of survival and of subsequent reproductive success ("inclusive fitness") whereas others may be more likely to lead to death and reduce the chances for success. Third, the variations leading to increased chances of survival and reproductive success ("natural selection") are transmitted from parent to offspring.

In short, natural selection is the process by which some individuals survive and pass on their characteristic to the next generation. Reproductive success, we should emphasize, is always relative to the challenges posed by environment. Behaviors which further inclusive fitness in one environment may no longer do so, or even be counterproductive should the environment significantly change.

One of the central issues which distinguish those in biopolitics from mainstream political science is the emphasis on the need to understand the evolutionary origins of the behavioral predispositions which *Homo Sapiens* shares with

the other social primates and which significantly affect our political life (de Waal, 2007). Major advances in post-World War II ethology, primatology, and anthropology, as well as in evolutionary theory, made it clear that political scientists should give proper weight to the role played by Nature, as well as by Nurture, in shaping our social and political behavior. There was also increasing agreement that the many behavioral predispositions we share with the other great apes could only be explained by a common evolutionary ancestry as reflected in the nearly identical (circa 98% with the chimpanzees) DNA.

But we have also evolved some striking behavioral tendencies and capacities that seem to be truly unique to our species. For those opposed to Darwinian thinking, these differences provide comforting evidence of an unbridgeable distance between homo sapiens and all other forms of life. Primarily concerned with how and why these behaviors evolved, neo-Darwinian theory takes no stand on that issue.

The most powerful factor shaping *Homo politicus* is our species' genetic legacy as social primates. That legacy, together with socialization, influences almost every aspect of our social, political, economic, and cultural life. Bluntly stated, we are great apes and we share many of the behavioral inclinations of our fellow great apes – gorillas, orangutans, and– to an even greater degree, Pan troglodytes, our closest relative, the chimpanzee.

Over an approximately six-million-year span, the great apes, especially the chimpanzee and humans, evolved the behavioral tendencies and morphology (i.e., physical attributes) they display today. On the one hand, we find superior intelligence, cooperativeness, a moral sense, and altruism. On the other, we find hierarchical social and political structures characterized by dominance and obedience relations, and often staggeringly unequal access to the necessities let alone the luxuries, of life. Mirroring and supporting these hierarchies are an insatiable question for status, a readiness to resort to violence and deception, nepotism, ethnocentrism and xenophobia, to mention a few of their perhaps less laudable tendencies.

Organizational Aspects

Within the context of the organizational aspects of biology and politics, two professional organizations, one journal, and two graduate education centers over time are at the heart of that structure (for greater detail, see Somit & Peterson, 2013; Sprinkle, 2017).

The first formal organization supporting the study of biology and politics was the International Political Science Association (IPSA) Research Committee # 12 (Biology and Politics), one of IPSA's earliest research committees. This designation authorized the research committee to form panels at the triennial (now biennial) meetings of IPSA, providing reliable outlets for scholarly discussion and papers (for a history, see Somit & Peterson, 2013). In addition, IPSA encouraged research committees to form panels at their national professional association (in our case, The American Political Science Association) and even at regional association meetings.

Thomas Wiegele, from Northern Illinois University, officially opened the Association for Politics and the Life Sciences (APLS) in 1981, with the support of his Dean. Before that, a Center for Biosocial Research had been established (under Dr. Wiegele's guidance) in 1977. APLS organized its first array of panels at the American Political Science Association in 1981 (On APLS, see Bonnicksen, 2013; Goetze, 2013; Hines, 1982; Sprinkle, 2017).

By 1982, the journal *Politics and the Life Sciences (PLS)* had been launched. Originally published by Northern Illinois University, then Allen Press, it evolved over the years until 2015, when Cambridge University Press took the reins as publisher. The alliance between *PLS* and Cambridge University Press has raised the visibility of the journal and lent an imprimatur to the Association.

APLS has become a virtual organization. Since 9/11 and the Great Recession, colleges cut back on many expenses – including travel for faculty attending professional meetings. With costs of publishing the journal fairly high and a reduction in a major revenue source (meeting registration fees and membership fees), meetings began to become less robust. With dwindling attendees, meetings moved from annual to whenever a supporting host could be found.

The real key to becoming a virtual organization was a happy arrangement where people downloading articles from the journal would pay a fee and some of that trickled back to the organization and its journal. Though matters had previously appeared bleak, APLS became financially viable (see Sprinkle, 2017 for more detail).

One desirable element in support of a specialization in biology and politics is graduate school training opportunities. The first well defined specialization in biology and politics as part of a political science doctoral degree was at Northern Illinois University. The program was created in the 1980s and – until its end in 2012 – generated a number of doctoral graduates with a specialization in biology and politics who went on to academic careers. It was the first program to offer a structured doctoral education in the subject (see Bonnicksen, 2013; Hannagan, 2011).

Before that, graduate students had to somehow develop a structure to their coursework to facilitate development of a special area in biopolitics. A do it yourself (DIY) program would be devised, using some independent study courses (on genetics for example) and other regularly offered courses in ethology (e.g., primate ethology) and biology (e.g., evolutionary theory). In addition, term papers in standard political science courses facilitated the development of a product that linked biology to the course's subject matter (e.g., political philosophy).

In recent years a fully formed and developed PhD specialty in biopolitics has been established at the University of Nebraska at Lincoln. The University offers a four-course set in biology and politics at the undergraduate level, a specialty in the master's program is available, and – of course – the PhD program. There are two doctoral seminars in the subject. To support research, there is a political physiology lab, fMRI and EEG capabilities as well as psychophysiology and eye tracking equipment. There is a Political Behavior Research Group in which graduate students and faculty meet during the semester to talk about research

projects – including biopolitical efforts. Finally, there is a multidisciplinary lab – Political Attitudes and Cognition. The lab is jointly affiliated with Political Science and the Center for Brain, Biology, and Behavior.

The Current Literature

Evolutionary theory and ethology (the biological study of animal behavior) have provided roots for much research in biopolitics. With that in mind, let us review a few examples. Peter Corning (2012) contends that evolutionary theory has profound policy implications. In this work, Corning argues for a fair society, in which social justice is done. At one point, he observes that: "group selection [evolution taking place at the group rather than individual level] between socially organized and closely cooperating groups seems likely to have provided a favorable selection regime for the emergence of our unique wardrobe of social and moral traits" (Corning, 2012, p. 66). Among these traits are: identification with our "group"; an eagerness to fit in with social norms; concern for the well-being of our particular group; a willingness to be altruistic and to support a sense of justice and fairness. The result of these effects could facilitate the development of a just society. Thus, evolutionary theory carries implications for our understanding of human societies.

Another evolution-based perspective examines why democracy has not been a dominant form of governance over time. Somit and Peterson (1997) seek to explain two apparently contradictory yet well-established political phenomena: First, throughout human history, the vast majority of political societies have been authoritarian. Second, notwithstanding this pattern, from time to time, democracies do emerge and some even have considerable stability. A neo-Darwinian approach can help make sense of these observations. Humans – social primates – have an inborn bias toward authoritarian life, based on their tendency to engage in dominance behavior and the formation of dominance hierarchies. Reinforcing this bias is an impulse toward obedience. These factors are associated with the propensity of humans to accept authoritarian systems.

Nonetheless, the authors argue, conditions of material abundance combined with another human characteristic – indoctrinability – can foster the emergence and maintenance of democracies. Somit and Peterson assert that an understanding of human nature from an evolutionary perspective can help to explain how and why political systems have developed. They conclude by pointing to policy implications that might enhance the odds of formation and continuation of democratic forms of government.

Sullivan and Masters (1988) provide a useful illustration of concepts from ethology – displays, signals from animals to one another that affect social behavior. Their focus is the effect of candidates for president in 1984; their "facial displays" (anger/threat, fear/evasion, and happiness/reassurance) are assayed and then viewers' responses recorded. There has been a long research tradition on, for example, facial displays by primates and their function within groups. Thus, Sullivan and Masters build upon that ethological foundation.

Response to displays was measured in multiple ways: verbal measures of affect and psychophysiological responses to displays (e.g., cheek and brow muscular movement, skin conductance, and heart rate). Displays by one's favored candidate led to more positive verbally expressed emotional responses to displays. Changes in subjects' views toward candidates, for example, appeared more affected by happy/reassuring displays than by standard predictors such as party identification. There is much more to this article, but the preceding provides an illustration of the work.

The work is very suggestive. However, the evolutionary approach, as examples show, is more theoretical than grounded in data. To be convincing, many readers would want to know what the evidence is. Theoretical arguments, of course, can be powerful, providing a takeoff point for subsequent research. But that is one common argument against evolutionary analyses (some have ungenerously referred these as "just so stories"). With respect to the ethological approach? How do the displays actually activate responses? What are underlying processes? It is obvious that displays affect responses to candidates. There is a theoretical literature from ethology; there are also other observational studies. What are the biological mechanisms involved going from stimulus (displays) to response? This is an arena where the promise is great if such issues can be addressed.

An emerging area in political analysis speaks to the effects of genes on political behavior. A number of students of human behavior have addressed this. Two distinct approaches have emerged. First, there is the use of data on molecular genetics as these are associated with sociopolitical behavior. Second, the use of twin studies to assess how much impact genes have on political attitudes and behaviors. We summarize illustrative research for both approaches and also note some of the ongoing debates about these two perspectives.

Boisvert and Vaske note that (2011, p. 168): "Molecular genetics is the study of gene functioning and how individual differences in gene functioning affect one's health, cognitions, and behavior." Databases have been developed that record individuals' genes for certain characteristics. Some of these databases have featured data from about their sociopolitical attitudes and behaviors. Thus, a statistical analysis of the relationship between genes, on the one hand, and political attitudes and behavior, on the other, can be developed.

Fowler and Dawes (2008) use a database to explore the relationship between genes and political party identification and voting. In this instance, they explore the effects of the A2 dopamine receptor gene variation of the DRD2 gene. One could have no A2 alleles, one, or two. The odds of identifying with a party are 1.2 times greater for a person with one allele as compared to someone with none. Just so, an individual with two A2 alleles has 1.4 times the likelihood of being partisan compared to a person with none. Finally, through the effects of the allele on partisanship, there is an indirect effect on voting, as those who are partisans are more likely to vote.

Questions have arisen about this method. At one level, as Charney and English (2012) note, complex behaviors are often affected by many different genes; at the same time a single gene may well be affecting numerous distinct characteristics. They note that over 266 genes are involved in the expression of

aggression in fruit flies (Charney & English, 2012, p. 13). Human sociopolitical behavior is more complex still, so identifying a single gene or two genes that have major roles to play may be overstated.

Twin studies have also generated considerable research. Alford et al. (2005) used twin studies data (the Virginia 30K, or VA30K, for short, and an Australian study) and found that there was a relationship between genetics and political orientations. In short, identical twins (monozygotic) were more similar in their political ideology and a variety of political attitudes than were non-identical twins (dizygotic). The political metrics were limiting, in that they represented a strange set of variables, not using standard political science measures (for example, some measures used: agreement or disagreement with statements about property tax, women's liberation, X-rated movies, modern art, astrology, the draft, and so on). The results, though, are indicative of a genetic component to the dependent variables. Overall, about one third of the variation in political attitudes is due to genes. The results, the authors conclude, suggest a strong genetic component to the dependent variables (see Hibbing, Smith, & Alford, 2014).

There is disagreement over the methods and uses of genetic research in political science. Several chapters in an edited volume by Somit and Peterson (2013) (for a nice survey of literature in which political scientists explore the consequences of genes, see Hannagan, 2011). Charney (2011) points out that the general approach to twin studies has its roots in the early twentieth century. And the understanding of genes has often not changed among those using twin studies.

In fact, of course, our understanding of genes has changed considerably since that time. As a result, questions arise about the use of current models in assessing the impact of genes (for a survey of literature on the general subject, see Ksiazkiewicz & Friesen, 2017).

Neuropolitics is another scholarly focus area. The study of the relationship between brain functioning and political behavior has long been an emphasis in biopolitics. However, much of the earlier oeuvre (before 1990) was theoretical and not data based (e.g., Schubert, 1983; White, 1982).

Currently, an important technique being used to assess the brain's role in political thinking is functional Magnetic Resonance Imaging (fMRl). fMRI is a non-invasive instrument for assessing brain activity. It is used to show how the brain works under different situations. When placed in a strong magnetic field, hydrogen nuclei respond. This technique has been used to study brain responses to political stimulation. Indeed, stories of the linkage between the brain and political thinking have appeared in the mass media (e.g., Mooney, 2013; Westen, Blagoff, Harenski, Kitts, & Hamman, 2006).

One study explored the relationship of brain response to risk-taking and political views (ascertained by party registration information) (Schreiber et al., 2013). The study evaluates whether Republicans and Democrats have different brain responses to risky decision-making (winning a small amount as guaranteed versus winning a larger amount, but with the risk that one will gain nothing). fMRl results suggest that different regions of the brain are activated for Republicans (right amygdala) as compared to Democrats (left posterior insula). These differences in activation accurately predicted the partisanship of 82.9% of

respondents (for other illustrations of using fMRl to study political attitudes, see Schreiber & lacoboni, 2012; Westen et al., 2006). Thus far, studies using neuroimaging are interesting in terms of what we might learn – but there are rather few studies at this time (For summaries of the literature, see such sources as Blank, 2017; Jost, Nam, Amodio, & Van Bevel, 2014; Schreiber, 2017).

In addition, there are methodological problems with the approach. The imaging process is relatively slow, based on blood flow. Neuronal activity is much faster than blood flow, hence something of a mismatch here. Sample sizes are a problem. A rule of thumb is that one should have about 30 subjects. One constraint? Cost. fMRl use costs over $500 per hour at some universities. Hence, without hefty grant support, there is a real constraint on sample size (for more detail and additional issues, see Somit & Peterson, 2017).

Finally, there has been a recent resurgence of psychophysiology as a takeoff point for research in biopolitics (for a detailed analysis of psychophysiology, see Cacioppo, Tassinary, & Berntson, 2017). Schell and Dawson say (2001): "Psychophysiology is the study of the interrelationships between mind and body. Psychophysiologists study primarily human subjects using non-invasive molar physiological responses." A goal, according to a textbook on media and psychophysiology, is to determine what psychophysiological processes mediate between media exposure and its effects (Potter & Bolls, 2012, p. 10). For political science, how do psychophysiological processes mediate political events and affect the individual?

One key element of this niche is the methods used. Among these: cardiac activity, EEG, fMRl, skin conductance, psychophysiological arousal, facial displays, eye blink, verbal measures, and voice stress (see Cacioppo et al., 2017; Potter & Bolls, 2012. For past examples applied to political science, see Schubert, 1988; Schubert, 1997; Sullivan & Masters, 1988).

The recent return to this approach has generated a substantial literature and some marquee publications (e.g., *Journal of Politics*, *Science*). In 2017, four panels on psychophysiology and politics were on the Midwest Political Science Association schedule. APLS sponsored a conference on psychophysiology, cognition, and political differences, held on Montreal in summer, 2019. Finally, a special issue of *Politics and the Life Sciences* is devoted to this subject. Thus, psychophysiology is a current focal point in biopolitics.

The renaissance of psychophysiological study in political science seems slow but steady, with some speed bumps along the way. For instance, Oxley et al. in Science (2008) analyzed a small sample ($N = 46$) to explore psychophysiological responses of subjects to political policy choices to determine if there were a linkage. Findings suggested that reaction to noxious stimuli (as measured by galvanic skin response) differentiated those who chose a more muscular foreign policy as opposed to those who reacted less strongly. However, a more recent essay, to be published in the *Journal of Politics* (Osmundsen, Hendry, Laustsen, Smith, & Peterson, 2022) cannot replicate the results, using larger samples and cross-national data. Indeed, Smith and Warren (2020) note that debates over methods and lack of a strong set of replications are a challenge for the psychophysiology and politics approach.

But despite something of a range in findings, there is abundant evidence that psychophysiological factors can be associated with politics. A meta-analysis of literature by Stewart, Salter, and Mehu (2009) demonstrates consistent findings on effects of facial displays of political candidates (such as anger, threat, happiness, sadness, etc.) on viewers, with several psychophysiological metrics used.

A few examples from the past suggest a long-term interest in the subject. Schwartz and Zill (1971) used observational metrics of psychophysiological arousal. Peterson (1981) used a self-report measure. Both studies found that subjects at a higher level of arousal were more participant in a variety of political activities. Wiegele (1978) used voice stress analysis to examine level of stress among elites in crisis decision making. Schubert, Peterson, Schubert, and Wasby (see summary in G. Schubert, 1997) used psychophysiological measures to study effects of oral argument as related to Supreme Court decision making and debate.

A number of issues need to be addressed. Replication, is, of course, important given mixed findings on one of the signal publications (Oxley et al., 2008). Another question that readers might raise: What is the role of psychophysiology in explaining people's political attitudes and behavior? Independent variable? Intervening variable? The body's response to the ongoing process of political thinking and action? Is there a causal role? An index to be used to predict behavior (as with the Supreme Court study; see G. Schubert, 1997)?

One metric of the effect of a body of research is to ascertain how often practitioners are cited. We used Google Scholar to examine the extent to which a subset of scholars in neuropolitics, genopolitics, and psychophysiology has been represented in the literature. The enumeration was carried out in December 2019. All citations to any biopolitical work that they did were counted. Table 2 provides results.

John Hibbing has been associated primarily with genopolitics and psychophysiology. A count of his citations indicates that his work was mentioned in political science journals and science journals 3,599 times. Christopher Dawes was cited 2,439 times. Darren Schreiber? 671 times. Peter Hatemi showed up 3,194 times. Rose McDermott was widely cited (including an article on testosterone and politics). 2,176 times. Finally, James Fowler was noted 4,921 times. All in all, a striking indicator of the visibility of those working in areas like

Table 2. Illustrative Citations (from Google Scholar).

Scholar	Total Citations
John Hibbing	3,599
Christopher Dawes	2,439
Darren Schreiber	671
Peter Hatemi	3,194
Rose McDermott	2,176
James Fowler	4,921

genopolitics, neuropolitics, psychophysiology, and so on. It is hard to dispute the visibility of biopolitical works in the literature – in political science as well as other disciplinary outlets.

NEXT

We have discussed where biopolitics has been and where it is. Now, a few speculative comments on what might come next. We see six major developments likely to come up in the near and further future.

(1) There has been a rapid increase in quantitative studies. Focal points have been genopolitics, neuropolitics, and psychophysiological studies, to name a few, as we have discussed above. There have also been explorations of hormones in politics (Apicella & Cesarini, 2011; Friesen, Gruszczynski, Smith, & Alford, 2020; McDermott, 2011). Others have used aggregate and individual level data to examine the effects of nutrition and health status on politics (Mattilla, Soderlund, Wass, & Rapeli, 2013; Peterson & Franzese, 2015; Schwartz, Garrison, & Alouf, 1975; Soderland & Rapeli, 2014). Frankly, much of the discipline of political science is oriented to quantitative work. To the extent that biopolitical scholars publish works along these lines, the more persuasive our efforts. This movement seems to be developing some momentum in recent decades.
(2) Biopolitics needs some home departments where students can get an organized, thought-out program of study. DIY doctorates with a specialization are needed, since there will not be enough students with an interest to fill classes in more than a small handful of universities. It is promising that the University of Nebraska at Lincoln has developed such a program. It is regrettable that Northern Illinois lost its program in biopolitics – One headwind? With states cutting back on funding of public universities and the likely aftereffects of COVID-19, will there be the development of any programs besides U of Nebraska-Lincoln? We are not sure that more than two or three such programs could be sustainable. We do think that the increase of junior scholars becoming involved provides hope that there will be fully articulated graduate specializations in biology and politics.
(3) Related to the second point, we are seeing the transition to a third generation of biopolitical scholars. The Founders were the leaders of the movement in the 1960s and 1970s as a new generation began to populate biopolitics – These adherents began to take more leadership positions and become deeply involved in this endeavor. The past decade or so? A third generation is emerging as second gen faculty are retiring. This transition is critical, so that biopolitics can continue into the future with a critical mass of committed scholars. Thus far, this transition appears to be developing nicely.

(4) There is the challenge of synthesizing and coordinating the biopolicy literature. Biopolicy (application of findings and theory from the life sciences to the study of public policy) is an amorphous literature. Some in biopolitics study this. Many who do not even know that there is such a specialization within political science are producing relevant work that may not be attended to by those in this endeavor. We probably ought to devise some way of beginning to synthesize and systematize this vast and unwieldy *oeuvre*. Such an undertaking could bear fruit in pulling a massive literature into some sort of order. And demonstrate the value of taking biology and the life sciences seriously.
(5) We need to move from theorizing big issues to breaking these theoretical arguments down and studying aspects of these – including quantitative studies – to demonstrate the value of such analysis. Earlier, under evolutionary theory/ethology as an area for research, evolution of democracy and evolution as the basis for "the good society" were discussed. But these books tend to be theoretical and not grounded in empirical study. There are, of course, many other such works. Can scholars break the works down and study aspects of these to test the suggestions embedded therein?
(6) Some have contended that biopolitics will have succeeded if it is accepted as one of many perspectives addressing the various subfields within political science – from comparative to international relations to political philosophy to methods to political behavior to public policy and beyond. Thus, biopolitics would no longer be seen as a special, narrow part of political science – but a part of every field in the discipline, integrated into the larger world of the study of politics. There would be room for an organizational structure pulling together practitioners across political science, as we have now with APLS and IPSA's Research Committee # 12. How that structure might evolve if the above scenario occurs is an open issue.

REFLECTIONS

We suggest that biopolitics now has a beachhead within the discipline. A number of indices suggest this:

- Abundant citations of leading biopolitical scholars.
- Acceptance of quantitative biopolitical studies.
- The increasing importance of biopolicy in the current era.
- Establishment of a doctoral program at the University of Nebraska-Lincoln (following up the Northern Illinois initiative).
- The survival of the enterprise as its Founders are no longer directly involved in the enterprise. A second generation emerged in the 1970s through the 1990s and, as they retire, a third generation has emerged. We now see a healthy "circulation of elites" within biopolitics. This has become a cross-generational movement.
- Biopolitics has outlasted systems theory, structural functionalism, and so on.

- The continued operation of two professional organizations in biopolitics (APLS and IPSA's Research Committee #12) and the movement's journal, *Politics and the Life Sciences*, becoming a Cambridge University Press publication provide institutional infrastructure to sustain the "movement."
- The presentation of research in the field at major regional and national meetings and publications in recognized journals within the discipline. Two prior analyses of the status and future of biopolitics have ended on a lugubrious note (Somit, 1972; Somit & Peterson, 1998). Currently? As noted with the metaphor at the outset of this section, biopolitics appears to have established a beachhead within the discipline. One can say that surviving 10 years is not much of an accomplishment. Thirty years? Suggests some staying power? Now, 50 years? Biopolitics has survived and is an ongoing movement many years after its origins. That itself is an accomplishment. Will this momentum continue? Can we expand that beachhead and infuse more biological thinking into the political science discipline? Can these promising signs be sustained?

That judgment must await the next generation's analysis, following up on efforts of the first two generations, to update our first three full-scale critical examinations. It is incumbent upon biopolitics to every so often assess at a macrolevel how well we are doing. We leave that task to our successors.

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POLITICS IN EVOLUTION: THE FIRST 5 MILLION YEARS, AND THE NEXT 100*

Peter A. Corning

ABSTRACT

Politics in human societies represents a variation, and elaboration, on a major evolutionary theme. Political processes have played an important functional role in goal-oriented, cooperative social systems in the natural world. This view of politics is also consistent with a causal theory – known as the Synergism Hypothesis – which explains the rise of complexity in evolution over time and, equally important, the frequent examples of devolution and dissolution. In addition to a brief discussion of this theory, the evolution of political systems in humankind will be described, from its possible origins among our remote australopithecine ancestors to the emergence of complex modern civilizations. Now, however, we confront an existential threat to our species, and to many others, due mainly to climate change. The future is very problematic. I will argue here that the only viable path going forward is a new social contract coupled with (democratic) global governance – a global "superorganism."

*A portion of this chapter is taken from of my chapter on "The Evolution of Politics: A Biological Approach," that appeared in Steven A. Peterson and Albert Somit (Eds.), *Handbook of Biology and Politics*, Cheltenham: Edward Elgar Publishing, Ltd., 2017. Additional material on defining politics and the cybernetic model of politics, as well as additional references, have been excised due to space constraints. More can be found among the author's previous publications (see http://complexsystems.org).

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INTRODUCTION: DEFINING POLITICS

Political behaviors and the rudiments of what we call "political systems" have a very deep history that predates even the evolution of our species. I believe this important aspect of contemporary human societies can be illuminated and informed in new and insightful ways by adopting a biological and evolutionary perspective.

We begin with the problem of how to define politics. It is possible to identify two distinct "schools" among the plethora of alternatives that can be found in the political science literature. What is often referred to as the "idealist" (or "holist") model of politics is identified with a collective purpose and the concept of a "public interest." And what is frequently called the "realist" model is power-oriented and associated with the pursuit of personal or partisan self-interest.

A new chapter in this ancient debate opened with the emergence of the science of ethology – the study of animal behavior – in the 1950s–1970s. It included the publication of various ethologically grounded books by Nikolaas Tinbergen (1951), Raymond Dart (1959), Konrad Lorenz (1966), Robert Ardrey (1966, 1976), Desmond Morris (1967), Irenäus Eibl-Eibesfeldt (1975), and others. This was accompanied by the rise of the biopolitics movement, predominately but not exclusively in political science (see especially Alexander, 1974, 1979; Corning, 1971, 1974, 1983; Masters, 1975, 1983, 1989; Schubert, 1981; Somit, 1968, 1976; Tiger & Fox, 1971; White, 1981; Wiegele, 1979; Willhoite, 1976, 1981; also, Losco & Somit, 1992; Somit & Peterson, 1991–2012; Somit, Peterson, Richardson, & Goldfischer, 1980). Somewhat later there was also the emergence of the discipline of sociobiology (Wilson, 1975) and the more human-oriented sub-discipline of evolutionary psychology (see the overview in Buss, 2005).

An ethologically oriented debate over the nature of politics and its role in human societies was initiated by anthropologists Lionel Tiger and Robin Fox in their provocative popularization, *The Imperial Animal* (1971). However, a more systematic case for the proposition that human politics is related to dominance behaviors in other animal species was developed in a succession of works by the primatologist Frans de Waal, beginning with his *Chimpanzee Politics: Power and Sex Among Apes* (1982) (see also Harcourt & de Waal, 1992; de Waal, 1989, 1996, 2001, 2006; cf., Somit & Peterson, 1997). Drawing on his own extensive research in captive chimpanzees, along with the many long-term field studies of these animals, de Waal offered us a deeper, richer perspective on the issue. The struggle for power and influence is ubiquitous among these animals, de Waal acknowledged. From the motivational perspective of the animals, this may well be an end in itself. And, yes, the dominant animals may gain advantages in terms of such things as nesting sites and breeding privileges. But there is much more to dominance behaviors than this. The competition for status very often involves coalitions and alliances; it is often a group process rather than an individualistic, Hobbesian "war."

Moreover, there is much evidence that social constraints on dominance behaviors are common, both in these and other social animals. Coalitions

sometimes form to thwart the actions of a dominant animal. And in bonobos (or pygmy chimpanzees), a loose female hierarchy seems to form the organizational backbone of the group; females often band together to constrain an aggressive male (de Waal, 1997). Indeed, similar constraining behaviors are universal in small-scale human hunter-gatherer societies. Anthropologist Christopher Boehm (1993, 1997, 1999), characterizes it as a "reverse dominance hierarchy" and refers to it as an "egalitarian syndrome." And, in an important co-authored paper, economist Herbert Gintis, and anthropologists Carel van Schaik and Boehm (2015), jointly proposed that an egalitarian political structure, with a more consensual leadership pattern, arose at a very early date in human evolution, as a result of the need for intense social cooperation. (I will return to this hypothesis below.)

In sum, a biological perspective suggests that both the holistic (idealist) model of politics and the egoistic (realist) model have some validity; they are not mutually exclusive. As de Waal (1996, pp. 9, 102) points out, we also need to ask: "what's in it for the subordinate?" His answer: "The advantages of group life can be manifold…. increased chances to find food, defense against predators, and strength in numbers against competitors…. Each member contributes to and benefits from the group, although not necessarily equally or at the same time… Each society is more than the sum of its parts." In other words, cooperative social groups may produce mutually beneficial synergies. (I will return to this key point as well.)

Accordingly, in this more "balanced" version of the biological paradigm, dominance behaviors may take on the functional attributes of leadership, and this may also provide a framework for organizing various cooperative activities, including collective actions or a division (combination) of labor (see Corning, 1983, 1987, 1996a, 1996b, 2003, 2005, 2018; cf., Grady & McGuire, 1999; Masters, 1989; Somit & Peterson, 1997; also Axelrod, 1984; Axelrod & Hamilton, 1981; Gintis et al., 2015; Ostrom, 1990; Rubin, 2002). Such organized "political systems" are characterized by overarching collective goals, decision-making, collaborative efforts, interpersonal communications, social control processes and "feedback". In short, political systems are cybernetic systems. (For an elaboration on the cybernetic model of politics, see Corning, 2017a.)

THE SYNERGISM HYPOTHESIS

The recent liberation of sociobiology and evolutionary psychology – not to mention social and political theory in general – from the constraints of inclusive fitness theory (see Corning, 2018) have created a more favorable climate for a causal theory of socio-political evolution that is focused on the "bioeconomics" of the evolutionary process (and on the actions of the fully-developed "phenotype" rather than the genes). In essence, the Synergism Hypothesis involves an economic theory of complexity in evolution. (The theory was first proposed in Corning, 1983, but the theoretical environment was not then propitious; the dominant Modern Synthesis paradigm in evolutionary theory in those days was

reductionist and gene focused. It has since been explicated and elaborated in Corning, 2003, 2005, 2017a, 2018, as well as in various peer-reviewed journal articles.) But times have changed.

The well-known biologist Richard Michod (1999) has observed that "cooperation is now seen as the primary creative force behind ever greater levels of complexity and organization in all of biology" (p. xi). And Martin Nowak (2011) has called cooperation "the master architect of evolution." However, it is not cooperation per se that has been the "creative force" or the "architect." Rather, it is the functional consequences or effects produced by cooperation that are the key. And these in turn are shaped by various kinds of *functional synergy*.

Very broadly, synergy refers to the combined (cooperative) effects that arise from the relationships and interactions among various forces, particles, elements, parts, genomes, individuals, or groups in a given context – *effects that are not otherwise attainable*. The term is derived from the Greek word *synergos*, meaning "working together" or, literally, "co-operating." Synergy is often associated with the cliché "The whole is greater than the sum of its parts," which dates back to Aristotle in the *Metaphysics* (1961/ca. 350 BC), but this is actually a rather narrow and even misleading characterization. In fact, synergy comes in many different forms. Sometimes wholes are not greater than the sum of their parts, just different. Thus defined, synergy is strictly a functional term, and the benefits and/or costs for the various "parts" must be separately determined.

What I refer to as the Synergism Hypothesis (Corning, 1983, 1996b, 2003, 2005, 2013a, 2013b, 2017a, 2018; Corning & Szathmáry, 2015; see also Maynard Smith & Szathmáry, 1995, 1999) is based on a fundamental characteristic of the material world, namely, the fact that things in various combinations – sometimes with others of like kind and sometimes with very different kinds of things – have been a prodigious generator of evolutionary novelties over time. Moreover, these novel "cooperative effects" (synergies) have, over the past 3.5 billion years or so, produced at every level of life distinct, irreducible "higher levels" of "emergent" causation and action whose constituent "parts" have been extravagantly favored by natural selection. Indeed, in many instances these emergent "wholes" have themselves become parts of yet another new level of combined effects, as synergy begat more synergy. An obvious example is eukaryotic cells, which are composed of many specialized internal "organelles" and can be 10,000 or more times larger than bacteria. These cells serve as essential building blocks for all complex multicellular organisms. (For a history and critical analysis of what has been termed "emergence theory," see Corning, 2002.)

The formal hypothesis is that synergistic effects of various kinds have been a major causal agency and a key source of creativity in the evolution of cooperation and complexity at all levels in living systems. The Synergism Hypothesis posits that it has been the functional (selective) advantages associated with various forms of synergy that have undergirded the evolution of complex, functionally organized biological and social systems over time; the synergies have been the drivers. In other words, underlying each of the many particular steps in the "complexification" process, a common functional principle has been at work. John Maynard Smith (1982, 1983) characterized (and modeled) this dynamic as

"synergistic selection." (For up-to-date reviews of this theory, see Corning, 2017a, 2018; Corning & Szathmáry, 2015.)

EXPLAINING POLITICAL EVOLUTION

An important test for the Synergism Hypothesis and the cybernetic model of politics is how well it fits the growing body of evidence – across a number of disciplines – regarding the evolution of humankind. Because this issue is discussed in some detail in Corning (2003, 2005, 2017a, 2018), here I will be brief. The underlying thesis, first articulated in *The Synergism Hypothesis* (1983), is that there was no prime mover in human evolution. Rather, the process was propelled by proximate *behavioral* innovations and choices; the common thread was various forms of cooperation and functional synergy with significant (economic and political) "payoffs" for the immediate problems of survival and reproduction.

As described in detail in my recent book, *Synergistic Selection: How Cooperation Has Shaped Evolution and the Rise of Humankind* (Corning, 2018), there have been three keys to our ancestors' extraordinary success over time: close social cooperation, adaptive innovation, and various forms of synergy. Our remote bipedal ancestors, the australopithecines, were relatively small (about three feet tall) and slow-moving. They could not have survived the harsh physical challenges involved in living on the ground, nor could they have held their own against the many large predators in their East African environment in those days – such as the pack-hunting *Palhyaena* – without foraging together in closely cooperative groups and defending themselves collectively with the tools that they invented for procuring food, and for self-defense (probably digging sticks that doubled as clubs, and perhaps thrown rocks). The result was a game-changing synergy – cooperative outcomes that could not otherwise have been achieved.

The two other major transitions in the multi-million-year history of our evolution as a species followed this same basic formula. Cooperation and innovation were the underlying themes, and the synergies that were produced (the functional benefits) were the reason why our ancestors cooperated and survived. Thus, the emergence of the much larger and bigger-brained *Homo erectus* some 2 million years ago was a product of a synergistic joint venture, namely, the hunting of big game animals in closely cooperating groups with the aid of an array of potent new tools – finely balanced throwing spears, hand axes, cutting tools, carriers, and (eventually) fire and cooking. Not to mention (quite likely) sequestered home bases, midwifery, and the first baby-sitting cooperatives. It was a collective survival enterprise, a superorganism – like the leaf cutter ants – and it was sustained by multiple synergies. True, there was a major "ecological opportunity," but our ancestors devised the means for being able to exploit it.

The final emergence of modern humankind, perhaps as early as 300,000 years ago, represented a further elaboration of this collective survival strategy; it was novel economic synergies that enabled the evolution of much larger groups. Each "tribe" was, in effect, a coalition of many biological families that was sustained by a sophisticated array of new technologies – shelters, clothing, food processing,

food preservation and storage techniques, and much else. Especially important were the more efficient new hunting and gathering tools, like spear throwers (which greatly increased their range and accuracy), bows and arrows, nets, traps, and a variety of fishing techniques. Indeed, culture itself (including spoken language) became a powerful engine of cumulative evolutionary change. Our collective survival enterprise – our superorganism – became an autocatalytic engine of growth and innovation (and environmental disruption) as synergy begat more synergy. (Some anthropologists have invoked the idea of culture as a "collective brain.") (see also Richerson, Gavrilets, & de Waal, 2021; Whiten, 2021)

But most important for our purpose, there is much evidence that these adaptive social behaviors and technological innovations preceded by many generations the anatomical changes that paleoanthropologists have used to define the major phases of our anatomical evolution as a species. In other words, over the course of several million years, the human species in effect invented itself through an entrepreneurial process involving gradual cultural innovations that changed our ancestors' relationship to the environment – and to one another. And these changes, in turn, led to the natural selection of supportive anatomical and psychological traits. As biologist Jonathan Kingdon (1993) put it in the title of his insightful book on this subject, we are the *Self-Made Man*.

THE EMERGENCE OF "LEADERSHIP"

As noted earlier, Herbert Gintis et al. (2015) have proposed that the combination of intense social cooperation and interdependence, plus weapons that "equalized" the power relationships among the participants, resulted in a more egalitarian political structure with a more consensual "leadership" pattern at a very early date in human evolution. These authors identify this shift with the emergence of cooperative big game hunting and confrontational scavenging in *Homo erectus*, perhaps 2 million years ago.

However, I believe a case can be made for a much earlier behavioral shift. The intense social interdependence associated with a cooperative foraging strategy in australopithecines, and the evidence for tool use and meat consumption that dates back some 3.3 million years, suggests that the origins of this "political" change may go back to these earlier hominins. Indeed, bonobos, baboons, and other species sometimes also display more "democratic" social decision-making processes (Boehm, 1996; Conradt & Roper, 2003; Kummer, 1968; de Waal, 1997). Big game hunting/scavenging with weapons may have been a facilitator, but it was not a prerequisite. Collective social action – a "reverse dominance hierarchy" (sensu Boehm) – may have been a more important "check" on dominance behaviors than weapons.

SYNERGY GOES TO WAR

A brief comment is in order here about the role of collective violence and "warfare" in human evolution. It is important to emphasize that warfare and

other forms of political violence in human societies are in fact another variation on a widespread theme in the natural world. As argued in Corning (2007), the Synergism Hypothesis also applies to the use of collective violence for various purposes, whether for predation, defense against predators, the acquisition of needed resources (food patches, nest-sites, water supplies, raw materials, territories, even mates), and the defense of these resources against other groups and species. Among other things, there have been (1) synergies of scale, (2) cost and risk sharing, (3) a division ("combination") of labor, (4) functional complementarities, (5) information sharing and collective "intelligence," and (6) tool and technology "symbiosis".

Many examples of collective violence can be seen in the natural world – from predatory bacteria like *Myxococcus xanthus* to social insects like the predatory army ants (*Eciton burchelli*) and the colonial raiders *Messor pergandei*, mobbing birds like the common raven (*Corvus corax*), cooperative pack-hunting mammals like wolves, wild dogs, hyenas, and lions, coalitions of mate-seeking and mate-guarding male dolphins, the well-armed troops of savanna baboons (with their formidable canines), and, closest to humans, the group-hunting, group-raiding and even "warring" communities of chimpanzees (reviewed in Corning, 2007). Equally significant, there is reason to believe that various forms of collective violence were of vital importance to our own ancestors' transition, over several million years, from an arboreal, frugivorous, mostly quadrupedal ape to a world-traveling, omnivorous, large-brained, tool-dependent, loquacious biped.

This does not mean that humans are, after all, "killer apes" with a reflexive blood lust or a war-seeking "drive." The biological, psychological and cultural underpinnings of collective violence are far more subtle and complex. Most important, the incidence of collective violence – in nature and human societies alike – is greatly influenced by synergies of various kinds, which shape the "bioeconomic" benefits, costs and risks. Synergy is a necessary (but not sufficient) causal agency. Though there are notable exceptions (and some significant qualifiers), collective violence is, by and large, an evolved, synergy-driven instrumentality in humankind, not a mindless instinct or a reproductive strategy run amok (see Corning, 2007, 2018; Shaw & Wong, 1989).

THE EVOLUTION OF COMPLEX SOCIETIES

The explosive rise of more complex, technologically sophisticated "modern" human societies since the Paleolithic has inspired many prime mover theories over the years (for detailed reviews, see Corning, 1983, 2003, 2005). The earliest theory was associated (initially) with the renowned nineteenth century polymath Herbert Spencer (1852–1857), who identified several causal factors but singled out the pressure of population growth as the "proximate cause of progress." More recently, the population pressure theory has been associated with

anthropologists Esther Boserup (1965), Don Dumond (1965), and, especially, Mark Nathan Cohen (1977).

Another popular theory involves the claim that the so-called "agricultural revolution" was the catalyst that led to the rise of complex civilization (Childe, 1936; see also Diamond, 1997). Technological innovation has also been singled out as a prime mover by many theorists, starting with Spencer but more famously with Karl Marx, and others since. Yet another prime mover theory is based on the Spencerian notion that societal progress is closely associated with the ability to harness and control energy. Anthropologist Leslie White (1949, 1959) expanded on this idea and developed what he called the "Basic Law of Evolution" – "Culture advances as the amount of energy harnessed per capita per year increases, or as the efficiency or economy of the means of controlling energy is increased, or both" (White, 1959, p. 56).

Finally, "social conflict" (internal or external) has frequently been touted as the "engine" of cultural evolution, and there is certainly good reason to believe that violent confrontations between human groups have ancient roots (as noted above). But many theorists have claimed that warfare also accounts for the evolution of modern "civilization" – from simple hunter-gatherers to advanced nation-states. Darwin, Spencer and a host of Social Darwinists stressed the role of social conflict to varying degrees, but some theorists have gone much further. They attribute cultural evolution to the overriding influence of our supposed "aggressive and acquisitive instincts." Sir Arthur Keith, in his *A New Theory of Human Evolution* (1949), was probably the first and least-known theorist of this genre, while the writings of Konrad Lorenz (1966), Robert Ardrey (1966, 1976), and Robert Bigelow (1969), among others, caused something of a furor in the latter 1960s and 1970s. (Some, like Bigelow, stressed the complementary role of cooperation as well.)

The well-known biologist Richard Alexander (1979) took perhaps the strongest position on this issue. In his so-called "balance of power" scenario, Alexander saw the process of cultural evolution as being driven by competition between human groups, which he viewed in turn as an expression of inclusive fitness maximizing behavior. In other words, it was a form of reproductive competition by other means.

Another conflict theory of political evolution, proposed by anthropologist Robert Carneiro (1970), is more subtle (it relies on a functional argument rather than a presumed instinctual urge), but it too was monolithic. "Force, and not enlightened self-interest, is the mechanism by which political evolution has led, step by step, from autonomous villages to states," Carneiro asserted. Though state-level political systems were invented independently several times, he claimed that warfare was in every case the prime mover. However, Carneiro's prime mover had a prime mover of its own. He proposed that the "mechanism" [*sic*] of warfare is a response to an underlying dynamic that he called "environmental circumscription" – a situation in which a population is ecologically constrained by mountains, deserts, limited resources, or even by other human populations.

THE SYNERGISM HYPOTHESIS REVISITED

The main problem with prime mover theories is that they don't work – as single-factor theories. They may highlight important influences, but they are manifestly inadequate – perhaps necessary but certainly not sufficient – to explain cultural evolution. This is especially apparent when you begin to ask historical questions. Why did a particular "breakthrough" happen when and where it did? And why not at some other time or place? Nor can prime mover theories account for the manifest influence of other important "movers" – other necessary factors. But more important, societies do not change in some automatic way or follow a unilinear path. Often the path leads in unexpected directions, or even downhill. Indeed, prime mover theories are at a loss to explain political devolution and dissolution. (For a more extended rebuttal, see Corning, 2003, 2007.)

I believe, in other words, that the Synergism Hypothesis is also applicable to the ongoing process of cultural evolution in complex societies. There is nothing predestined about this process, any more than there is a deterministic directionality in biological evolution itself. Moreover, each succeeding generation in effect reevaluates the technologies and socio-political institutions and practices that it inherits (including the use of collective violence). A given technology/practice is sustained over time by a cultural analogue of what is known in population genetics as "stabilizing selection," just as various functional changes over time are products of "directional selection" within and across each new generation of users. By the same token, the many cases in which an older technology/practice is supplanted could be likened to adverse selection in nature. Thus, a society that was once war-like might radically change its survival strategy, as did Germany and Japan after World War II. In any case, cultural (and political) evolution is always a synergistic process.

However, as Richerson and Boyd (1999) have pointed out, synergy is not enough to account for our recent cultural evolution. Large-scale societies also require "workarounds" to compensate for the lack of the face-to-face social influences that facilitate cooperation and constrain anti-social behaviors in small groups. (On this point, see also Boehm, 1993, 1997, 1999; de Waal, 1996.) In comparison with, say, army ants or small hunter-gatherer societies, Richerson and Boyd argue, a large, complex human society is at best a "crude superorganism." It is sustained by what the game theorists, behavioral economists and others call "strong reciprocity."

The political workarounds that human societies have invented are many. They include such things as ruling councils, law codes, legislatures and representative governments, electoral systems, an independent judiciary, a free press, bureaucracies, police forces, and much more. These and other political/cybernetic practices and institutions have evolved over the last 11,000 years (or more) through a process of trial-and-success (to borrow a term from paleontologist George Gaylord Simpson). As human societies have grown in size and complexity, many new political (cybernetic) challenges have arisen. Thus, political evolution has closely tracked the larger process of societal evolution. (The evidence on behalf of this theory was developed and presented in considerable

detail in Corning, 1983; updates can also be found in Corning, 1987, 1996a, 2003, 2005, 2017a, 2018.) Three full-length treatments of this process by archeologists can be found in Fagan (1998), Maisels (1999), and Trigger (2003). Another still useful classic is Cohen and Service (1978). But compare the analyses of economist Douglass North (1973, 2005). Especially important is the recent article by Richerson et al. (2021), which traces our modern perspective on the role of cultural evolution back to Darwin's *The Descent of Man*.

THE FUTURE OF POLITICS

In my forthcoming new book. "Superorganism: A New Social Contract for a Species in Peril" (Corning, Forthcoming), I develop a possible scenario for the future of our species if we remain on our present course as a deeply divided and competitive set of countries that are focused on their own narrow self-interests. The recent surge in polarizing nationalism and the rising tide of conflicts between various countries is especially disturbing. (Witness the war in the Ukraine.) Not to mention the recent extreme weather events. Our global civilization has failed, on the whole, to respond effectively to our growing survival crisis. Whether we are aware of it or not, we are intensely interdependent and have a shared fate. We are all participants in an emerging global superorganism where close cooperation is vitally important. However, our collective fate is now in real jeopardy. A hangman's noose is tightening around the neck of the human species. It's a doomsday rope with several deadly strands (see Brown, 2011; Ehrlich & Ehrlich, 2012; Frase, 2016; Greer, 2016; Hansen, 2009; McKibbon, 2019; Nesbit, 2018; Rich, 2019; Scranton, 2018; Wallace-Wells, 2019).

One of these strands, quite obviously, is global warming and accelerating climate change. Climate warming is already causing lethal mischief to the environment and to our species in various ways. Droughts, floods, tsunamis, and hurricanes, for instance, are age-old threats, but they have become much bigger and more frequent. Killer heat waves will have a devastating effect on our food production, and rampant wildfires will consume our vital forests. A recent report from a United Nations' panel on climate change, the Intergovernmental Panel on Climate Change (IPCC), warned that we have only a decade left to make drastic reductions in our greenhouse gas emissions. The response to date has been nothing short of alarming (see also Berg, 2018; Bremmer, 2018; Markham, 2018; Mooney, 2019; Nolan et al., 2018).

Another major threat is a global food system that is already seriously eroding – with declining topsoil, severely depleted irrigation water supplies, and shrinking fisheries, among other things. Even now, perhaps 15% of the world's population are not properly fed. (The estimates range up to 1 billion people.) (See Ehrlich & Harte, 2015; Flavelle, 2019; Little, 2019.) This, too, is likely to get much worse, along with growing shortages of fresh water and an increasing potential for water wars between neighboring countries (Goodell, 2018; Lu & Flavelle, 2019; Mooney, 2019). Our global fresh-water challenges are detailed in another recent UN report (UNESCO, 2020).

A third major threat is our relentlessly increasing global population, now closing in on 8 billion people and projected to grow to an estimated 11 billion by 2100, an increase of nearly 40% if it's not checked. This trend could become a self-inflicted Malthusian disaster. And this says nothing about rising sea levels, where the worst-case scenarios predict that many of world's major cities may be under water – or become sea-walled fortresses – well before the end of this century. Many of them – like Venice in 2019 – are already having serious flooding problems (see Mooney, 2019; Pierre-Louis, 2018; Ward, 2002).

Then there is our capitalist economic system, with ever-increasing extremes of concentrated wealth at the very top and widespread poverty among the rest of the population. With some notable exceptions, the world's economies are falling short, or even failing, in their primary obligation to provide for the basic needs of their citizens. Add to this the current gridlock of governmental dysfunction, endemic corruption, failed states, self-serving authoritarian leaders, renewed big power rivalries, and, not least, a polarized and increasingly angry global population that is awash in destructive weapons (see Chayes, 2015; Felber, 2015; Heinberg, 2011; Inglehart, 2018; Monbiot, 2017; Streeck, 2016).

And this is only the short list. You could call it negative synergy. The liberal, democratic world order that was created after World War II seems to be unraveling, and the threat of virulent nationalism and lethal global conflict seems to be growing, as illustrated by the war in the Ukraine.

However, there is an alternative. We still have a chance to make a bold positive choice going forward. We must seize the opportunity that still exists to create a sustainable global society based on cooperation and mutually beneficial interdependence – a global superorganism with global governance. However, this in turn will require the replacement of an individualistic, competitive (nationalistic) social ethic with new social and political values and a sublimation of our global economic system to the ancient principle of the "common good" (see Ostrom, 1990). In other words, we must reverse the ominous present trend toward increased division and conflict in world politics and economics.

The fate of our species is truly at stake. We face a collective choice like none other in our long, multi-million-year history (and pre-history) as a ground-dwelling bipedal ape. Will we act for the common good as a species or will we descend into a "war of each against all" (or each nation against all) as the philosopher Thomas Hobbes long ago warned us? Perverse as it may seem, the greatest threat we may face is each other – and a regression into tribalism and violent conflict. As noted above, collective violence has long been a part of our problem-solving "toolkit" as a species. We now face the very real prospect of an era of global conflict and "climate wars." Or worse.

Equally important, the challenges we face going forward will very often transcend national borders – from mega-droughts to lethal disease epidemics and the hordes of climate refugees. One recent estimate, in the updated 2021 Groundswell report from the World Bank, projects a climate refugee total of up to 216 million over the next 30 years. Another new study in 2019 by Climate Central, a science research organization, predicts that 150 million people (or more in a worst-case scenario) might need to evacuate from low-lying cities that

will be underwater by 2050 due to rising sea levels. Even more disturbing is a new environmental model developed by a global team of researchers, which projects that within the next 30 years the number of people without sufficient food and water could number in the billions. These unprecedented life-and-death challenges will overwhelm the ability of most countries to deal with them unaided. They pose unimaginable humanitarian, security, and military threats.

We have only two paths available to us going forward. We must either create a more effective global superorganism (with collective, global governance) or else our species will very likely be convulsed by mass starvation, waves of desperate migrants, lethal social conflict, and perhaps even devolve and go all but extinct. There is no stand-pat, status quo option, I believe. Only an organized process of major social, economic, and political change on a global scale offers us genuine reason for long-term hope. It would be transformative for our species, and it would be unprecedented in the history of life on Earth. Our species is already unique in many ways, but now we need to take the next step. In my forthcoming book, *Superorganism: A New Social Contract for a Species in Peril* (Corning, 2022), I outline a master plan and provide a roadmap for a new, more legitimate and sustainable economic and political world order. A brief summary of this roadmap follows in the next section.

A FUTURE FOR HOPE?

To a biologist, the basic, continuing, inescapable challenge for all living organisms is survival and reproduction. Life is quintessentially a "survival enterprise," and every organized cooperative society, whether it be in social insects or humankind, is at bottom a "collective survival enterprise." Whatever may be our aspirations, or our illusions (or our economic status, for that matter), the fundamental purpose of a human society is to provide for the basic biological needs of its members, and of the society as a whole over time. Biological survival is a prerequisite for any other, more exalted objectives. Our basic survival needs – some 14 categories in all – define the priorities for every human society, and they are at the core of what we mean by the "common good" and the "public interest."

It is this fundamental biological reality – and our growing interdependence – that must guide how we respond to our global crisis. We are at a tipping point as a species, but it is a crisis of our own making and, fortunately, we also have many resources at our disposal for how to deal with it. If we follow the proven pathway of cooperation, innovation, and creating new synergies, there is every reason to hope that we can make the necessary changes and build a sustainable global society for the long term – a truly global superorganism.

But this will require a new level of social cooperation that transcends what we have already achieved as a species. Indeed, it will require a reversal of the ominous current trend toward nationalistic rivalries and increasing social conflict. And this, in turn, will depend on reciprocity and fairness. Social justice is an essential enabler; there has never been sustained (voluntary) cooperation in humankind without it.

There are, in fact, three distinct fairness principles that play a vitally important role in our social relationships. They represent the goal posts, so to speak, for achieving a legitimate and fair society. These principles are (1) *equality* with respect to providing for our basic survival needs; (2) *equity* with respect to merit, or "giving every man his due," as Plato (1946/380 BC) put it in his great treatise on social justice, the *Republic*; and (3) *reciprocity*, or paying back for the benefits we receive from others, and from society.

As I discuss in an earlier book, *The Fair Society: The Science of Human Nature and the Pursuit of Social Justice* (Corning, 2011), these three fairness principles – *equality, equity* and *reciprocity* – must be bundled together and balanced in order to achieve a stable and relatively harmonious social order. It could be likened to a three-legged-stool. All three legs are equally essential. Together they form the framework for what could be called a "biosocial contract" (see also Corning, 2017b). But this must include a "basic needs guarantee." So, in addition to what we must do to meet our overarching survival crisis, a new social contract is essential to global stability/security, and it will require a broad array of economic and political/policy changes.

If we hope to achieve a new major transition in human evolution, I believe it will require global cooperation and self-governance for the common good, along with many local initiatives and changes in every individual country. New global agencies and new programs, along with greatly increased financial resources, will be needed to deal effectively with our environmental crisis, as well as investing in a major upgrade to our global infrastructure and responding to the ever-increasing menace of massive, prolonged climate disasters. I have proposed an upgrade of the machinery and governing authority of the United Nations, plus a new U.N. Global Infrastructure Fund and a Global Emergency Management Agency, along with adequate funding. In addition, we must rein in our capitalist economic system and subordinate it to the common good. Free market capitalism has made many contributions, but it must be enlisted – to a much greater degree – to be a part of the solution, as the Microsoft co-founder and philanthropist Bill Gates (2021) argues in depth his important new book, *How to Avoid a Climate Disaster*. (See also Ackerman & Alstott, 1999; Kelly, Kelly, & Gamble, 1997.) And all of this must be accompanied by broad political reforms. Effective governance on behalf of the ancient principle of the "public trust" is a key part of the solution (see Brown, 1994; Wood, 2014).

The task we face is comparable to how the United States mobilized an all-out war effort in just a few short months after the bombing of Pearl Harbor in December 1941. We now confront a global Pearl Harbor – a vastly larger and more complicated set of challenges, with much higher stakes. Radical changes are needed – a global mobilization. Yet many of the people who hold the power and resources needed to make these changes have not yet heard the bombs dropping, so it seems. Many of them have been lulled by our prolonged period of economic growth and sky-high stock market prices. Or by technological progress in solar power and electric cars. Or blind faith in technology. Or ideological mind-traps. Or naked self-interest. Many of these naysayers still reject the very idea of a global emergency, despite the ever-increasing evidence.

It is vitally important for all of us to become aroused and support this effort, and there are some hopeful signs that this may be happening. Especially inspiring is the youth-led climate action movement. However, it is equally important to persuade the world's leaders, the ruling classes, and power elites in various countries that it is in their own (enlightened) self-interest, as well as being a moral imperative of the highest order, to lead the way forward – starting now. Our elites must become the guardians of the greater good. In other words, the future will depend on both a bottom up and a top-down transformation. All this social change is obviously a very tall order. The skeptics will respond that it's much too tall. Totally unrealistic. Even utopian. But just listen to those falling bombs. Feel the tightening hangman's noose. Consider the likely alternative.

A CONCLUSION, AND A BEGINNING?

In the summer of 2018, America's premier scientific journal, *Science*, published an unprecedented series of papers, under the heading "Tomorrow's Earth," on how to deal with our multi-leveled environmental crisis. In the lead-off article for this series, the author (Berg, 2018) wrote: "Today, global human society stands at a decision point. Business-as-usual approaches are likely to lead to catastrophic changes to our planet and our health and well-being. What will it take for universal recognition of our perilous position, and how can we begin to make the often-difficult changes required to live in a more sustainable, cooperative, and compassionate way?"

Especially disturbing was the scenario published a month later by an international team of climate scientists in the prestigious *Proceedings of the National Academy of Sciences*. These scientists warned that, if we continue polluting the atmosphere as we are now doing, there is the possibility of a future "Hothouse Earth" driven by a vicious circle of runaway climate warming feedbacks. It was termed a "doom loop." If this should happen, much of the Earth could become literally uninhabitable before the end of this century. While admittedly speculative, this scenario underscores the peril that lies ahead.

Equally alarming, IPCC, composed of 90 of the world's leading climate scientists, issued a dire report near the end of 2018 calling for "rapid, far-reaching and unprecedented changes in all aspects of society" to avoid a climate catastrophe. There must be a 45% drop in greenhouse gas emissions from 2010 levels by 2030 and "net zero" by 2050 in order to keep global warming below the critical threshold of 1.5^0 Celsius, the report concluded. A separate report co-authored by 13 US government agencies a few weeks later warned of the dark consequences for this country as well, and we are already seeing some of the evidence in raging wildfires, massive floods, tornadoes, hurricanes, and heat waves.

A dire warning of a "climate emergency" was also published late in 2019 by more than 11,200 scientists in 153 countries in an article for the journal *BioScience*: "The climate crisis has arrived and is accelerating faster than most

scientists expected. It is more severe than anticipated, threatening natural ecosystems and the fate of humanity."

Finally, U.N. Secretary-General António Guterres, in an important speech in late 2020 entitled "The State of the Planet," warned that "we must act more broadly, more holistically, across many fronts, to secure the health of our planet on which all life depends… Now is the time to transform humankind's relationship with the natural world – and with each other. And we must do so together …Solidarity is survival… Let's learn [this] lesson and change course for the pivotal period ahead."

I believe we have a path forward. It leads to a new social contract and an effective (democratic) system of global governance that can act on behalf of the public trust. Now we must find the collective will to choose this path. To paraphrase Benjamin Franklin, either we will survive together, or we will go extinct separately.

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THE REMERGING FOUNDATIONS OF A BIOPOLITICAL SCIENCE

Kenneth C. Blanchard Jr.

ABSTRACT

Aristotle's Politics provides an example of what a biopolitical science might look like. Three key elements stand out: (1) an account of political structure as a multilevel society including kin and non-kin relationships; (2) an account of the human species that includes comparison with other social species that are capable of coordinated action; and (3) an emphasis on the human capacity to understand and communicate moral rules. Over the last 50 years, a number of research programs in evolutionary anthropology have provided the basis for a biopolitical science that maps onto the elements above. Schultz, Opie, and Atkinson describe the trajectory of human evolution from solitary to a pair bonded, familial species. Michael Tomasello's two-step account of the evolution of human cooperation shows how the ancestral humans went from merely gregarious to genuinely political animals. Christopher Boehm shows how the human capacity for moral emotions and decision making by consensus developed. Richard Wrangham provides evidence that the suppression of reactive aggression by ancestral human societies resulted in a self-domesticated species, a process that enhanced the human capacity for cooperation and communication. Bernard Chapais argued that the emergence of pair bonding among ancestral humans laid the foundation for both consanguineal and affinal kinship structures. That these bodies of research hold together can best be seen when they are viewed in light of Aristotle's biopolitical science.

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INTRODUCTION

Political science begins more than 2300 years ago, with the composition of Aristotle's *Politics*.[1] This work remains relevant for contemporary investigations into the biological foundations of political life because it is the first, best illustration of what a genuine biopolitical science would look like. Three fundamental principles stand out at the beginning of that work (Aristotle, Politica, 1957, pp. 1252a24–1253b1). First, the political community is a multilevel society. Households based on primary kinship are nested inside villages, based on extended, consanguineal ties. Villages are bound together by more formal ties into a *polis*, or city. Second, the human being is the *most* political animal. Aristotle recognized three levels of social complexity: isolated, gregarious, and political animals. Only the latter are capable of coordinated action for some common goal (Aristotle, 1965, pp. 487b34–488a14). Identifying the anthropos as the most political animal means both that our species must be understood by comparison to other species capable of coordinated action and that our species is hyper-cooperative compared to all the other political animals. Third, but most important is *logos*, the capacity to recognize and communicate the difference between what looks good for us and what is genuinely good for us, what we are tempted to do and what we ought to do. *Logos* is the definitive human trait. All politics is about collective decision making. The nature and historical origin of that power is fundamental to any political science.

I suggest that a genuine biopolitical science must contain these three principles. I will argue that such a science is emerging now, after 50 years of biosocial research. Interestingly and tellingly, it is emerging out of the work of psychologists, anthropologists, and primatologists, all with deep roots in evolutionary biology. Aristotle's account of the multilevel structure of political communities is largely confirmed by current models of the evolutionary trajectory of ancestral humans from isolated animals to political animals. Comparisons of human forager societies with our nearest primate relatives confirm the philosopher's view that *Homo sapiens* is not the only political animal but definitely the *most* political, which is to say, the hyper-cooperative animal. Models of the selection pressures driving the emergence of the human capacity for moral deliberation support the view that Aristotle's *logos* is indeed the definitive human power and the one that is most responsible for our nature as political animals. The biggest surprise, from the philosopher's point of view, is the strong indication that the emergence of political behaviors preceded the emergence of families centered on pair-bonded couples. He would not be surprised to learn that the extension of familial bonds beyond kinship ties to include more artificial relationships was a key step in emergence of mature political animals.

[1]See Carnes Lord's introduction to his marvelous translation (Aristotle, Aristotle's Politics, 2013). Aristotle was not, of course, the first political philosopher. Plato and his Socrates preceded him. Nor was he the first political theorist. He discusses two predecessors in the *Politics*. "The significance of Aristotle's *Politics* lies in the first instance in the fact that it represents the earliest attempt to elaborate a systematic science of politics."

In this chapter I will discuss five bodies of biosocial research. In order, I will present an account of the transition from solitary animals to political (i.e., cooperative animals), Michael Tomasello's two step argument for the evolution of human cooperation, Christopher Boehm's account of the emergence of human moral consciousness, Richard Wrangham's account of *Homo sapiens* as a domesticated species, and Bernard Chapais's argument that pair-bonding was an essential step in the evolution of human social and familial structures. I will argue that these bodies of research hold together and lay the foundation for a genuinely Aristotelian biopolitical science.

GREGARIOUS ANIMALS

It easy to mistake Aristotle's account of the multilevel society as an evolutionary account if one is already acquainted with the idea that a species can change over time. At some point human beings cease to be solitary animals and form nuclear families. Next, they form extended families, and then they establish cities. Each transition is from a simpler to a more complex form of social intercourse. It is not such an account. The philosopher had neither a biological nor a political history to work with. He begins with the Greek *polis* as he knew it-the small, independent community with an urban center and breaks it down into its nested communities (Kullmann, 1991, pp. 98–101).

It is simple enough to transform Aristotle's model into an evolutionary story. One need merely assume that the first societies were the smallest and simplest and that modes of sociality became more complex over time. In considering how this might be done as well as alternative models, I do not wish to pin the argument down to any particular time frame. I will use the term ancestral humans to indicate the evolutionary history of our species as it diverged from the last common primate ancestor toward uniquely anthropomorphic animals.

At least one evolutionary model of primate social evolution does look a lot like Aristotle's account. Schultz, Opie, and Atkinson refer to this as *the increasing complexity model* (Fig. 1).

According to this model, our primate ancestors were solitary animals before they became social animals. They foraged largely alone.

> Primate social complexity has been proposed to increase in a stepwise fashion from solitary individuals, through small groups to large, socially complex groups. (Schultz et al., 2011, p. 219)

The first social unit was a pair-bonded couple and their offspring. It expands as males gain more than one mate and again later as more than one family lives in

Fig. 1. The Increasing Complexity Model. *Source:* Adapted from Schultz, Opie, and Atkinson (2011, p. 221).

the same social unit. The arrows go both ways because transitions from a more complex to a less complex step are equally likely. Transitions are possible between all but only contiguous steps.

To evaluate such models and offer alternatives, the authors "mapped the composition of foraging groups (solitary, family groups, harem or multi-male...) for 217 species into a primate consensus tree derived from genetic data." The map was designed to identify which social systems preceded which in the evolutionary history of primate species. The increasing complexity model was not supported by the author's study. It was the reverse-jump model that best fit the data and was "also decisively better at explaining" it (Fig. 2).

In this model, primates transition directly from solitary to aggregations of males and females. From there a transition to uni-male harems or pair-bonded families is possible; however, while the transition to uni-male societies is reversible, the transition to pair-living families is not. Pair-living in family groups appears to be a stable form of social grouping (Schultz et al., 2011, pp. 221–222).

That bisexual aggregations of primates appeared before pair-living should be of special interest to political scientists. It may be that the human species had to become political before it could become familial; that without groups capable of exercising moral suasion over their members, the human family is impossible. I will argue that this is precisely what a new biopolitical science will confirm.

A second question addressed in this study is what was/were the factors that drove primate social evolution? The authors consider two possible catalysts: "the switch to sex-biased dispersal, whereby one sex (typically males) disperses further from the natal range than others," and "the switch to social living is presumed to occur under increased predation pressure coinciding with the shift from nocturnal to diurnal activity." The authors found that

> ...the ancestral state for primates is bi-sexual dispersal... and the estimated transition rates indicate that sex-biased natal dispersal follows the shift to sociality rather than precedes it.

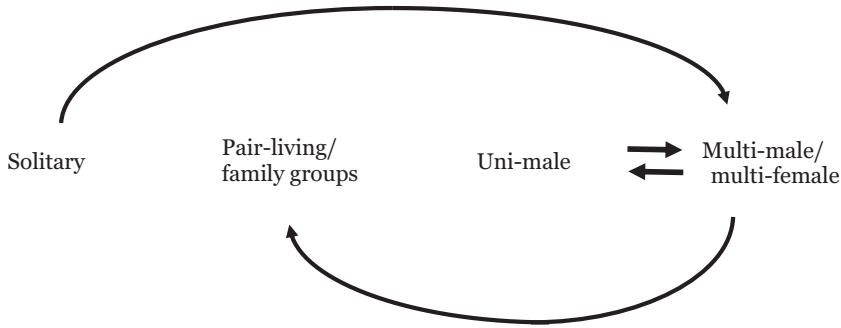

Fig. 2. The Reverse-Jump Model. *Source:* Adapted from Schultz et al. (2011, p. 221).

The transition from solitary to bisexual aggregations coincides with the shift to daytime foraging. All solitary living primates forage nocturnally, with the single exception of orangutans (Kappeler, 2012, p. 24). Once foraging takes place in daylight, more eyes mean more information generally available, information that may sometimes be accessed merely by monitoring one's neighbors. Predator detection and collective responses, including mobbing predators, may have been factors driving primates toward social living (Fitchel, 2012, pp. 181–183). Information about the location of food sources, especially fruit, may have also been an important factor (Müller & Soligo, 2005).

These advantages are available to that category of animals that Aristotle called ἀγελαῖα, or gregarious. These are creatures that live in close proximity to one another but do not cooperate. Much of the behavior of non-human apes falls into this category. They forage individually without cooperation (Herrmann & Tomasello, 2012, p. 710). Even mobbing may be merely mutualistic, with each member of the group doing what he or she would do if alone. Notable exceptions may include chimpanzee hunting (Boesch, 2002) and warfare (Wrangham & Glowacki, 2012).

Christophe Boesch argues that chimpanzee hunting of monkeys is well-coordinated, involving a division of skilled labor as well as shared intentions and goals (Boesch, 2005). Gilby and Connor argue that it is simple mutualism-every ape acting out of pure self-interest. While it appears to be a joint endeavor, it was triggered by the common detection of the monkey prey (Gilby & O'Connor, 2010). While Chimpanzees may or may not coordinate when hunting, they certainly do coordinate when going to war. Chimpanzee intergroup aggression involves group-organized defensive patrols and raiding of other communities (Boehm, 2018, pp. 684–689). These activities seem to put chimpanzees squarely into the category of Aristotelian political animals.

By this standard, the human species is not only *more* political than any other primate species; the anthropoi are *hyper-political*. Human beings are capable of fine-tuned and flexible coordination in child-rearing, foraging and distribution of food, hunting and war. They are not only capable of social learning, helping, sharing, and the subordination of individual to group interests; they are *primed for it* from birth (Tomasello & Vaish, 2013, pp. 240–249).

We are now in a position to ask a question not available to Aristotle: how does a merely gregarious animal become the hyper-political animal?

POLITICAL ANIMALS

There are four general models of the evolution of cooperation among the species. Of these, three almost certainly play a role in human evolution but cannot easily explain the transition from uniformly gregarious feeders to cooperative hunters. Group selection could have operated only after groups of hunter-gathers became stable enough that inter-group competition could create significant selection pressure on the general population. Kin-selection, as we will see, requires that our ancestors could tell who their kin were; that is probably not possible prior to the

emergence of stable pair-bonding. Reciprocity – coming to the aid of another animal *because* it is likely that the favor will be returned — seems to require cognitive sophistication and social mechanisms that would have appeared only when our ancestors were well on their way to becoming political animals.

By contrast, by-product mutualism requires only that cooperation emerges as an accidental byproduct of individual and purely selfish efforts. Foraging for vegetation does not require much in the way of cooperation. Following others to where the food is, learning from observation how to crack nuts or extract insects from a log, are benefits of social living. Beyond that, each animal does more or less what it would do if it were alone.

Hunting small game is another matter. A single chimpanzee pursuing a monkey is unlikely to succeed; if a group of chimpanzees is chasing the same quarry, the odds dramatically increase that someone will grab it. The only coordination that is necessary is simultaneous action and that is ensured by the common detection of the prey. If the prey is too large for one lucky ape to easily monopolize it, and begging is sufficiently annoying, some form of sharing is likely. If the meat is valuable, this creates selection pressure for low cost, cognitively undemanding forms of cooperation (Tomasello, Melis, Claudio, Wyman, & Herrmann, 2012, pp. 674–676).

Michael Tomasello et al. have advanced the interdependence hypothesis to explain how the trajectory of human evolution crossed the gap from gregarious to political animals (Tomasello et al., 2012). This crossing consisted in two basic steps. In the first step, optional collaborative foraging became *obligate collaborative foraging*: as the ancestral human population became better at the business, it came to depend on it. In that way the members of the ancestral group became *interdependent*. They could no longer do without one another's assistance where sustenance was concerned. In the second step, ancestral humans developed a sense of *group-mindedness*. The members of a hunter-gatherer group acquired a sense of *we-ness*; they could conceive of group action and group benefit.

The argument for the first step was based on the stag-hunt model of cooperation, a game-theoretical account. A cooperative action is a stag-hunt if the following three conditions are met:

(1) individuals must collaborate with others to benefit,
(2) the benefits of the collaboration are greater than those of any solo alternatives, and
(3) all solo alternatives must be forsaken (risked) in order to collaborate (Tomasello et al., 2012, p. 674).

Small-scale collaborative foraging would seem to satisfy these conditions. The spoils must be shared, so that each hunter obtains a greater benefit than he could get by solo foraging; the hunters must coordinate their actions, at least as far as agreeing when to hunt; and free riders (who invest too little in the hunt) and hogs (who take more than their share of the kill) must be discouraged.

The fact that chimpanzees and bonobos do regularly hunt means that these challenges could be surmounted by ancestral humans at a relatively primitive stage in their development. Humans became much better at meeting all of them. Chimpanzees solve the first problem by beggars harassing those who have the meat in hand (or even sometimes in their mouths). Humans came to share voluntarily; they learned to coordinate their action by more sophisticated communication; and they began to socially select against non-cooperators, if only by the choice of companions. As long as the groups remained small, reputation alone would be sufficient to insure trust. Everyone knew by experience who could be counted on, and the possibility of ostracism would be a powerful incentive to make sure that one's value to the group was on constant display. What drove ancestral humans from chimpanzee-like collaborators toward much more sophisticated hunting groups is uncertain. The authors suggest some external change, probably an ecological one.

What drove the second step was the increasing success of human hunting groups. Two factors pushed human populations toward an increasing sense of group-mindedness. One was simple population growth. More meat meant more hunters; however, more hunters meant a weakening of ties between individual members of the group. More and more, hunters found themselves in a party with individuals that they did not know well. Mechanisms were needed to distinguish reliable from unreliable partners. The second factor was increasing competition between groups. As groups grew larger and multiplied, foraging ranges would begin to overlap. This led to the kind of agonistic intergroup encounters that are observed in contemporary chimpanzees (Tomasello et al., 2012, pp. 681–682).

Just when group cohesion becomes even more imperative, reputation alone can no longer secure it.

> As groups became larger... incentives for cooperation diminished (each individual was less needed, and reputational information was more difficult to obtain), so free riding—and even active cheating—proliferated and needed to be controlled. (Tomasello et al., 2012, p. 681)

At this point, probably with the emergence of behaviorally modern humans, new devices were necessary.

They came in the form of what Aristotle would call *nomoi*, meaning the written and unwritten laws that circumscribe the behavior of *our* tribe and have the authority of the tribe. These cultural practices had two general functions. First, they were "markers of cultural identity," markers that set *our* group apart from others and can identify a complete stranger as one of *us*. Chimpanzees have behavioral traditions that are learned and handed down and in that sense we can speak of their culture; such traditions do not emerge from or create a sense of group identity.

> Cultural practices are different from behavioral traditions because their practitioners understand them as "shared" in the group; that is, they understand them as conventional. We have all "agreed" to do them in a particular way, even though we all know that there are other ways we could do them. (Tomasello et al., 2012, p. 682)

Presenting these cultural markers is the easiest way to reassure other members of your group that you are loyal and competent.

The second general function of the *nomoi* is *social selection* by the application of social norms. These are group expectations that channel behavior in socially approved directions, and especially toward responsible cooperation. Social norms have two key aspects. They have force. To violate them is an act of contempt for group opinion and thus marks the violator for shunning and other, more serious means of punishment. The second key aspect is that the norms are general. They are not role-neutral—different rules may apply to one person but not another due to division of labor. They are *agent-neutral* in that they apply the same to anyone in a specific role. They are likewise general in so far as they represent the opinion of the group as a whole, and not that of any particular individual (Tomasello et al., 2012, p. 683).

The two steps in the evolution of human cooperation outlined above account for the transition of ancestral humans from merely gregarious animals to animals that are already much more political than any other mammalian species. To see how the species is more political even than the highly organized eusocial insects, it is necessary to consider the evolution of a specifically human moral psychology.

MORAL ANIMALS

The emergence of the human capacity for moral deliberation, and along with that a palate of adaptive moral emotions, probably occurred long before Tomasello's group-mindedness takes form. Effective hunting, so effective that ancestral humans became dependent on it, may have been the single most important factor in their evolution away from the other apes. Legs longer than the forelimbs and obligate bipedalism, sweat glands and lack of fur for shedding heat, seem specifically adapted for persistence hunting—running down larger, furrier animals.

Behavioral and psychological traits are as much or more indicative of the role of hunting as a selection pressure. As collaborative hunting became obligate, so did other kinds of foraging. Gatherers of fruit, roots, nuts, berries, eggs, etc., not only provided essential nutrients, but they were also a backup when the hunt was unsuccessful. All this required efficient systems for sharing.

Christopher Boehm has shown how the specific and perhaps definitive human powers of cooperation might emerge by solving a problem presented in the second requirement of the stag-hunt model. Each participant must benefit more from joining the hunt that he could from any solo effort. This requires a more or less equal sharing of food and especially of meat. The greatest threat to such sharing would be the presence of bullies who would be tempted to use superior strength to establish dominance over the group. This is what is observed among the other great African apes (Boehm, 1999, p. 3) and may explain why meat eating is either absent (gorillas) or a marginal part of their diets (chimpanzees). The silver back gorilla has no need to share with anyone and so cannot engage allies in a hunt. The alpha male chimpanzee need only be a little more generous.

By contrast, nomadic foragers are universally egalitarian. Instead of one powerful individual imposing dominance on everyone else in the group, or a hierarchy of would-be tyrants, it is the group that is dominant over every individual. Foragers present a *reverse-dominance hierarchy* (Boehm, 1993, p. 228). This conclusion is based on surveys of late Pleistocene-appropriate foragers, studied since the beginning of modern anthropology. These small-scale societies are thought to be similar to ancestral humans living in the millennia before the beginning of agriculture.

> All nomadic foragers are egalitarian, a pattern that makes the adult males, and sometimes also the females, into equals as household heads. They are politically egalitarian societies to the degree that named leadership roles are lacking or devoid of authority, status differences among politically autonomous household heads are muted, and individuals who try to influence group decisions must do so very circumspectly. (Boehm, 1997, p. S104)

The autonomy of each member in good standing was enforced by an escalating series of sanctions. Anyone tempted to throw his weight around might find himself checked by public opinion. He finds himself the odd man out in any discussion. He hears whispering behind his back, followed by open criticism. If these measures did not solve the problem, more extreme sanctions might be employed. The miscreant might find himself or even his family temporarily ostracized, perhaps forced to camp away from the protection of the common fire. He might be permanently exiled, which in many cases would amount to a death sentence. He might, finally, be executed. In order to avoid a cycle of revenge, the death sentence would frequently be entrusted to a member of his own family, who would want to avoid a penalty of attainder.

The *egalitarian ethos* of nomadic foragers, as Boehm articulates it, maps nicely onto Tomasello's social selection by social norms. I would argue that it provides, however, a more powerful and plausible motive for the origin of such norms. Long before ancestral humans could have recognized the value of the collaborative foraging that they were engaged in, each person would have been aware that he didn't like to be bullied or to be denied a fair share of the kill. Each person would have been more confident in asserting himself when he stood with the rest of the group against the bully. The force of public sanction grew as ancestral humans adapt their weapons for the tasks of group resistance or the surprise assassination.

A second aspect of the egalitarian ethos was group decision making. The nomadic forager group was acephalous (headless). Decisions were made around the council fire. Each member had his say, and the consensus was the policy. The most important decision facing early foragers would have been whether to move on and where to. The problem here was less the bully than the dissenter. Since every hunter was an asset of the group, the least pressures that were deployed against the one could be effective against the other.

Boehm argues that the egalitarian ethos operated over enough time to be a powerful selection force in human evolution.

> The hypothesis, then, is that a far-reaching political invention, namely, hunter-gatherer egalitarianism as defined by anthropologists had profound and fundamental effects on

> Darwinian selection mechanics. Obviously, for a distinctive cultural way of doing things to affect selection mechanics in a way that could influence the long-term selection of behavioral traits at the level of genes, the cultural tradition in question would have to be in place for thousands of generations. This condition is met, for our prehistoric human predecessors remained consistently egalitarian for scores, probably hundreds, of millennia. (Boehm, 1997, p. S101)

In the context of collaborative foraging, resistance to bullying was empowered. This, in turn, decisively shaped the human animal.

One of the most basic functions of cognitive sophistication is to allow an animal to anticipate the actions of other animals-predator or prey or, especially in the case of social organisms, conspecific partners. It is often much cheaper to anticipate the outcome of an interaction than to make a trial and risk a terrible error. When certain problems occur over and over again in the history of a species, effective strategies for solving them may be written by natural selection into the cognitive apparatus of the species, as evolved psychological mechanisms (Buss, 2015, pp. 40–53).

The egalitarian ethos was gradually internalized by ancestral humans. Keeping on the good side of the group was vital to survival and reproductive success. The inherited map of the egalitarian ethos will not include specific moral rules (let the hunters divide the meat) for the same reason that no linguistically enabled infant is born knowing French. Instead, it will include a pallet of moral emotions. For example, guilt is a fear that one's transgressions will be discovered by others. It is a self-punishment that discourages transgressions. Righteous indignation encourages one to prove one's worth to the group by joining them in punishing a transgressor. Even bashfulness and blushing may be selected for, as nothing makes you look more trustworthy than a manifest inability to get away with lying. If Boehm is right here, human beings are moral animals as much and in much the same way as they are linguistic animals. We are designed to internalize the laws of the moral culture we are born into.

The capacity for self-government that the moral emotions conferred also prepared the individual forager for sitting in judgment on one of his peers. The stakes were almost as high for the juror as for the defendant. He would not want the others to think that he values his own opinion above the group consensus. He would avoid being too harsh or too lenient. The power to interpret and anticipate the judgments of others and to express his own would secure his status in the group and thus promote his own reproductive success. As the dynamic between effective collaborative foraging and effective communication drove the evolution of language and logical thinking, so participation in the egalitarian ethos drove the evolution of the capacity for moral judgments.

Nomadic foragers obviously could have had no clue about the Darwinian selection mechanics influencing their own evolution. Boehm argues that in collectively enforcing the egalitarian ethos they are engaging in deliberate social selection. They knew full well that they were selecting for some kinds of behavior and against other kinds. This he calls *purposeful social selection*. If this collective enforcement of the *nomoi* was indeed as powerful a selection pressure as he thinks

it was, then the political nature of human beings was in a very real sense a product of legislation.

Boehm's boldest hypothesis involves a shift between two levels of natural selection. The dominion of the silverback gorilla over his harem, the dominance of alpha male over a chimpanzee group, the muted but still detectable hierarchy among bonobos, are examples of *within group selection*. In each case, males compete with other males for reproductive opportunities. Because the largest, strongest, most aggressive male is likely to sire the most offspring, he will sire large, strong, and aggressive sons. Those are the traits that are selected for. All four of the African great apes present sexual dimorphism in size, with the males being significantly larger than females. This dimorphism is proportional to the degree of reproductive advantage. The silverback enjoys exclusive access to his harem and so sires almost all the offspring. The chimpanzee alpha gets first access to females as they come into estrus. In bonobos and human beings, this competition is dramatically muted; consequently, they come in third in degree of size dimorphism.

Between-group selection occurs when groups of conspecific animals compete against each other in ways that confer reproductive advantages on the members of the most competitive groups. If the selection pressure is sufficient, traits that promote group success will be selected for. In the case of chimpanzees, there is little doubt that between-group selection has shaped individual behaviors in such activities as patrolling and raiding. It seems equally certain that within-group selection is a much more powerful pressure shaping the general behavior of the males. Boehm's hypothesis is that this balance of selection pressures reversed in the case of *Homo sapiens*.

> The hypothesis is quite specific: the well-documented equality-based social traditions of human foragers drastically modify the balance of power between within-group selection and between-group selection. (Boehm, 1997, p. S101)

Three effects of the egalitarian behavioral syndrome are responsible for this shift of selection pressures. First, it dampened phenotypical variation within groups. Males could no longer use size and aggression to increase their reproductive advantage. The chief prizes of such competition, females and food, could not be monopolized by the most competitive male if the equal distribution of such prizes is guaranteed by the group.

Second, the egalitarian ethos amplified competition between groups. Once groups are acting as units, those that were better at coordinating, cooperating, and at collective decision making, would be more competitive. This involved the capacity to pool information within the group and effectively weigh alternative decisions. Successful collective decisions would be indirectly strategic in so far as they maintained or increased its military strength. They would be directly strategic in so far as when they had to decide when to press their advantage and when to fight another day.

Third, the ethos enabled the group to monitor and suppress anti-social individuals who were tempted to take more of their share of the bounty or take less of the risk and burden. This amounts to selection for cooperation and against

cheating. This would have amplified the selection pressures driving ancestral humans toward the hyper-cooperative animal that we know.

It is important to recall that the evolutionary trajectory of a species is not necessarily *unbiased*. The models of human social evolution presented at the beginning of this essay differed on this point. The increasing complexity model assumed that the transition from one social stage to another (e.g., solitary to pair-living) was unbiased. It could just as easily reverse direction as continue toward more complexity, depending on changes in selection pressure. The model that was supported by the study (the reverse-jump model) involved pronounced biases. The transition from solitary living to multi-male/multi-female living and the transition from the latter to pair-living, are apparently irreversible. Was the ancestral human evolution toward political animals biased?

DOMESTICATED ANIMALS

Living together has many benefits for social primates but it also entails costs. Proximity increases the odds of social friction. For males, the chief problem is the risk of injury. For females it is stress, which can result in significant reductions in fertility (Dunbar, 2016, pp. 37–43). These costs must be managed if sociality is to turn a reproductive profit. Anything that increases mutual pleasure from proximity will help to mitigate the friction, which largely explains the ubiquitous activity of grooming among furry primates.

Primate social structures also include solutions to this problem. Gorilla harems solve it by concentrating power in the silverback and largely excluding other, problematic males. Chimpanzees solve it, in so far as they do solve it, by a strict hierarchy of males and dominance/submission displays. Bonobos solve it by powerful coalitions of females who protect each other and their sons from male aggression. Humans ultimately solved it by means of the egalitarian ethos. In each case, "solving" the problem means managing, not eliminating it.

Richard Wrangham addressed one of the most persistent questions in political philosophy: are human beings aggressive and violent by nature (a position he associates with Thomas Hobbes and Thomas Huxley) or are they cooperative and peaceful by nature (which he associates with Jean-Jacques Rousseau and Peter Kropotkin). His answer to this either/or question is *yes* (Wrangham, 2018).

He answers the question by arguing that it presents a false choice. It assumes that aggression is unimodal, that there is only one type and you either do it or you don't. He argues, to the contrary that aggression is bimodal. One type is *reactive aggression*. As the term suggests, this involves an emotional response to some threat or annoyance. It aims to relieve the unpleasant manifestations of stress rather than necessarily the original stimulus, for which reason it often results in a change in targets. A chimpanzee reeling from an encounter with a dominant male may take it out on a subordinate male.

The second type is *proactive aggression*. This involves deliberate, sometimes planned attacks on a conspecific. It is calculated in so far as a target is chosen that may be safely assaulted. It tends to be done in cold blood, in the absence of

emotional arousal. The goal of proactive aggression is some external (e.g., food or females) or internal (emotional) satisfaction. For that reason, it tends to focus on a consistent target.

The most important difference between the two types, for our purposes, is that the former suggests a lack of cortical regulation over behavior while the latter suggests just such regulation. This provides a nice way to map out the aggressive natures of chimpanzees, bonobos, and human beings. Human beings and chimpanzees have greater propensity to proactive aggression than do bonobos. Human being and bonobos have a lower propensity to reactive aggression than chimpanzees, and a much lower propensity toward potentially lethal reactive aggression. If we count chimpanzee military activities as proactive aggression (and we probably should) we can rank the three species in order – bonobos, chimpanzees, and humans – in terms of increasingly lethal proactive aggression.

All this maps on well to both Tomasello and Boehm's view of intergroup competition as a major selection force in human evolution. There was a dynamic relationship between the reduction of intragroup, reactive aggression in ancestral humans and proactive intergroup aggression. Advances in either amplified the selection pressure promoting the other. Less intergroup aggression made for a larger, more cooperative armed force.

Wrangham has since gone on to argue that both ancestral humans and bonobos were influenced by a powerful developmental bias in their respective evolutionary trajectories now known as the *domestication syndrome*. It often turns out in evolution that a powerful selection for one trait has a series of unexpected changes in other traits. Selecting against reactive aggression in a mammalian species and some birds seems to result in a suite of other physiological and behavioral traits. Among the former are smaller bodies with shorter and smaller faces and smaller teeth, reduced sexual dimorphism, smaller brains, and paedomorphism (the retention of juvenile traits in mature adults). Among the latter are reduced reactive aggression and an increase in self-control, adults engaging in play and in recreational sex, and increased communication skills.

Domestication must be distinguished from tameness. The latter indicates desirable and more or less stable changes in the behavior of individual animals as a result of manipulation by humans. The former means changes in gene frequency in a population over time that produces the physiological, morphological, and behavioral traits listed above. Because these changes can be observed across a range of animals and frequently distinguish domesticated variants from their wild counterparts, it appears to be an example of a developmental bias (Wilkins, 2020). When one particular trait is selected for, you tend to get a suite of others that are not adaptations, not selected for, but are by-products of the adaptation. The emergence of the syndrome may present within a few generations of deliberate breeding but it seems to be persistent. Once a species goes down that road, there is no going back (Wrangham, 2019, pp. 69–75).

The operation of natural selection in the developmental bias is described by Belyaev's rule: "Selection against reactive aggression causes a domestication syndrome" (Wrangham, 2019, p. 112). Following Darwin's lead, we might consider wolves and dogs first. The latter were domesticated by human beings,

eventually in very deliberate ways. While selective breeding has somewhat obscured this, ancient dog breeds show strong correlations with the domestication syndrome. The result is not only that dogs are generally more docile than wolves but that they present the morphological markers of the domestication syndrome: smaller skulls and brains, shorter snouts, floppier ears. Most dogs look more like wolf pups than like adult wolves. Dogs are also more playful as adults and better able to interpret human gestures. As the chief anthropomorphic selection pressure on dogs has always been to discourage reactive aggression, this is a strong example.

As Darwin famously realized, selection occurs in nature apart from human intentions. The domestication syndrome distinguishes bonobos from their close cousins, the chimpanzees: a smaller cranial capacity, a juvenile cranium, smaller teeth, etc. (Hare, Wobber, & Wrangham, 2012, p. 574). Their most famous traits include a complete (or almost complete) absence of lethal aggression combined with the use of sexual stimulation as a bond between females (van der Dennen, 2013, pp. 102–106). Adults seem to enjoy playing with infants. The case for bonobos as a domesticated species is very strong. The obvious question is how did a wild species get domesticated?

The answer is that they domesticated themselves. As indicated above, coalitions of females kept the peace. They did not eliminate reactive aggression; bonobos are still more irritable on average than human beings. They did discourage it to the point that it suppressed within-group competition between males. That, apparently, was enough to trigger the syndrome. Male size and aggression relative to the rest of the group was no longer a reproductive asset. As a consequence, sexual dimorphism decreased.

The domestication syndrome also distinguishes *Homo sapiens* from *Homo neanderthalensis*. Humans have a more upright, flatter face, a smaller braincase and no brow ridges, smaller teeth than Neanderthals; roughly the same set of changes observed between dogs and wolves (Theofanopoulou et al., 2017, pp. 2–4). Unfortunately, we cannot directly examine the behavior of an extinct species; however, making do with comparing humans to chimpanzees and bonobos, there is little doubt that *Homo sapiens* is a self-domesticated species. The question that obviously raises concerns the mechanism of self-domestication. If power of female coalitions was a sufficient selection pressure against reaction aggression to domesticate the bonobos, what was the mechanism for human beings?

In a recent essay, Richard Wrangham evaluates nine distinct evolutionary scenarios that have been advanced to explain human self-domestication. He finds that the best fit is the *language-based conspiracy* scenario.

> Boehm and Gintis et al. proposed that the shift from a typical primate style of alpha-male dominance to the egalitarian male hierarchy of mobile hunter-gatherers depended on males forming coalitions that enabled them to dominate the original alpha... Sufficient execution of Pleistocene despots would have led to selection against reactive aggression. (Wrangham, 2019, p. 7)

These coalitions against would-be tyrants could more easily form behind the tyrant's back if the members of the band had the means to communicate their

displeasure with him, hence it is language-based conspiracy. Increasingly sophisticated communication would also allow for the resistance to move through Boehm's stages: gossip, ridicule, ostracism, and slaughter.

The relationship between the domestication syndrome and increases in cooperative communication may, in the case of the human species, be a dynamic. There was a "complex feed-back loop" involving the evolution of the human capacity for language and human self-domestication (Benítez-Burraco & Progovac, 2020, p. 1). Boehm's language-based conspiracy scenario proposes that language was instrumental in dampening reactive aggression and was the means by which the human species domesticated itself. A survey of other domesticates suggests that the syndrome frequently results in an increase in the powers of communication and learning.

> Intriguingly, there is evidence that domestication can enable the development of complex behaviors beyond those discussed so far for the domestication syndrome. For example, both dogs and domesticated foxes outperform all non-human primates in tests of cooperative communication. The Bengalese finch, domesticated from its wild ancestor, the white-rumped munia, has developed a complex song that is preferred by both female finches and munias over the stereotyped song of the male munia. There are tempting parallels to be drawn here regarding the potential effects of self-domestication on the emergence of human language, relating to the emergence of a fully modern `language-ready' brain, or the triggering of our capacity for complex iterative learning, necessary for the cultural transmission of language. (Theofanopoulou et al., 2017, p. 4)

The case of the domesticated Bengalese finch is particularly interesting. Both the domesticated species and its wild counterpart must learn their songs from others and must do so during a developmental window. They are primed to learn to sing as humans are to learn to talk. Three important differences suggest the effect of the domestication syndrome on this learning ability.

> Firstly, the domesticated Bengalese now sings a much more complex and syntactically rich song, with greater levels of unpredictability in the patterns of transition between notes and note groups than is seen in the wild munia (Okanoya, 2002). Secondly, cross-fostering experiments (Takahasi & Okanoya, 2010) have shown that Bengalese chicks exhibit much lower copying fidelity in what they learn from tutor birds. Whereas munia chicks copy tutors with a high level of fidelity, Bengalese chicks combine the tutor's song with their own improvisations and variations. Finally, and most importantly, Bengalese finches are much less constrained in what they are able to learn. (Thomas & Kirby, 2018, p. 8)

The Bengalese finch is highly prized by the Japanese for its snow-white breast. By breeding the bird for comfort in closeness, proximity to humans, they have unintentionally produced a better and more creative vocal learner.

One of the indicators of domestication syndrome in some species is a patch of white color on fur or feathers. In the case of marmoset monkeys, the size of the white patch on the forehead apparently corresponds to the frequencies of affiliative contact calls, especially with parents (Ghazanfar et al., 2020, pp. 5026–5057). When one group of marmosets was translocated to proximity with another group, the translocated group would gradually learn the specific pattern of calls that identified their new neighbors, indicating that the marmosets are capable of socially learning new dialects (Zürcher, Willems, & Burkart, 2019).

It now appears that the domestication syndrome is a key factor in the evolution of ancestral humans into political animals. The selection pressures against reactive aggression identified by Tomasello and Boehm are fundamental parts of the story. They are the context in which humans self-domesticated. The domestication syndrome means that the brute force of these selection pressures did not have to do all the work. A developmental bias, evident now across a wide range of species, channeled human developmental toward a more political nature. The suppression of reactive aggression coupled with increases in within-group cooperation and coordination enabled an increased capacity for proactive aggression.

The elements of the story outlined so far would have been sufficient to shape unusually cooperative bands of primates. Such bands would have been competitive against other, closely related species of hominins. They would have still fallen far short of the political animal observed by Aristotle. For that, something else had to happen.

The egalitarian ethos protected each member of the group against aggression by bullies. What would such a bully be after? He might want to seize the food and tools of a weaker person. He might want to inflict harm merely for the sake of emotional satisfaction. One thing he might definitely want is the female partner of the poor fellow he assaults. If the egalitarian ethos *recognizes* and *protects* the partnership between breeding pairs, the human family becomes possible for the first time. The last step to the most political animal is the emergence of pair-bonding.

THE FAMILIAL ANIMAL

Much of sociobiology and evolutionary psychology is based on a single, fundamental observation: for the males of most sexually reproducing species, more sexual partners means more offspring. This explains a wide range of physical and behavioral dimorphisms between the sexes. Among chimpanzees, the most aggressive male will tend to enjoy the most (or at least the most timely) reproductive opportunities. A silverback gorilla has exclusive access to a handful of females. As a consequence, the chimpanzee male is about 30% larger than the female whereas the silverback is almost two and half times larger than his mates.

These facts make the transition from promiscuously mating primate societies to monogamous pair-living difficult to explain. Why would a male primate concentrate his attentions on one or two females at the expense of other mating opportunities? One reason might be that his investment would pay off in terms of a higher rate of survival for his offspring. In the case of the alpha male, this is unlikely to be a winning wager. In the case of other males, especially down-status males, two problems are present. One is that the male has no easy way to be certain who his offspring are. Investing in the wrong infants would be costly. Another is that most males would be unable to defend their access to a long-term mate or protect their offspring against a stronger male intent on infanticide.

The situation would change decisively, however, if the other members of the group were willing and able to protect each male's access to his mate or mates.

Once human males have become obligate collaborative hunters, their sense of mutual dependence, their ability to coordinate their behaviors, and a universal dislike of being bullied would create the foundations for the most primitive form of marriage. The group recognizes that this mate is your mate, these children your children. This might increase paternity confidence to the point that monogamy is an evolutionarily stable strategy.

Two more factors then come into play. One is the increased probability of male survival due to a reduction in fighting in general. The other is a widening of the "duration of effective breeding" for males. In a species where intrasexual competition for reproductive access is fierce, a male is likely to enjoy reproductive success only between the time he reaches full maturity and the time his strength begins to decline. This effect may be ameliorated in part by coalitions of males acting together, for example among chimpanzees (Müller et al., 2020, pp. 2–4). This is supported by the fact that the sexual dimorphism among foragers is about 1.19 in body-mass, significantly lower than chimpanzee and dramatically lower than gorillas. Breeding females also benefit from the increase of parental investment in *her* offspring. The advantages of monogamy, once the conditions for it had emerged, may explain the apparent stability of human pair-living and family grouping among ancestral humans. As discussed at the beginning of this essay, once a primate species has made the transition to that sort of society, it appears to be irreversible.

Bernard Chapais has argued that pair-bonding "gave birth to human society" (Chapais, 2008). Here I will focus on his more recent attempt to explain how human societies become so much more complex than that of chimpanzees and presumably the last common ancestor of the two sister species.

> My aim in this paper is to show that two major features of human society, stable breeding bonds and peaceful contact between interbreeding groups, help bridge the gap to a considerable extent. (Chapais, 2017)

By stable breeding bond, he means an enduring relationship between a father and the mother or mothers of his offspring. Groups interbreed by exchanging males, females, or both, in order to avoid inbreeding. Both features sharply distinguish human from chimpanzee societies.

Chimpanzees breed hierarchically but promiscuously (van der Dennen, 2013, p. 107). While the alpha male will likely get his choice of females as soon as they come into estrus, each female will mate with several males. This places strict limits on the ability of chimpanzees to recognize their kin (Chapais, 2008, p. 192). A chimpanzee male knows who his mother is (she nursed him) and has a good guess as to his siblings or at least half-siblings are. That is about it. He has no clue who his father is, much less uncles, aunts, etc. Because they are mostly patrilocal (males remain in their birth groups while females disperse to other groups), there is a good chance he is related to any other male in the group. He cannot, however, distinguish degrees of relatedness with non-siblings. With such limited kin recognition, kinship can provide little or no internal structure to their societies.

Nor can kinship define relations between groups. Chimpanzees live in fission-fusion societies. A unit-group will break up into smaller foraging parties

later to recombine and renew ties. The unit-groups are invariably hostile to one another, with lethal warfare a likely result of sustained contact. Once females disperse out of one such group into another, all ties are lost. Chimpanzees may be political, but their political life is not familial.

The situation changes for ancestral humans with the advent of stable breeding bonds. A human female knows who her mother is and may hazard a good guess about her father. She may have information about her grandparents and so about her uncles, aunts, and cousins, nieces and nephews (Chapais, 2008, p. 200). The development of language will facilitate such knowledge. While paternity confidence cannot approach maternity certainty, it may be good enough for government work; especially when reinforced by strong moral rules.

Whether a cause or consequence of this extended kin recognition, the relationship between human unit-groups is not inevitably hostile. A forager may maintain ties with a sister or brother who marries into a previously unaffiliated group and in that way may establish ties to that group. Even if one has not seen her for some time, she is still your sister. Any time a couple from distinct groups marry and produce children, a consanguineal tie is established between those groups. The degree of relatedness to one's granddaughter is the same as that to one's niece. Whatever influence natural selection has on that kind of relation, it may certainly be subject to social selection if it is recognized by the group. With language and inherited stories, such ties may become much more durable than authentic ties of blood.

The substance of the family as a biological unit depends on social selection. It is the recognition of the group that this couple and their children constitute a family that creates the conditions for stable pair-bonding. Because this is so, that recognition can easily be extended beyond consanguineal ties to include affinal ties. The husband of one's sister becomes one's brother-in-law.

The social selection that was employed by ancestral humans to create egalitarian societies and make decisions by consensus led almost inevitably to pair-bonding. Pair-bonding led to extended families united by familial history. At that point, humans were living in nested societies. A forager was simultaneously a member of his immediate family, his extended family, and perhaps a larger community that had to come together, on occasion, perhaps for common defense. Collective decisions would have to be made, obligations and claims of status negotiated, at each level of society. Long before human beings settled down and built the first town halls, Aristotle's political animal was in business.

THE BIOPOLITICAL SCIENCE

The bodies of research that I have attempted to articulate here, when fit together, constitute the foundations of a genuine biopolitical science. They give political science and political theory what it has lacked up to, shall we say it, the present day: a deep, biohistorical dimension. I would argue that we cannot understand

political behavior without that dimension anymore than we could understand a blueprint without knowing that it described a three-dimensional object.

Schultz, Opie, and Atkinson provide evidence that ancestral human beings became gregarious before they formed families. Tomasello et al. give us a very plausible account of how ancestral humans went from gregarious animals to political animals, interdependent and capable of collective intentions. Christopher Boehm shows us how, in the context of increasing interdependence, a capacity for collective legislation and moral emotions could emerge from the simple aversion to being bullied. Richard Wrangham provides evidence that a developmental pathway existed that could be triggered by the selection pressures that were created by human interdependence and the egalitarian ethos. I would argue that these elements explain how the human pair-bonded family emerged as a viable evolutionary strategy. Bernard Chapais shows us how pair-bonding was essential to the development of behaviorally modern human societies.

After 50 years of biopolitical research, we have arrived a point that is, let us allow, somewhat beyond what Aristotle could imagine or achieve. Unlike the philosopher, we can go on.

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A MULTIDIMENSIONAL UNDERSTANDING OF HUMAN NATURE IN MORAL, POLITICAL, AND LEGAL PHILOSOPHY[1]

James H. Rutherford

ABSTRACT

A multidimensional understanding of human nature based on biology can provide a very useful framework of analysis and bring some understanding and coherence to the very fragmented perspectives within moral, political, and legal philosophy. A useful four-part framework of analysis can be based on the evolution of the brain as described by Paul MacLean (1973, 1990) and Sir John Eccles (1989). A similar pattern of development of our mental and moral capacities through experience in childhood was also described by Jean Piaget (Inhelder & Piaget, 1958) and Lawrence Kohlberg (1981). This multidimensional understanding of human nature considers the individual, social, rational, and metaphysical perspectives. Because this four-part multidimensional understanding of human nature is based on a naturalized epistemology related to the development of our mental capacities in both evolution and through experience, this pattern can be seen across a wide variety of disciplines. Medical ethics, US constitutional democracy, and legal philosophy will be used as examples of the usefulness of this multidimensional understanding of human nature.

> But what is government itself but the greatest of all reflections on human nature?
>
> James Madison in *Federalist No. 51* (1788/1987)

[1]This chapter is a recapitulation, revision, and addition to my previous writings (Rutherford, 1992, 1999, 2004).

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INTRODUCTION

A multidimensional understanding of human nature based on biology can provide a very useful framework of analysis and bring some understanding and coherence to the very fragmented perspectives within moral, political, and legal philosophy. A useful four-part framework of analysis can be based on the evolution of the brain as described by Paul MacLean (1973, 1990) and Sir John Eccles (1989). A similar pattern of development of our mental and moral capacities through experience in childhood was also described by Jean Piaget (Inhelder & Piaget, 1958) and Lawrence Kohlberg (1981). This multidimensional understanding of human nature considers the individual, social, rational, and metaphysical perspectives. The metaphysical perspective, for example, relates to narrative, integration, meaning, and purpose. This correlates with our evolved capacity for language and the self-aware integrative capacities of the left prefrontal cortex in humans, which Sir John Eccles called the neo-neocortex. It is also made possible by the development of our capacity for abstract thought through experience, which sometimes isn't fully developed until the age of 25 (Arian et al., 2013). Because this four-part multidimensional understanding of human nature is based on a naturalized epistemology related to the development of our mental capacities both in evolution and through experience, this pattern can be seen across a wide variety of disciplines. Medical ethics, United States constitutional democracy, and legal philosophy will be used as examples of the usefulness of this multidimensional understanding of human nature.

A MULTIDIMENSIONAL UNDERSTANDING OF HUMAN NATURE BASED ON BIOLOGY

> In the distant future I see open fields for far more important researches. Psychology will be based on the foundation…of the necessary acquirement of each mental power and capacities by gradation. Charles Darwin in *The Origin of Species* (1859/1936, p. 373)

> Epistemology goes on, though in a setting and clarified status. Epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science. W. V. Quine in *Epistemology Naturalized* (1969/1996, p. 82)

Most of modern philosophy has been like the blind men describing an elephant. Each perspective describes a particular part, but none gives a coherent and integrated view of the "elephant." A useful four-part framework of analysis based on a multidimensional understanding of human nature brings some understanding and coherence to the fragmented fields of moral, political, and legal philosophy. The very generalized functional capacities of the mind are understood in the context of ecology or the interaction between an organism and its environment. Our ways of knowing and our sources of information are both genetic and cultural. We are a product of both nature and nurture.

A multidimensional understanding of human nature is not a modern concept, but a premodern idea. Plato discussed the triune soul. Aristotle described man as an animal, a political animal (meant to live in a *polis* or community), a rational animal, and a contemplative animal that seeks *eudaimonia* (variously translated as well-being, happiness, proper functioning, or meaning and purpose). Greek civilization began with primarily concrete descriptive thought in the time of Homer, progressed to predominately social thought in Athens at the time of Pericles, further developed rational and naturalistic thinking under Pythagoras, Euclid, Thucydides, and Hippocrates, and finally emphasized abstract thought with the classical Greek philosophers and the Stoics (Finley, 1966). This multidimensional understanding of human nature was related to the different ways that we interact with the world in which we live. It was often referred to as the organic paradigm, particularly when it was applied to social structure (Rutherford, 1999). It was eventually discarded after the Middle Ages because it also had been used to justify religious and political hierarchies. Plato had used this model in his writings to justify the rule of a philosopher-king. In the Middle Ages this paradigm, among others, was used to justify political class divisions and the rule of the king and the Pope.

We now often use similar categories, but not necessarily in a hierarchical manner or related to social class. There is thus a reason to reconsider these categories and a multidimensional understanding of human nature as a framework of analysis for moral, political, and legal philosophy. This proves to be very useful as a means of analyzing those philosophies and ideologies that have been based primarily on only one aspect of human nature or have perhaps left out or minimized an aspect of human nature. One often does not have to argue that a particular philosophical position is wrong, but simply that it has a hold on only one part of the "elephant" and that it is not inclusive enough. There are multiple perspectives about moral, political, and legal issues because human nature is also multidimensional. Physical and social ecology also vary across the globe and ecology can also change. A multidimensional understanding of human nature in the context of ecology thus does not lead to a particular conclusion or certainty, but it is very useful as a framework of analysis.

A multidimensional understanding of human nature is compatible with the evolutionary development of the forebrain, which Paul MacLean in *The Triune Brain in Evolution* (1990) described as beginning with a "reptilian complex" (concerned with such basic instincts as individual survival, aggression, and social hierarchy), progressing to a limbic system which involves emotions and a social capacity other than hierarchy, and then adding a neocortex which gives the capacity for reason and language (Sagan, 1977, pp. 57–83). A further distinction, however, can be made within the neocortex between the increased intellectual capacities and memory seen in the brains of primates such as the chimpanzee and the unique characteristics in humans associated with the left or dominant prefrontal cortex. Sir John Eccles in *The Evolution of the Brain: Creation of the Mind* (1989) described this as the neo-neocortex, or the executive center of the brain,

which includes a language center with a capacity for narrative, meaning, and purpose as well as a capacity for both more integrated and abstract thought. Epistemology refers to ways of knowing. These evolutionary developments of our mental capacities correlate with a multidimensional understanding of human nature. A naturalized epistemology would include each of these ways of knowing, including our capacity for narrative, abstract thought, and metaphysical considerations of meaning and purpose.

This pattern of the evolutionary development of the brain is also repeated in a general way in the development of our mental capacities in childhood through experience as described 1958 by Jean Piaget in *The Growth of Logical Thinking: From Childhood to Adolescence* (Inhelder & Piaget, 1958). This development begins with concrete self-interested thought, and then progresses to social, logical, and finally abstract thought. Related to this, for example, children are learning social skills in kindergarten and the logic of multiplication tables in about the 3rd or 4th grade. Lawrence Kohlberg in *The Philosophy of Moral Development: Moral Stages in the idea of Justice* (1981) described our moral development through experience as following the same general pattern as the development of our mental capacities.

The four-part framework of analysis being described considers the individual, social, rational, and metaphysical perspectives. These generally correlate with our everyday experiences and the way we actually live our lives. Paul Churchland in *The Engine of Reason, the Seat of the Soul* (1995) described folk psychology as "our shared portrait of ourselves as self-conscious creatures with beliefs, desires, emotions, and the power of reason" (p. 18). He further described folk psychology as "the basic descriptive and explanatory conceptual framework with which all of us currently comprehend the behavior and mental life of our fellow humans and ourselves" (p. 18) and he noted that it "forms the background matrix of our current moral and legal discretions" (p. 18). Folk psychology just through introspection understands there to be physical, social, rational and spiritual aspects of human nature (Covey, 2020, p. 342). Churchland though preferred a modular description of the brain.

Leslie Stevenson, in *Seven Theories of Human Nature* (1987), suggested that the best way to understand any philosophy or philosopher is to understand the assumptions being made concerning the nature of man, the nature of society, and the nature of the universe. Ever since the Copernican revolution, however, the last question has been divided into the scientific nature of the universe, which asks the question "How?" and the metaphysical nature of the universe which concerns man's place in the universe and asks the question "Why?"

The multidimensional understanding of human nature also gives some coherence to the ethical categories. Deontological ethics (*deon* means duty), which are often metaphysically based, ask "What is obligatory?", "What is right?", or "What is my duty?" This is often a universal rule-based ethic. Consequential ethics which are usually rationally based, consequential, and utilitarian, ask "What is good?" Communitarian ethics ask "What is fitting?" An egotistical ethic that begins with the concerns of the individual is now interpreted primarily in terms of human rights and basic needs, and asks "What is humane?"

A FOUR-PART FRAMEWORK OF ANALYSIS

Using a four-part framework of analysis which considers the individual, social, rational, and metaphysical perspectives and relating it to the multidimensional aspects of human nature is obviously based on a generalization of categories. It is looking at the big picture rather than the details. It is also understood of course that the parts of the brain are very complex, dynamic, and interconnected.

Consider that for a Rubik's cube with just 64 cubes there are 43 quintillion possible configurations. The human brain has close to 100 billion neurons and each neuron has up to 10,000 connections. The possible configurations exceed the number of atoms in the visible universe.

A two-part framework of analysis, such as yin and yang or body and soul, is not broad enough to describe the functional categories. On the other hand, if one were to use even 10 parameters the possible combinations would exceed 1,000. The four-part framework of analysis is a useful and comprehensible way to describe what Darwin called "the necessary acquirement of each mental power and capacities by gradation" (1859/1936, p. 373). Darwin of course also understood the complexities and dynamics of our mental capacities. Darwin wrote in *The Descent of Man* (1871, Vol. I) that "ultimately our moral sense or conscience becomes a highly complex sentiment – originating in the social instincts, largely guided by the approbation of our fellow-man, ruled by reason, self-interest, and in later times by deep religious feelings, and controlled by instruction and habit" (pp. 71–72).

Paul MacLean, writing in 1990, did not have all of the details correct. A modular description of the brain has also prevailed over a very general functional perspective based on the evolutionary development of our mental capacities. Both of these approaches, however, are useful.

A COSMIC PERSPECTIVE

Carl Sagan (1934–1996) was an American astrophysicist and a highly successful author and popularizer of astronomy and other natural sciences. His 1980 TV series *Cosmos: A Personal Journey* made him a household name.

In the first chapter of his book *The Dragons of Eden: Speculations on the Evolution of Human Intelligence* (1977), he described a Cosmic Calendar. The most instructive way he knew to express the cosmic chronology was to imagine the fifteen-billion-year lifetime of the universe compressed into the span of a single year. Then every billion years of cosmic history (now estimated to be 13.8 billion years) would correspond to about 24 days of our cosmic year, and one second of that year to 475 real revolutions of the Earth about the Sun. The construction of such tables and calendars is inevitably humbling. He noted that "It is disconcerting to find that in such a cosmic year the Earth does not condense out of interstellar matter until early September; dinosaurs emerge on Christmas Eve; flowers arise on December 28th; and men and women originate at 10:30 P.M. on New Year's Eve. All of recorded history occupies the last ten seconds of

December 31; and the time from the waning of the Middle Ages to the present occupies little more than one second" (p. 17).

Sagan was also known for the phrase "billions and billions" referring to the stars and that was also the title of one of his books. We now estimate there to be 100 billion galaxies of which our Milky Way is but one and there are an estimated 100 billion stars in the Milky Way of which our Sun is but one. Our planet Earth also has a fit environment for the development of the biology of life. We are privileged in terms of both cosmic time and space. We are also fortunate in terms of being a result of almost four billion years of evolutionary development of life on earth and also the beneficiaries of a comparatively very short period of human cultural evolution.

The Dragons of Eden: Speculations on the Evolution of Human Intelligence won a Pulitzer Prize for general non-fiction in 1978. In the central part of this book Carl Sagan described and popularized Paul MacLean's concept of the evolutionary development of the triune brain. This was another big picture perspective (see also Corey, 2002; Panksepp, 2002).

Robert M. Sapolsky is a professor of biology and neurology at Stanford University and the author of *Behave: The Biology of Humans at Our Best and Worst* (2017). In this work he uses Paul MacLean's evolutionary functional description of the triune brain and Piaget's and Kohlberg's stages of cognition and moral development in childhood as models and good organizing metaphors (Chapters 2 and 7). The four-part framework of analysis being described, however, follows the four general stages of development of our mental capacities through experience as described by Piaget. It differs from the evolutionary triune brain concept in that, in addition to individual and social perspectives, it recognizes both a rational consequential mode of thought and also a more abstract metaphysical/integrative mental capacity related primarily to language and the prefrontal cortex.

SOME PERSPECTIVES IN NEUROSCIENCE HAVE CHANGED

Social Darwinism, eugenics, and the atrocities of German National Socialism made any discussion of evolution and genetics difficult after World War II. The structure of DNA was not described until 1954 by Watson and Crick. Behaviorism, Marxism, and the Standard Social Science Model prevailed in academics. These considered human nature to be almost entirely malleable and determined by experience. The human mind was just a black box which could be controlled by changing the input and reinforcing the output as described by the behaviorists, or a blank slate which could be changed by changing the society in which one lives as described by the Marxists. Totalitarian indoctrination and the loss of freedom were the concern of George Orwell's dystopian novel 1984 published in 1949 (Orwell, 1961). The studies, however, in ethology, anthropology, primatology, genetics, neuroscience, and biology and politics were accumulating knowledge about how genetics are also a factor in determining human nature.

Then in 1975, E. O. Wilson published his book *Sociobiology* (Wilson, 1975) which brought about a heated debate about nature and nurture in academia. The position that human nature was related to both genetics and culture was passionately opposed by behaviorists, sociologists, and Marxists and the discussion was not collegial. Wilson was accused of racism, misogyny, and being sympathetic to eugenics. He had a pitcher of water poured over his head at a conference.

Then Richard Dawkins in 1976 published *The Selfish Gene* (1976) which gave a gene's eye view of evolution in which organisms can be seen as vehicles for gene replication. Steven Pinker in 2003 wrote *The Blank Slate: The Modern Denial of Human Nature* (2003) and explained that our mind is not a blank slate or what had famously been described by John Locke (seventeenth century) as a *tabula rasa*. Matt Ridley in 2003 wrote *Nature via Nurture: Genes, Experience and What Makes Us Human* (2003).

Subsequent developments, including studies of twins and the genome projects, have also given support to an understanding of human nature as being a result of both nature (genetics) and nurture (environment and culture). The functional capacities of the human brain are largely determined by genetics and the development of those capacities is largely influenced by experience and culture. Our information is both genetic and cultural. In ethics, both nature and nurture are important because they place limitations on each other. We don't accept what is, but try to improve it. On the other hand, nature places some limits on our individual and social will.

Neuroscience has also been significantly advanced by neuroimaging, genetic and epigenetic studies, pharmacology, basic research, and game theory. Genome studies, for example, have shown that some of the genes related to very basic physiology and anatomy have been preserved in evolution. Humans have genes that are shared with those of fruit flies (60%), acorn worms (70%), zebra fish (70%), mice (85%), and chimpanzees (98%) (National Human Genome Research Institute, 2021).

Many of our mental capacities have also evolved in parallel with related physical structures such as our upright posture and our opposable thumbs. Our capacity for language involved the restructuring of the laryngeal structures which allows for better vocalization.

In *The Triune Brain in Evolution* (1990), Paul MacLean also described the functions of the midbrain, the hindbrain, the spinal column, and the autonomic and peripheral nervous systems in maintaining the homeostasis of basic functions needed for survival. It is reasonable to include the ancient homeostasis mechanisms which reflect the internal state of the body as also part of the "reptilian complex" (Sapolsky, 2021). They are essential for consciousness (Damasio, 2021). The characteristics MacLean attributed to the reptilian complex of our forebrain included also basic individual needs as well as aggression, dominance, territoriality, and social hierarchy. Researchers such as Jack Panksepp and Lucy Biven (2012) and Antonio Damasio (2021) have emphasized an evolutionary perspective on consciousness in which basic primal needs and emotions in the subcortical parts of the brain play a significant role.

The brains of mammals are categorically distinct from reptiles in that surrounding the reptilian complex they have a developed limbic system which involves emotions and a social capacity other than hierarchy. Mammals also have a six-layered neocortex. The most defining characteristic of mammals is that unlike reptiles they don't lay eggs but have live births and feed the infants with mammary glands. Patricia Churchland, in her book *Braintrust* (2011), reviewed the very complex hormonal and neurotransmitter changes associated with this and particularly the role of oxytocin in bonding. She contends that "morality originates in the neurobiology of bonding and that the oxytocin-vasopressin network in mammals can be modified to allow care to be extended to others" and this "marks the crucial shift that makes us social" (Churchland, 2011, pp. 63, 70; see also Sapolsky, 2017, pp. 107–117).

The brains of primates are also categorically distinct from lower mammals. Jon Kass in "The Origin and Evolution of the Neocortex: From Early Mammals to Modern Humans" (2019) states that "early mammals had little neocortex and roughly 20 cortical areas, while early primates had much more cortex and around 50 cortical areas. Humans have the largest of primate brains that is 80% neocortex with about 200 areas" (p. 61). Probably as an adaptation to their environment, chimpanzees have been shown to even have better flash memory than humans (BBC, 2013; De Waal, 2016, pp. 119–120). The primatologist Jane Goodall, who studied chimpanzees in the wild, wrote in *Reason for Hope* (1999) that, "During the first ten years of the study I had believed […] that the Gombe chimpanzees were, for the most part, rather nicer than human beings. […] Then suddenly we found that chimpanzees could be brutal—that they, like us, had a darker side to their nature" (p. 117). This included instances of dominant females killing and eating the infants of another female within their own community and brutal tribal territorial attacks on neighboring chimpanzees. Chimpanzees and humans are thought to have shared a common ancestor about six million years ago. The primatologists such as Frans De Waal (2016) and Michael Tomasello (2019) have thus studied the emotions, intelligence and behavior of chimpanzees looking for some insights into the similarities and differences related to human characteristics. Humans are also territorial and tribal, and history has also shown that we can also be territorial and tribal about our abstract ideas, ideologies and religions (Peterson, 1988). The elements of many other emotional and moral behaviors, however, can also be found in chimpanzees. Primatologists recognize, however, that the more complex human emotions and decisions, though integrated, also depend upon a higher level of cognitive processing and language.

Homo sapiens are categorically distinct from other primates. The human brain is three times as large as that of a chimpanzee. The thin gray outer layer of neurons in the neocortex also has a much larger surface area due to convolutions. There is only a 30:1 ratio of neocortical gray matter to the size of the medulla in the brainstem of chimpanzees, while the ratio is 60:1 in humans (Kass, 2019, p. 61). Many of our most unique mental capacities, such as enhanced language, a higher level of information processing, and abstract thought are located mostly in the left prefrontal neocortex as described by Sir John Eccles (1989). The neurons in the human prefrontal cortex are more strongly connected to other cortical

areas resulting in a higher order of perceptual self-awareness, integration, and working memory (LeDoux, 2019, pp. 249–260). An article "The Maturation of the Adolescent Brain" by Arian et al. (2013) describes how the environment and experience affect the development of the prefrontal cortex which is not fully matured until about the age of 25 (See also Eagleman, 2017, pp. 3–36). Human language has also allowed for an incredible amount of cultural evolution. Before writing, knowledge was restricted to what could be remembered. Knowledge became cooperative and accumulative with writing, then with the printing press, and now with computers, the internet, and artificial intelligence.

There is much that we don't know and can't explain about human consciousness. Information is different from matter and energy. How can just the physics and chemistry of a brain account for and result in a mind with self-awareness or a perception of free will? How do just the physical properties of atoms result in a knowledge about atoms? Or the subjective experience of seeing and smelling a red rose? David Chambers (1995) described this subjective experience of "qualia" the "hard" unresolved problem of consciousness. Joseph LeDoux (2019) noted 20 contemporary physicalist theories of consciousness (p. 273).

The cosmological perspective of time and space is a big picture background. A big picture, multidimensional understanding of human nature can be based on the development of our mental capacities in evolution and then a similar pattern of development of these mental capacities through experience in childhood. A biological understanding of human nature includes both nature and nurture. The usefulness of this naturalized multidimensional understanding of human nature which considers the individual, social, rational, and metaphysical perspectives will be illustrated by applying it to medical ethics in the field of moral philosophy, United States constitutional democracy in political philosophy, and, in contrast to these, legal positivism in legal philosophy.

MEDICAL ETHICS

> "First do no harm" Hippocrates ("Primum non nocere").
> I WILL RESPECT the autonomy and dignity of my patient:
> I WILL MAINTAIN the utmost respect for human life;
> I WILL NOT PERMIT considerations of age, disease or disability, creed, ethnic origin, gender, nationality, political affiliation, race, sexual orientation, social standing or any other factor to intervene between my duty and my patient; The World Medical Association Declaration of Geneva (2006).

The profession which is based on human biology is medicine. The primary moral principle of the medical profession is a respect for human life. A respect for human life is a moral assertion and at its foundation it is a self-affirmation of personal dignity and an affirmation of our common humanity. That affirmation can enable dialogue because it can be based on religious, rational, political, and/or

humanitarian foundations and medicine is an international profession. Medical ethics are an applied example of a four-part framework of analysis that can bring some understanding and coherence to the fragmented field of philosophy.

Modern medicine considers human nature to be multidimensional. The four general principles of medical ethics as described by Beauchamp and Childress in *Principles of Biomedical Ethics eighth edition* (2019) are as follows:

- *Beneficence* – (similar to the Golden Rule to do unto others as you would have them do unto you or a concept of reciprocity)
- *Nonmaleficence* – (similar to the Silver Rule or don't do unto others what you don't want them to do unto you. This is based on the concepts of reason and reversibility and the adage of "do no harm".)
- *Justice* – (a social concept)
- *Autonomy* – (individual rights)

These four principles recognize the individual, social, rational, and metaphysical/integrative dimensions of human nature. In this framework one looks at the individual as well as the social perspectives which are sometimes in tension. One also looks at the rational consequences of an action, but also at one's duties and what are perceived to be the right principles for one's actions, and these are also sometimes in tension. Indeed, most of the difficult or quandary questions in moral philosophy are not about good versus evil, but about choosing between two different perspectives of the good or between the lesser of two evils. This is the stuff of literature. This multidimensional understanding of human nature is just a very useful framework of analysis. Often the very difficult issues are settled by some agreed upon process that is felt to be at least fair and does justice to the ends, such as a vote by the people or a vote by a jury or a Supreme Court.

Medicine from the beginning has also involved both a science and an ethic, both facts and values. Medicine considers both nature and nurture and it is descriptive, but also prescriptive.

The classical hierarchical organic paradigm was replaced in Western philosophy in part by utilitarianism, which attempts to calculate the greatest good for the greatest number based on pleasure and pain. A model used by the American Medical Association (1993, p. 307) to evaluate pain, however, describes pain as also having physical, social, mental, and spiritual dimensions.

The four-part framework of analysis seen in medical ethics is not meant to determine or advocate a particular conclusion. It will help, however, to understand the spectrum of moral and political considerations involved in a complex issue such as abortion in a pluralistic society. This example is also meant to show that what are perceived to be the facts in medicine are part of the considerations, but they are not the *sole* determinants of the values and decisions.

One of the original reasons for laws against abortion in Texas, the jurisdiction of *Roe vs. Wade*, was the very high mortality and morbidity of the procedure in a time before antibiotics and blood transfusions. The current state of medical science also forms the criteria for the present laws which are, in part, related to the

possible viability of the fetus. In addition, the technological aspects of genetic counseling, the treatment of infertility, and methods of birth control all affect the issue. These changing facts in *medical science* are one of the considerations in the decisions concerning abortion. There are also *social* issues for the physician. The physician is licensed by the state, for example, and has an obligation to abide by the laws of the society in which he or she practices. If the law permits abortions, then there is also a *metaphysical or religious* issue for patients, doctors, and hospitals as to whether they want to choose or perform abortion as an elective procedure. Finally, there are the central issues of the *individual rights and well-being* of both the mother and the fetus or unborn child. If one understands government to be a monopoly of coercive power, there are also the issues of privacy as opposed to what are the concerns of the state. On the other hand, there is also the political issue of the uses of taxation in a pluralistic society. Our perceptions of the facts are important, and sometimes an overriding consideration, but they are not the *sole* determinants of our values (Rutherford, 2004, p. 141).

Circumstances, such as our technological and political environment, also change. Politics based on power, and even perhaps a needed balance of power, reach an absurdity when there is a foreign policy of mutual assured destruction in which that power cannot be used without not only self-destruction, but the destruction of the foundations of much of life on earth. There is thus also a need for moral concepts of universal equality understood as a respect for individual personal dignity and our common humanity. It is the moral concept of universal equality that makes the accommodation of diversity and a wide variety of attributes possible.

The political tragedies of the twentieth century, a century which coined the word genocide, bore witness to the need for a respect for personal dignity and our common humanity. The United Nations, for example, in 1948 passed *The Universal Declaration of Human Rights*. The Preamble begins, "Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world" (United Nations Declaration of Human Rights, 1948).

Since World War II there has been a concern that our technical progress has far exceeded our biological adaptive mechanisms and our cultural moral structures. In evolutionary theory this is referred to as the "nuclear trap." Among the problems that threaten the future of all peoples are those of nuclear or biological warfare, and the level of totalitarianism and terrorism which technology has made possible. It is difficult to imagine an adequate resolution of global problems without a concept of universal equality and a respect for human life and our common humanity. The advantages of cooperation are also enormous, cooperation requires community, and to live in a community requires some moral constraint. We now live in a pluralistic global community and to build a more stable world order there is a need for values that recognize our common humanity.

Medical ethics are an applied example of a multidimensional understanding of human nature that can bring some coherence to the different moral perspectives

and enable dialogue. Medical ethics also have a lot to offer political philosophy at this particular time in history because they have at least the capacity to accommodate pluralism in a global community without coercion or alienation.

UNITED STATES CONSTITUTIONAL DEMOCRACY

> If Men were angels, no government would be necessary…In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and the next place, oblige it to control itself. James Madison in Federalist 51 (1788/1987)

> All honor to Jefferson – to the man who, in the concrete pressure of a struggle for national independence by a single people, had the coolness, forecast, and capacity to introduce into a merely revolutionary document, an abstract truth, applicable to all men and all times. Abraham Lincoln in a letter to Henry L. Pierce and others (1859)

The Declaration of Independence

The founding principles of United States constitutional democracy were put forth in the Declaration of Independence:

> We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with inalienable rights, that among these are life, liberty and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed.

In 1856, before his presidency or the beginning of the Civil War, Abraham Lincoln said:

> Our government rests in public opinion. Whoever can change public opinion, can change the government, practically just so much. Public opinion, or [on?] any subject, always has a "central idea," from which all its minor thoughts radiate. That "central idea" in our political public opinion, at the beginning was, and until recently has continued to be, "the equality of men." (Basler, 1953, Vol. II, p. 385)

In his "I Have a Dream" speech in 1968, Martin Luther King, Jr. urged us to live up to the ideal in the Declaration of Independence that "all men are created equal" (NPR, 2010).

The United States Declaration of Independence was written in the manner of Euclidean geometry. Its first moral assertion was that "all men are created equal," and this put everything that followed, including life, liberty and the pursuit of happiness in a moral context. We have struggled to live up to that ideal, but Jefferson, Madison, Tocqueville, Lincoln, and the great reformers, such as the women suffragettes and Martin Luther King, Jr., all considered the primary moral concept of United States constitutional democracy to be equality (Rutherford, 1992, pp. 6–7). Because of the tragic flaw of slavery at the time of our Founding, it has taken a Civil War and a long struggle for civil rights for us to progress in our attempt to fully live up to these principles.

The four-part framework of analysis based on the multidimensional aspects of human nature can be applied to the several origins of the concept of equality in Western Civilization and their incorporation into United States constitutional democracy. Canon Law, Roman Law, English Common Law, and the social contract theory associated with constitutional law each had a different source of moral authority. Each was based on a different type of ethical system and each focused on a different aspect of human nature.

Canon Law, for example, was based on a religious or metaphysical source of authority and it contained universal ethical principles of equality based on a reverence for God and reciprocity toward one's fellow humanity. It is based on a duty to "love God with all thy heart and with all thy soul and with all thy strength and with all thy mind; and thy neighbor as thyself" (English Standard Version Bible, 2001, Luke 10:27; see also Lev 19:18, Deut 6:5, Mark 12:29, Matt 22: 36–40). The equal dignity and worth of all persons in this religious system derives from a belief that we are all children of God and that we are made in God's image. Equality is intrinsic and not derived from one's individual attributes, but from the relationship between God and humanity.

Roman Law, on the other hand, incorporated significant aspects of Natural Law. This was a perceived natural moral order in the universe which could be understood by all persons because it was believed that all persons share a capacity for right reason, the ability to know basic right from wrong. Equality was also based on a concept of reversibility which requires reason, and imagination to consider a reversal of circumstances.

English Common Law in feudal society derived its moral authority from yet another source–not from God or nature, but from social custom and tradition. This was primarily a communitarian ethical system based on the traditional rights and responsibilities in society.

Finally, the social contract theory associated with constitutional law derives its moral authority beginning with the individual in a state of nature concerned primarily about his or her own safety and happiness. Its premise is that everyone would be free and equal in a state of nature and that everyone is endowed with natural rights which they are entitled to defend. It is based on what we now describe as human rights and a just claim to resist the violation of those rights.

Thomas Jefferson described the Declaration of Independence only as "an expression of the American mind" with its authority resting on the "harmonizing sentiments of the day" (Foner, 1950, p. 802). In a general way, however, the United States Constitution incorporates and balances each of these four ethical systems as they apply to the several aspects of universal equality and the coercive powers of government.

The United States Constitution

The multiple purposes of law and government are described in the Preamble of the Constitution which reads:

> We the People of the United States, in Order to form a more perfect Union, establish justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

These purposes of government are compatible with a multidimensional understanding of human nature. The general welfare is about basic needs, justice is a social concept, domestic tranquility and the common defense are about rational order, and liberty includes the freedom of religion and opinion. Each of these is also reflected in a general division of powers into legislative, judicial, and executive branches of government with religion and speech then being separated from the coercive powers of government. That division of power is also by function rather than class. Both the purposes of government and the division of powers in the Constitution along with the Bill of Rights can be understood within the four-part multidimensional understanding of human nature based in biology which is being described. In the context of biology and politics, remember that Madison, the "Father of our Constitution," considered government to be the greatest of all reflections on human nature.

One of Madison's greatest concerns as expressed in the Federalist Papers 10 was the adverse effects of factions. He also in the Federalist Papers 47 (Madison, Hamilton, & Jay, 1987) stated that "The accumulation of all powers, legislative, executive, and judiciary, in the same hands, whether of one, a few, or many, and whether hereditary, self-appointed, or elective, may justly be pronounced the very definition of tyranny." The division of the powers of government thus also included many elaborate checks and balances. To counteract a will to power it was inverted in part to a will to resist tyranny.

There is another division of powers with federalism. The Constitution granted limited and enumerated powers to the national government. Each of the states, for example, has its own constitution and court system. More than 90% of legal cases are heard in state courts. Different policies that best suit their communities can be enacted and tested in this "laboratory of democracy" at the state level without directly affecting the rest of the country.

Regarding sovereignty, the first three words of the Constitution are "We the People." The Constitutional Convention invited representatives from the 13 states in the Articles of Confederation. The Constitution they produced had to be ratified by 9 of the 12 states that attended. The government was thus a representative democracy based on the consent of the people, but also a product of a union of states. This combination is reflected in a bicameral legislature, the Electoral College, the criteria for amending the Constitution, and the legal plurality of federalism.

It is important also to refer to the government of the United States as a *constitutional* democracy because it balances both procedural and substantive concepts of equality. There is a democratic procedural equality with "one person, one vote" and majority rule. This procedural equality is essentially a ritualization of coercive power based on the consent of the governed. There is also a substantive equality in the Constitution and the Bill of Rights that includes "Higher

Law" principles and the protection of individual rights against the possible abuses of majority rule (Corwin, 1955). These substantive protections involve mostly negative freedoms which place limitations on the coercive powers of government. These substantive protections can be amended, however, by a constitutional convention or ⅔ of the legislature and ¾ of the states. The Constitution can thus be changed by a supermajority. The Maldives is more than 95% Muslim and the recent Constitution of the Maldives, for example, with this supermajority limits citizenship to Muslims. Madison hoped that the Bill of Rights would be maintained even against a supermajority because those rights would come to be recognized as maxims of free government (Diamond, 1979, p. 71).

Martin Seymour Lipsett, in the concluding chapter of his book *American Exceptionalism* (1997, p. 275) used a quote from my book, *The Moral Foundations of United States Constitutional Democracy* (Rutherford, 1992), that in America "the free and equal individual with moral responsibility is the basis of communal solidarity" (pp. 23–24). This idea of forming a government on these moral principles and then forming a constitutional democracy which limited and separated the coercive powers of government and incorporated both procedural and substantive concepts of equality was exceptional from a historical perspective.

In 1795, Fisher Ames, a congressman from Massachusetts compared our system of government to a monarchy. "A monarchy," he said, "is a merchant-man which sails well, but will sometimes strike a rock, and go to the bottom; a republic is a raft which will never sink, but then your feet are always in the water" (Bartlett, 1968, p. 491).

Legal Philosophy

> …one might wonder whether it makes sense to speak of "law" as a self-defined or unity group at all. Brian H. Bix *in Jurisprudence: Theory and Context* (2019, p. 11)

Alasdair MacIntyre in *God, Philosophy, Universities* (2009) described the academic fragmentation of knowledge and the absence of any integrated and overall view of things. A biological perspective with a multidimensional understanding of human nature can provide a useful framework of analysis for the fragmented field of philosophy, including the field of legal philosophy.

Most of the disputes in legal theory center around the claims of legal positivism and its critics. Legal positivism doesn't begin with any moral assertions and, in fact, it does just the opposite. In an attempt to be scientific, legal positivism thinks it is worthwhile to separate a description of law based on just empirical facts from any normative or moral judgments. In this manner the "hard" legal positivists don't find any universally accepted legal values such as equality, freedom or human rights.

There developed several variations of legal positivism represented in general by John Austin, the most prominent nineteenth century legal theorist and H. L. A. Hart, the most prominent twentieth century legal theorist.

John Austin (1790–1859)

John Austin, an English legal philosopher, had a goal to transform law into a true science. Law, according to Austin, is a social fact and it could be described in strictly empirical terms. Leslie Green, a legal philosopher at Oxford, has stated that earlier positivists such as Hobbes, Bentham and Austin "thought that law is constructed of commands, threats, and obedience. A sovereign is a person or group who enjoys the habitual obedience of most others but does not habitually obey anyone else. Law is a general command of a sovereign backed by force" (Hart, 2012, p. xx).

H. L. A. Hart (1907–1992)

H. L. A. Hart was a Professor of Jurisprudence at Oxford University. In his book *Concepts of Law* (1961) he began with a critique of John Austin's theory of law. As an alternative, Hart proposed a "rule of recognition." Hart's project was also reductionist, but he also felt that law was too complex for a definition and therefore he described what turned out to be several concepts of law and several aspects of a rule or rules of recognition. This inverted Austin's description of law as the command of a sovereign to one of social "rules of recognition."

All of the proponents of legal positivism agree that it is based on sociology and that law and legal systems are social constructions. When one considers both human nature and society to be multidimensional, however, the different critiques of legal positivism are predictable. One would expect a merely objective social description of law to be criticized from metaphysical, rational, and individual perspectives. The most prominent critics have been Lon Fuller, John Finnis, and Ronald Dworkin.

Lon Fuller and John Finnis both critiqued legal positivism using versions of a Natural Law that can be known by reason. Roman Law based Natural Law on our capacity of reason to know a natural moral order. St. Thomas Aquinas, a medieval theologian, attempted to integrate the two great sources of Western Civilization based on faith and reason by describing Natural Law as that part of Eternal Law that we can also know by reason.

Lon Fuller (1902–1978)

Lon Fuller, an American legal philosopher, in his book *The Morality of Law* (1964), opposed legal positivism and described a secular and procedural form of Natural Law theory.

Fuller described eight principles of legality that must be met for legal rules to count as genuine laws. These "principles of legality" would assure that all law would embody certain moral standards of fairness and predictability that constitute important aspects of the rule of law.

Fuller also wrote that "Where the morality of aspiration starts at the top of human achievement, the morality of duty starts at the bottom. It lays down the

basic rules without which an ordered society is impossible, or without which an ordered society directed toward certain specific goals must fail of its mark. It is the morality of the 'Ten Commandments'. It speaks in terms of 'thou shalt not,' and less frequently, of 'thou shalt.' It does not condemn men for failing to embrace opportunities for the fullest realization of their powers. Instead, it condemns them for failing to respect the basic requirements of social living" (Fuller, 1964, pp. 5–6).

Hart, in the very first paragraph of his 1965 book review of Fuller's *The Morality of Law*, remarked that it may be "that our starting points and interests in jurisprudence are so different" that he and I "are fated never to understand each other's works" (Hart, 1965, p. 593).

John Finnis

John Finnis has been one of the most prominent advocates of Natural Law theory, but his newer formulation of Natural Law has been somewhat controversial.

Finnis, in his book *Natural Law and Natural Rights* (2011), based his opposition to legal positivism on concepts of the human good and practical reason. In describing what is worthwhile, valuable, and desirable in life Finnis describes seven "basic forms of good." Finnis also describes nine "basic requirements of practical reasonableness" and states that practical reason has direct unmediated apprehension of basic human goods. Finnis appears to have two objectives in his interpretation of a new Natural Law. First, Finnis attempts to avoid what has been called the naturalistic fallacy of deriving an "ought" from and "is." Secondly, Finnis and the "new Natural Law" philosophers want to avoid any metaphysical, religious, or teleological claims. The good can be known intuitively by practical reason and is self-evident rather than being derived from nature or theism.

In an article entitled "What is the Philosophy of Law?" Finnis (2014) also wrote, "The philosophy of law is not separate from ethics and political philosophy, but dependent on them" (p. 133).

Ronald Dworkin

Ronald Dworkin's critique of legal positivism has been that it doesn't take individual human rights seriously. In *Taking Rights Seriously* (1977), Dworkin, another Oxford legal philosopher, emphasized individual rights as opposed to a descriptive sociology of law. Dworkin also wrote that "in countries with complex legal systems such as the United States and Great Britain "no ultimate distinction can be made between legal and moral standards, as positivism insists" (p. 65).

Together these legal theories represent four different approaches to legal philosophy. The proponents within legal positivism and their critics are addressing different questions and perspectives with different starting points and

assumptions in addition to focusing on different aspects of human nature and the world in which we live. A fair assessment would be that each of the legal theorists probably has a valid and valuable point. The critique would not be that they are wrong, but that they are not being inclusive enough. A multidimensional understanding of human nature brings some understanding and cohesion to this fragmentation.

Judge Richard Posner and the Holmes Lectures of 1997

H. L. A. Hart (1958) presented his views in a Holmes Lecture at Harvard Law School in 1959 entitled, "Positivism and the Separation of Law and Morals." Almost 40 years later, Richard A. Posner, Chief Judge of the United States Court of Appeals for the Seventh Circuit, gave the Holmes Lectures at Harvard Law School in 1997 entitled, "The Problematics of Moral and Legal Theory" (Posner, 1998). Judge Posner, by applying the same descriptive sociology of legal positivism in law to morality, stated that "morality is local" and "There are no *interesting* moral universals" (p. 1640). This combination of only descriptive positivism in both law and morality results in a position of relativism in moral, political, and legal philosophy.

Posner's major argument against academic moralism was that even *within* the United States, "moral theorists are up against the brute fact that there is no consensus on any moral principles from which answers to contested moral questions might actually be derived" (p. 1657). Posner thus recognized academic moral philosophy as being fragmented. Posner stated that "every moral theory takes for granted that a uniform morality is desirable, while what a society like ours needs is moral variety, in fact, we need some immoralists, or at least some amoralists" (p. 1642).

Posner was also provocative in the examples that he used. He stated that morality was local, and the most local was subjectivism. He described the Nuremberg trials of Nazi leaders to be *politically* right, "But it was not right because a trial could produce proof that the Nazis *really* were immoralists; they were, but according to our lights, not theirs" (p. 1645). Posner also claimed that inclusiveness, lacking as it does any definite scope of content, has no moral valence. Posner stated that "one reading of Nietzsche is that he was against morality, but another is that he simply preferred, on aesthetic grounds that are impossible to refute, the moral code of a warrior society, a code both cruel and inegalitarian… There is no common ground to appeal to in arbitrating among competing moralities" (p. 1651).

Posner then, on the other hand, also stated that he does not embrace a "vulgar relativism" that teaches that we have a moral duty to tolerate cultures that have moral views different from ours. He also stated that he is not a moral relativist in the "anything goes" sense more accurately described as moral subjectivism (p. 1642). He found no criticism of "moral theory" as a synonym for normative reasoning (p. 1639). He described law and morality as parallel methods of social

control for bringing about the kind and degree of cooperation that a society needs in order to survive and flourish (p. 1694).

Posner suggested a type of moral relativism which is an *adaptationist* conception of morality judged by its contribution to the survival, or other goals, of a society. Posner, however, opposed an originalist interpretation of the law. He also recognized that some cases can be decided on issues unrelated to morality and the other cases are more appropriately decided by legislative action. He recommended that judges should try to understand the effects of their decisions and he thus recommended pragmatism to create the "best" results for society. Judge Posner (2014) has also written about and promoted an economic analysis of law in *Economic Analysis of Law* (9th ed.) and in *The Economics of Justice* (1981).

Any student in philosophy can find fault with any particular singular moral theory. It is sophomoric, however, to discard a moral perspective because it doesn't apply to all cases without exception due to competing perspectives. Human nature is multidimensional and because a particular perspective doesn't explain everything doesn't mean that it is not part of the whole. Posner's suggestion of an "immoral" or "amoral" position is thus mostly provocative and his endorsement of pragmatism is more inclusive in his economic theory of law.

Legal positivism is a profound change from the opinions of the Founders of United States constitutional democracy. Because it fails to consider moral criteria, legal positivism has been described as "sterile" and "useless" (Hart, 2012, p. 242; Law Page, "Legal Positivism").

SUMMARY

By natural selection through evolution, we are not indifferent to our fate. As living organisms that evolved through a process of natural selection, we have basic instincts for survival, food, reproduction and our well-being. The long dependency of our childhood and the need for cooperation requires social abilities. We have the capacity for reason. With language we have a capacity for narrative and abstract thought. We are multidimensional based on the evolutionary development of these functional capacities of our brains and there is a similar pattern in the development of our mental capacities in childhood through experience. We are the result of both nature and nurture. We have intentionality. We have a capacity to transcend our environment and, to a limited but significant degree, choose alternative futures. If one postulates the goals of human survival and well-being, then moral and political values become conditional factors for achieving these ends.

Therefore, when considering moral, political, or legal philosophy or indeed any philosophy or philosopher it is useful to consider the assumptions being made about the individual, society, the physical universe, and metaphysics concerning meaning and purpose. Considering each of these perspectives provides just a framework of analysis, but it does bring some understanding and cohesion to the fragmented field of philosophy, including moral, political, and legal philosophy.

Some political philosophers, dating back to Aristotle, have thus recommended moderation and more recently a balance of consciousness, a parliament of the mind, or a reflective equilibrium. A multidimensional understanding of human nature would also give one a perception of choice and free will. Because this framework is based on a naturalized epistemology it is something that we can understand intuitively and it relates to many endeavors and disciplines.

Consider for example the ship analogy. To have a successful voyage each ship must be in good repair and seaworthy. The ships need to sail together without colliding with each other or getting lost. There must be the knowledge to navigate to the destination. And finally, there needs to be a purpose for making the journey.

Epistemology is the study of ways of knowing and biology is an epistemic process. Unlike physics and chemistry, which relate to matter and energy, biology also relates to information, which is both genetic and cultural in human biology. In evolutionary biology and in culture the transmission of information is also historical. Life involves the presence of intrinsic values. Biology is based on information about how to compose, maintain, reproduce, and transmit life processes. There are emergent properties, synergies, and values that exist and are lost in a reduction to chemical elements or physics (Corning, 2018; see also Wilson & Wilson, 2007).

For these reasons, biology rather than physics will become the primary paradigm of this century. This is in part due to the genome projects and the influence they will have on scientific research. It will also, however, be a result of a much broader understanding of both genetic and cultural evolution and our interaction with the world in which we live. Ecology changes and we now have weapons of mass destruction and other serious global issues. A biological paradigm will thus also be driven by very practical and pragmatic issues concerning life on earth and our need to live in a pluralistic global community. We tend to be territorial and tribal, but we also need to affirm our individual personal dignity and our common humanity.

Concerning politics, discord and alienation often result when as a society we develop ideologies that relate to one of our concepts of metaphysics, nature, society, or the individual, but to the exclusion or minimization of the others. Singular theories that have based order and moral authority on only individual material needs, society, reason, or a metaphysical/religious concept have often led to individual and communal tragedy. By focusing on even perhaps a particular truth, in a quest for certainty, they have too easily justified the use of coercive force or been the cause of alienation. The quest for certainty often seeks truth in only one parameter and then the end is often used to justify the means.

In George Orwell's *1984* (1949), Big Brother, Newspeak and Doublethink destroy the freedom of thought and allow contradiction such as WAR IS PEACE. History becomes what serves the state, for "who controls the past controls the future; who controls the present controls the past." In this dystopian novel, Winston Smith represents rational thought and Julia represents sex and love. In the end, both of their spirits are broken and subdued by brainwashing and terror. In Orwell's *Animal Farm* (1990), all animals are equal, but some

animals are more equal than others. Orwell saw the totalitarian state as a great threat to humanity and their ideologies as a thin veil for power for the sake of power. In his writing he emphasized the importance of language and history. Oppression begins with the distortion of the truth and therefore candor is one of the burdens of freedom. He urged us to accept the moral, economic, and political responsibilities of freedom, for he knew how easily freedom could be lost.

Ideas and moral values are thus important in politics and foreign policy because our survival and well-being as well as the enjoyment of individual freedom are not inevitable. They are contingent, to a large degree, on our willingness and ability as moral agents to place our free will within ethical constraints. It is indeed the self-imposed ethical and moral foundations of government that change mere obedience to the coercive powers of government into a sense of consensual responsibility for a moral duty, a just order, the common good, and human rights. The coercive powers of government are also less needed when those moral values and ethical constraints are incorporated into the culture and the intermediary institutions, such as voluntary associations, education, law, medicine, economics, science, religion, and philosophy. This is even truer when those moral values and ethical constraints are in the character of the citizens.

A cosmic perspective on time, space, evolution, and culture should also make us both humble and grateful. Brian Greene, a well-known physicist and author of *Until the End of Time: Mind, Matter, and Our Search for Meaning in an Evolving Universe* (2020), has written that our existence is astonishing and a foundation for gratitude (p. 323). The big picture story is indeed wondrous and astonishing. Concerning gratitude, we cannot always pay back, but as part of this story we can follow an old adage and pay forward.

A multidimensional understanding of human nature which considers the individual, social, rational, and metaphysical perspectives can provide a very useful framework of analysis and bring some understanding and coherence to the very fragmented perspectives within moral, political, and legal philosophy. Carl Sagan, in his book on the evolution of human intelligence, also wrote that "the hallmark of a successful, long-lived civilization may be the ability to achieve a long-lasting peace among the several brain components" (Sagan, 1977, p. 244).

Based on the advantages of cooperation, trust, loyalty, and social order, and also a sense of belonging related to kinship, ethnicity, culture, history, language and/or religion, we tend to be tribal at several levels. In order to survive and flourish as an individual or as a social group, however, we now need to meet new challenges and learn to survive and flourish as a species in what is a pluralistic global community. It is the moral concepts of a respect for human life and equality, understood as a respect for individual personal dignity and our common humanity, that at least have the capacity to make the accommodation of diversity and a wide variety of attributes possible in a pluralistic global community without coercion or alienation. These also are a part of who we are.

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THE BIOPOLITICS OF COVID-19: REPERCUSSIONS FOR INTERNATIONAL RELATIONS

Andrey Makarychev

ABSTRACT

This chapter seeks to look at the most important trends in international relations and global affairs spurred by the coronavirus crisis, and its long-term repercussions. In this analysis the author adapts the current biopolitical scholarship to such disciplines as security studies, foreign policy analysis, international relations and regional studies, and world politics and globalization. The chapter starts with discussing the biopolitics of the coronavirus crisis from a security perspective that requires a juxtaposition of COVID-19 emergency with some other securitized biopolitical events and experiences such as the war on terror and the refugee crisis. When it comes to the global level, the analysis includes the new roles of global organizations and their contribution to the fight against COVID-19. Another perspective is grounded in the discussions on the idea of "the international" and the reverberations of COVID-19 for the entire system of inter-state/inter-governmental/trans-national relations, including its regional dimensions. From the viewpoint of national foreign policies, the pandemic can be viewed as a global calamity producing new forms of diplomatic activity that significantly re-actualize and expand the concepts of biodiplomacy and health diplomacy.

INTRODUCTION

The state of epidemiological emergency provoked by the corona virus has significantly altered the overall structure of the academic discourse and drastically elevated the validity and admittance of the biopolitical knowledge as a key element of social science scholarship. From the academic sidelines, biopolitical

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categories dashed into the very center of the current debate that in the context of the COVID-19 crisis and its long-term effects appear to be impossible without a strong emphasis on healthcare and medicine, corporeality, bodily politics, and the issues of life and death as constitutive for political agendas. The bulk of the nascent academic literature on COVID-19 points to multiple domestic elements of new biopolitical regimes of crisis governance, including societal reactions to lockdown measures, their long-term economic effects, and implications for democratic freedoms. Biopolitical scholarship contributes to academic debate through grasping the crux of the "new normal" – a future world in which lines of distinctions will be less defined by geopolitical considerations, and more by policies of protection and care taking, both symbolic and practical. In this world the lines between individual bodies and the collective bodies of communities and nations will be increasingly blurred, and the minds of the population will be more exposed to manipulations by the multifarious flows of (mis)information with different level of trustworthiness and credibility.

Apparently, the ubiquitous feeling of existential anxiety and insecurity has boosted the popularity of the concept of bare life coined by the Italian political philosopher Giorgio Agamben and replicated by his multiple followers. The idea of bareness in the biopolitical context signifies a sense of unprotected life beyond legal and institutional arrangements, a physical existence fundamentally endangered by forces beyond our control – from natural catastrophes to wars. Another of Agamben's favorite concepts – *homo sacer* – metaphorically constructs a figure of defenseless outcast whose life does not count much, and whose potential death won't be considered as something exceptional or unusual. And, finally, this biopolitical chain is complemented by the metaphor of the *camp* as an exemplification of the permanent *Ausnahmezustand*, the global state of exception.

In the meantime, international and global dimensions of the current pandemic remain less studied. This chapter seeks to contribute to filling this gap in the biopolitical scholarship by looking at the most important trends in international relations and global affairs spurred by the coronavirus crisis, and its long-term repercussions. In my analysis I adapt the current biopolitical scholarship to such disciplines as security studies, foreign policy analysis, international relations and regional studies, and world politics and globalization. I start with discussing the biopolitics of the coronavirus crisis from a *security perspective* that requires a juxtaposition of COVID-19 emergency with some other securitized biopolitical events and experiences such as the war on terror and the refugee crisis. When it comes to the *global level*, the analysis includes the new roles of global organizations and their contribution to the fight against COVID-19. Another perspective is grounded in the discussions on the idea of "the international" and the reverberations of COVID-19 for the entire system of inter-state/inter-governmental/trans-national relations, including its *regional dimensions*. From the viewpoint of *national foreign policies*, the pandemic can be viewed as a global calamity producing new forms of diplomatic activity that significantly re-actualize and expand the concepts of biodiplomacy and health diplomacy.

THE BIOPOLITICS OF CRISES: SECURITY PERSPECTIVES

Academic interest in biopolitics has been always contingent on the dynamics of political events in the world. The end of the Cold War and the fall of the communist system have opened much space for a cluster of theories with liberal background that were interested in institutional transformations and normative matters more than in human lives and bodies. The security shock of 9/11 has not only drastically re-actualized all possible schools of security studies, but also integrated biopolitical concepts into the research on terrorism and the exceptional measures aimed at its eradication. The refugee crisis of 2015 has further expanded the room for re-conceptualizing borders, mobility, multiculturalism, and belonging in biopolitical categories, including those coming from racial distinctions prompted by the right-wing populism.

Security studies was one of the academic disciplines that opened up its traditional vocabulary of threats and force projection to biopolitical reasoning (Brennan, 2019). Some authors claimed that security is more a biopolitical than a geopolitical problem (Samimian-Darash, Henner-Shapira, & Daviko, 2016, p. 331). However, in all the cycles of (geo)politicization and securitization scholars of biopolitics were representing minority views and thus struggling for recognition and acceptance of their ideas in the global academic community. In recent decades, they did receive a lot of attention and interest, yet exactly because they were largely perceived as an innovative alternative to major and well-established schools of thought in political science, international relations, sociology, and cultural studies.

The current explosion of interest to biopower is built on the previous waves of biopolitical theorizing about the global war on terror and the refugee crisis, and is grounded in new biopolitical distinctions of "unsecured, and therefore 'dangerous', lives" (Bell, 2006, p. 152), as opposed to "safe forms of life," or "good circulation" of people as opposed to "bad circulation" (Dillon & Lobo-Guerrero, 2008, p. 280) of "maladjusted populations" and "underdeveloped life" (Evans, 2010, p. 420). These dichotomies were verbalized by multiple medical tropes (such as "cancerous terror cells") that shifted "the terms of debate from the political to the ultimately technocratic terrain of fixing social pathologies… [thus forming] a global liberal strategy of pacification and stabilization geared toward securing humanity from threats emanating from within humanity" (Kienscherf, 2011, p. 137). In result, "any form of political subjectivity that stands against the technical recovery of the good life is necessarily rendered dangerous for the greater social good" (Evans, 2010, p. 420), and tends to be sidelined or excluded.

Arguably, each of the recent turning points in global politics – the war on terror, the refugee crisis, and the COVID-19 pandemics – "created its biopolitics" (Singh, 2020). Authoritative voices in the post- 9/11 literature posited that "the war against terror emerged out of a generic biopolitics of contingency in the west, and is being conducted according to its political technologies and governmental rationalities" (Dillion, 2007, p. 8). Within this logic, counter-insurgency was

conceptualized as a form of biopolitics since it leaves no other "option but to kill certain types of life" for saving other lives, which seems to be similar to "the language of infection" (Anderson, 2011, p. 221) that implies isolation and purification of bearers of sickness or illness. Reaction to the 9/11 terrorist attack by the United States is often referred to as an illustration of "the manner in which the modern biopolitical state justifies mass killings in the name of life, and both produces and exploits racism in order to do so" (Taylor & Taylor, 2011, p. 51). In this context, one may say, the "body of the people as a free and equal citizenry endowed with the capacity to reconstitute itself through recourse to historically venerated social significations was replaced by a biological population that the state protected from biological terrorism" (Pease, 2003, p. 12). In this vein, the issue of the financial value of human life was brought to the limelight of academic discourse (Gilbert & Ponder, 2014), and borders were deployed within the biopolitical epistemology (Vaughan-Williams, 2010) as well. This type of biopower extended much beyond the Euro-Atlantic West: according to a report, in China "a similar biopolitics of exclusion has emerged in the state's handling of its alleged Uyghur terrorist threat" (Roberts, 2018, p. 236).

In a similar way, debates on immigration were largely spurred by populist discourses emphasizing "the need to secure populations from the threat of potentially dangerous life" (Pinkeerton, 2019, p. 5). As a critically-minded scholar noted, "the biopolitics of immigration looks after the bodies of the host community and protects it against parasites that might want to invade it, but it needs to equip itself with tools that will allow it to trace, detect and eliminate these parasites. Technology is mobilized to probe and scan the bare life of those wanting to penetrate the healthy body politic: through the use of fingerprinting, face recognition and scanners in lorries traveling" (Zylinska, 2004, p. 526). It is in this context that some practical measures – for example, biometric control over asylum-seekers and refugees - were introduced and discussed (Jacobsen, 2015). What the refugee crisis brought to light is that a key biopolitical category – protection of people's lives – in times of an emergency may constitute a major justification for deviating from the normalcy of democratic freedoms and citizens' rights. As multiple critics of anti-immigration measures posited, "abnormal, degenerate and dangerous bodies are to be treated, incarcerated or expelled in order to foster the life of the social body" (Nishiyama, 2018, p. 203).

The biopolitical debates triggered by each of the global misfortunes – the war on terror, the refugee crisis, and the COVID-19 pandemic - were revolving around the value of human life. In this respect "biopolitics is always a politics of differential vulnerability. Far from being a politics that erases social and racial inequalities by reminding us of our common belonging to the same biological species, it is a politics that structurally relies on the establishment of hierarchies in the value of lives, producing and multiplying vulnerability as a means of governing people" (Lorenzini, 2020). By the same token, different modes of biopolitics were in one way or another marked by the "deep-seated impetus to improve and purify life … as innate potential in modern (liberal) political rationality" (Villadsen & Wahlberg, 2015). As Thomas Lemke (2011, p. 4) posited, "'life' has become an independent, objective, and measurable factor, as

well as a collective reality that can be epistemologically and practically separated from concrete living beings and the singularity of individual experience… [yet in the meantime] life does not represent a stable ontological and normative point of reference." In this sense, "corporeal fragility both equalizes and differentiates: all bodies are menaced by suffering, injury, and death (precariousness), but some bodies are more protected and others more exposed (precarity)" (Watson, 2012).

Each of the three critical junctures I have been referring to offers its own frame for the constellation of key concepts central for biopolitical analysis – sovereignty, governmentality, and biopower. The 9/11 tragedy has reinvigorated and exposed the sovereign vulnerabilities of the leading power of the West and, through the war on terror, boosted a set of exceptional(ized) measures to fight terrorism. In many Western countries this "reconstituted the archetype of the soldier-citizen" with a militarized subjectivity and the concomitant discourses of sacrifice (Baggiarini, 2019, p. 243) as part of the securitized governmentality, which has moved biopolitics in a thanatopolitical direction. The refugee crisis has biopolitically polarized many affected societies (Mavelli, 2017b) into adherents of a multicultural and immigrant-friendly type of governance, and their opponents who lambasted the flows of refugees as a major challenge to national sovereignties, and who were capable of mobilizing millions of votes all across Europe in support for the plethora of anti-immigration and consequently European Union (EU)-skeptic groups. This polarization was a major factor that explains the rise of right-wing parties in the West that redefined traditionalism, nationalism and conservatism as anti-multiculturalist ideologies of nativism and ethnic homogeneity that might be described in the categories of biopopulism and bionationalism (Antal, 2017).

As for the COVID-19 emergency, it contributed to the reformulation of sovereignty from the usual geopolitical and spatial domains to the protection of human bodies, as well as to the ensuing merger of biopolitics and governmentality: the two intertwined with each other thus forming a core of a post-political shift from ideologically charged liberal values to technologies of public management. The pandemic crisis has also reinvigorated the practices of health diplomacy that can be approached from the biopolitical perspective. Therefore, COVID-19 had significantly changed the structure of security debate by shifting its core from issues of geopolitics to what in the academic literature for quite some time has been known as global biopolitics manifested through political strategies and calculations based on protecting and securing human lives against multiple risks, threats and dangers to the physical existence of populations (Evans, 2010, p. 420).

THE INTERNATIONAL RELATIONS PERSPECTIVE: SOVEREIGNTY AND GOVERNMENTALITY

In this section, I look at the concept of the international and its derivatives – such as international relations and international politics – from the vantage point of a broadly understood biopolitics, including its COVID-19-related dimension. More specifically, using Foucauldian perspective, I discuss an interplay of sovereignty

and governmentality as two focal points of the international. By governmentality I understand a concept that denotes the work of governing as requiring public authorities "to act upon the particulars of human conduct so as to enhance the security, longevity, health, prosperity, and happiness of populations. Governmentality draws attention to all those strategies, tactics, and authorities – state and nonstate alike – that seek to mold conduct individually and collectively in order to safeguard the welfare of each and of all" (Inda, 2005, p. 6).

The 2020–2021 global state of emergency, largely administered and managed by sovereign governments, has in the meantime paradoxically unveiled the limitations of sovereignty when it comes to exceptional circumstances. There were plenty of voices in the academia who for decades were skeptical about the ability of national governments to protect their citizens from terrorism, or properly take care of millions of refugees and internally displaced persons. The eruption of COVID-19 triggered a new wave of interest to the growing importance of practices of governmentality, as opposed to the sovereign power. In the pre-COVID academic literature governmentality was characterized as political technologies by means of which biopower has been exercised (Ojakangas, 2012, p. 9). In other words, biopolitics is "a specific technology and rationale of the government of modern society" (Rosenow, 2009, p. 509). In the concurrent opinion, "biopower may be said to be refined by liberal techniques of governmentality, but may also include more coercive or disciplinary forms of power" (Joseph, 2009, p. 424). More specifically, governmentality has a liberal pedigree, while biopower is a more all-encompassing term. In a radical version, "the international is a political sphere increasingly defined by liberal norms" (Neumann & Sending, 2007, p. 698) promoted through governmental means.

Apparently, this approach necessitates a discussion on what is liberalism from a biopolitical perspective. A typical viewpoint is that liberalism implies delegation of some of original responsibilities from governments "to non-state agencies of power, communities and even households" (Vrasti, 2013, p. 52). However, the equation of liberalism – including neoliberalism – with the deregulated free market capitalism overlooks the fact that liberalism is a form of biopolitical regulation (Rosenow, 2009, p. 505), opening new spaces for two fields of knowledge – medicine and statistics – to dominate the scene of what might be dubbed "algorithmic governance" and "medicalized society." Never before were there such huge opportunities to build political logic on the basis of arguments derived from these two terrains. Their combination constitutes the core of what might be dubbed "immuno-biopolitics" that "deepens biopolitical governance in an era of foundational uncertainty and recognized perpetual risk" (Swyngedouw & Ernstson, 2018, p. 16) associated with viruses, contagious diseases and their long-term consequences. This re-actualizes the Foucauldian idea of "self-secured subjects" (Reid, 2013, p. 355) that understands biopower as a political force constructing "entrepreneurial and resilient subjects who may be inscribed in and become part of the neoliberal order" (Mavelli, 2017a, p. 498).

Practices of biopolitical control and regulation have always been part of the liberal society. The liberal agenda in biopolitics also includes the issues of bio-legitimacy, along with the increasingly sophisticated and ubiquitous

bio-digitalization (Colman, 2015) and bio-surveillance (Maureira, Tirado, & Torrejón, 2018, p. 514) that raised many questions concerning inevitable transformations in the domain of liberal internationalism (Navarria, 2014). Yet in the meantime it also makes sense to re-actualize from today's perspective what Michel Foucault has dubbed "responsibilization," or individual practices of ruling our bodies and managing our corporeal lives – something that is to remain a key element of a liberal polity.

The Foucauldian understanding of biopolitics offers meaningful insights into the debate on the current transformations within - and challenges to – the liberal international order, leaving much space for various epistemologies of post-liberalism. Emblematic in this sense is a friendly polemic between Oliver Richmond and David Chandler. For the former, "a possibility of a post-liberal politics emerges, in which everyday local agencies, perhaps a technology of the self in Foucauldian terms, rights, needs, class, culture, custom and kinship are recognized as 'webs of meaning' in opposition to territorial notions of sovereignty" (Richmond, 2011, p. 118). As for Chandler, post-liberalism augurs "a clear epistemic break with … the legacy of a liberal world … of choice-making subjects" (Chandler & Richmond, 2015, p. 12). In his opinion, the liberal project was grounded in a "rights-based framing of political legitimacy in terms of autonomy and self-determining state authority, while the discourse of [post-liberal] governance focuses on technical and administrative capacity, or the way of rule, rather than the representative legitimacy of policymaking or its derivational authority" (Hanafi, 2010, p. 70). This interpretation makes post-liberalism a form of biopolitical governmentality beyond sovereignty, which opens ways for "confluence of neoliberalism and biomedicine" with such effects as commodification of human bodies and their parts, and the advent of the concept of "human capital." In this vein, the neoliberal view of the body as investment capital transformed the human person into "contractual negotiator who can treat his or her body, and parts therefrom, as alienable commodities, [and] who seeks to maximize his or her corporeal capital" (Tierney, 2016, pp. 377–378). This biopolitical model ultimately translates into the medicalized concept of "therapeutic domination" that "entails the expert application of an instrumentally rational technical procedure, typically a treatment protocol, to a subordinated individual or population in a situation of emergency, crisis, or disease, always to the supposed benefit of the treated" (McFalls & Pandolfi, 2012). In this interpretation, post-liberalism appears to be tantamount to a technology of biopower that aims at a more fundamental control over human lives, expands space for potential social manipulations, and challenges "the transcendent qualities of the autonomous, rational (neo-)liberal subject" (McFalls & Pandolfi, 2012).

In other words, if Foucault tried to reconcile measures of incentivizing and controlling human bodies under a common umbrella of neoliberalism, Chandler is more sympathetic with drawing a line between the original sense of liberalism – the freedom of autonomous subject as a primary value – and its later operationalization and rationalization through different techniques of governance, management and administration. In this sense Foucault's liberalism is Chandler's

post-liberalism. This definitional debate is helpful for offering a peculiar interpretation of the challenges the EU institutional model faces nowadays as a crisis of the Foucauldian conception of the governmental power beyond sovereignty and norms trumping military force. The post-liberal momentum many Western countries are going through implies an intrinsic transformation within liberalism – from ideologically driven values to technologies of governance, particularly when it comes to more complicated than ever relations with illiberal regimes.

Two issues related to the functioning of post-liberal governmentality in the pandemic time appear to be relevant for biopolitical analysis. One is what might be dubbed bio-inequalities (Fassin, 2009, p. 49) with the concomitant "hierarchisation of lives" and "technologies which sort populations into lives worth saving and those left to die" (Aradau & Tazzioli, 2020, p. 204); another issue relates to the apparent dysfunctionality of international regions in the anti-crisis management toolkits.

New Biopolitical Inequalities

COVID-19 brought new forms of inequality to the international scene (Chan, Gentile, Kinossian, Oakes, & Young, 2020, pp. 349–352). In the West, a deeply biopolitical debate concerns immunity passports that, as many believe, may create differentiation between human beings when it comes to their access to travel-related services, entertainment and leisure industry and hospitality infrastructure. Domestically, COVID-19 has unveiled cases of minority mistreatment (Africans in China, Roma in Europe) (Li, 2020).

In a wider sense, COVID-19 has confirmed the validity of those scholars who saw the international arena as composed of two biopolitical zones: the "insured" liberal life of the global North and the "uninsured" life of the global South (Ingram, 2009, p. 2090). Within this logic, "aimed at the pacification and normalization of unstable regions across the globe, biopower operates… as a biopolitical technique of security… This distinction between the stable Western 'metropolis' and the chaotic 'borderlands' of the developing world, is, in effect, a distinction between those political subjects who are able to govern themselves and those who are not" (Singler, 2018).

Within this framework, the North–South cleavages became more accentuated. The pandemic had spurred competition between states for vaccine supplies, raised moral dilemmas and practical questions of how to help developing countries in the "global South" (IntelBrief, 2021), and sharpened collisions between rich and poor nations, Indicatively, South Africa, India, and more than 100 other nations have called on the World Trade Organization (WTO) to temporarily waive patents for COVID-19 vaccines, saying they are being prevented from immunizing their people (Aljazeera, 2021). Biopolitical implications are manifested in deeper gaps between those who can afford large-scale purchase of vaccines (Canada, Australia, US, New Zealand) and those who can't and will need to either wait (and thus most likely stay in a relative international isolation), or use less efficient vaccines.

Within a wider Europe the gap in possibilities for vaccination between the EU and its eastern partners is so large that it became a matter of political attention: "Notwithstanding the mobilization of these significant resources for the region despite its own shortages and dramatic challenges during the pandemic, the EU still seems to be a step behind its competitors – primarily Russia and China – in showcasing its support" (Gherasimov, 2020, p. 6). In the long run, this may certainly affect the state of international relations in Europe, as well as EU's relations with non-European countries.

Another interesting layer of all of this is the role of China and Russia to provide their vaccines to developing (and other) countries. Vaccine diplomacy has to be re-conceptualized as a hybrid phenomenon: on the one hand, it is a specific tool of nation branding and soft power; on the other hand, it is a business policy of vaccine producers competing for their shares in the global vaccine market. Both sides will undoubtedly be among the major drivers shaping the reconfiguration of power and influence in many regions of the globe. Russia's vaccine race can serve as an example of a geo/biopolitical instrumentalization of the pandemic. Sputnik V was introduced in August 2020 as the first anti-COVID-19 vaccine, before completion of the required third stage of tests. Such a fast-track Kremlin's approach to vaccine development lucidly revealed its desire to exploit the global extraordinary situation to improve Russia's position in the international arena.

Biopolitical Challenges to Regionalism

Since March 2020 the bulk of decision-making power from the international and supranational levels was reclaimed back by nation states, yet even the largest nation governments are far from self-sufficient when it comes to resources and competencies (Italy, US). This raises a question of whether there is some niche for regional organizations such as ASEAN, NAFTA, African Union, and Black Sea Economic Cooperation in developing and implementing anti-crisis policies. Some of them lack authority in the medical sphere, others are short of funding for healthcare projects, which makes regional integration one of the weakest links in the international efforts to fight COVID-19.

A good example is the state of affairs within the Baltic Sea Region, previously considered as one of success stories of regional integration in the post-Cold War West. However, the drastic dissimilarities in the COVID-19 crisis management have engendered conflictual lines of distinction between regional partners. During the first wave of the pandemic Sweden has pursued much less restrictive and more liberal, in a sense, policy that drastically contrasted with all neighboring countries, which made a search of common denominators at the regional level quite complicated. Another example of dissimilarities in anti-coronavirus policies is an unusual tug-of-war between Estonia and Finland, two neighboring countries sharing common cultural and linguistic roots. However, with the outbreak of the pandemic the Estonian government has publicly raised concerns over hyper-restrictive policy of the Finnish authorities that prevented thousands of

Estonians working in Finland to regularly travel back and forth between the two countries. In the opinion of the official Tallinn, Finland has established entry rules that were above EU standards, which was considered as a derogation from the Schengen principles of open borders (ERR, 2021). And finally, the border lockdown with Russia has also complicated the integrity of the Baltic Sea Region as an inclusive and de-bordered cross-national space of human exchanges and flows.

FOREIGN POLICY ANALYSIS: NEW FACETS OF BIODIPLOMACY

At the intersection of biopolitics and foreign policy analysis one may find new forms of diplomatic activities and practices. The coronavirus crisis has raised interest to the concept of biodiplomacy that explicates how biological research and commercial activities become parts of the tackling of health emergency situations. "The term 'biodiplomacy' also extends to the strategy by which governments, private groups, and individuals influence the attitudes and opinions of other peoples and governments to create domestic and foreign policy concerning biological materials, equipment, and facilities" (Sutton, 2013). This interpretation of biodiplomacy points to its networked character, since it embraces a broad spectrum of issues requiring international cooperation and related to technological and scientific progress in saving and improving people's lives, particularly in such areas as environmental protection (Biodiplomacy, 2016), agriculture (Juma, 2005), biodiversity, and counter-epidemic policies.

As some authors claim, biodiplomacy connotes a type of "biopolitics exercised upon a foreign population" (Constantinou & Opondo, 2019, p. 12). In this vein, biodiplomacy implies various ways of categorizing populations into "ours" and "aliens", those who within a specific regime of biopolitical regulations are objects of care and those who are not. These lines of distinction might be drawn on the basis of citizenship and passportization, or through appeals to ethnic diasporas.

A particular case of biodiplomacy is health diplomacy as a multilateral international activity corresponding to the global policies of development assistance and sustainable development. In other words, it connotes "international aid or cooperation meant to promote health or that uses health programming to promote non-health-related foreign aims" (Fazal, 2020, p. E78), Arguably, "few programmes serve a purely humanitarian purpose. Even the high commitment of the Scandinavian states to development assistance and global agenda is linked to their foreign policy goal of remaining a relevant actor in the global arena" (Kickbusch, 2011, p. 2).

Health diplomacy comes in different forms. On the outset of the COVID-19 crisis China has launched its "mask diplomacy" as a policy of politically selling its image of a globally responsible country (Wong, 2020). On a parallel track, Taiwan engaged in its own "mask diplomacy" to gain due recognition

as a full-fledged member of international society, particular in the West (Giacomo, 2020).

Vaccine diplomacy that commenced in the early 2021 unveiled new dimensions of soft power and influence related to supply chains, training, and technology transfer (Ministry of External Affairs, 2021). The phenomenon of "vaccine nationalism" – boiling down to certain governments blocking, even if indirectly, vaccine supplies to other countries - also became part of international diplomacy. In the meantime, the pandemic also exposed new tensions – for example, between the EU and World Health Organization (WHO) over export control (BBC, 2021), or between the EU and AstraZeneca over vaccine shortfalls (Politico, 2021). The EU was harshly criticized for non-transparent mechanism of negotiation with major vaccine producers and for reluctance to support the appeals to life property rights for vaccines and therefore to directly contribute to making vaccines a global public good.

International actorship of vaccine producers, both private and closely associated with states (China, Russia), seem to be quite consequential for new relations between producers and distributors, producers and nation states/organizations (EU), producers and global organizations (WHO, Doctors without Borders). Vaccine diplomacy embraces such new issues as price fluctuation, discounts for poor countries, responsibility of producers for quality and timing of supplies, all of them being integrated into foreign policies of national governments.

TOWARD GLOBAL BIOPOLITICS: INSTITUTIONAL DYNAMICS

The idea of global biopolitics has multiple connotations – from human security on the liberal flank of political theorizing (Roberts, 2010) to the leftist interpretation of the global empire as a biopolitical machine of the late capitalism (Hardt & Negri, 2000). The concept of global biopolitics was also one of reference points to study the war on terror (Kiersey, 2009, p. 30). With the outburst of COVID-19 the scholarship on global biopolitics gained even more topicality, particularly when it comes to debates on global health and governmentality (Brown, Craddock, & Ingram, 2012).

All these academic interpretations pointed to the growing tensions between two types of global politics – territorial and population-centric/biopolitical, and the COVID-19 crisis has confirmed it. The virus crisis has evidently sharpened a deep conflict between the traditional nation-state-based territoriality (with borders, checkpoints and other elements of security infrastructure) and the expanded space of biopolitical agenda emerging beyond national jurisdiction. Within the global biopolitics framework, much has been said about a gap between the declared (and codified) universal value of human life (human security, human capital, responsibility to protect, humanitarian assistance, fighting crimes against humanity), and the ubiquitous practices of inequalities that discriminate certain "forms of life" (through disenfranchisement and

marginalization of racial, ethnic, religious, or linguistic "others"). It is this gap that international organizations and platforms to be discussed below are meant to bridge.

With the outbreak of COVID-19 new functions and operational formats of global organizations come into being. Thus, *WHO* is instrumental in fostering a global debate on immunity passports, contact tracing, developing trust in vaccination and monitoring national anti-COVID medical programs. *COVAX* is a new platform to support the research, development and manufacturing of a wide range of COVID-19 vaccine candidates, and negotiate their pricing. Launched in April 2021 by WHO, the European Commission and France in response to this pandemic, COVAX has the world's largest and most diverse portfolio of COVID-19 vaccines available for all participating countries, regardless of income levels. Self-financing countries will be guaranteed sufficient doses to protect a certain proportion of their population. Subject to funding availability, funded countries will receive enough doses to vaccinate up to 20% of their population in the longer term.

International Air Transport Association (IATA) is helpful in framing the debate on digital COVID-19 passport, as well as providing recommendations on pre-departure and post-arrival testing, quarantine procedures and risk assessment (for example, temperature screening and reduced plane capacity are considered of low efficiency, as opposed to quarantine and testing measures). According to IATA recommendations, quarantine is a major disincentive for travel and is incompatible with the objective of international mobility (IATA, 2020). By the same token, the Association argued that countries where vulnerable groups have been vaccinated should no longer require COVID-19 testing. While IATA expected that a significant majority of international travelers will be willing to get vaccinated, COVID vaccination should not be a mandatory government requirement for international travel. Asymptomatic travelers should self-monitor for symptoms rather than be required to undergo quarantine, and arriving passengers should not be subject to any measures over and above those applied to the population of the arriving country. Pre-departure testing is preferable to testing on arrival as it increases passengers' confidence that they are not currently infected and reduces the possibility for them (and possibly their traveling companions) being stranded at destination. In a similar way, International Civil Aviation Organization designed a test certificate for travel which could be a component of a health passport and eventually be used as reference to specifications for a vaccine certificate.

In the meantime, *Doctors without Borders* are advocating for vulnerable and neglected communities – refugees, migrants, internally displaced, and communities experiencing conflict and poverty, calling for lifting property rights on drugs, tests, and vaccines used in the COVID-19 pandemic. In October 2020 India and South Africa asked the World Trade Organization to allow all countries to choose to neither grant nor enforce patents and other intellectual property related to COVID-19 drugs, vaccines, diagnostics, and other technologies for the duration of the pandemic.

CONCLUDING REMARKS: THE BIOPOLITICS OF LIBERALISM, POST-LIBERALISM, AND ILLIBERALISM

In this chapter new trends stemming from the COVID-19 pandemic were identified, unpacked, explicated and contextualized from the vantage point of their implications for the broadly understood international relations and global politics. Our major argument was that the current crisis is a major shaper in the ongoing debate on the transformation of the liberal international order. The variety of disciplinary perspectives we have explored in this analysis gives a good overview of the major challenges to the liberal system, and opens important perspectives for the idea of post-liberalism. We have seen that the COVID-19 pandemic has refocused security perceptions in the West to the new biopolitical agenda of "global health," and in the meantime has opened up some windows of opportunity for illiberal actors who took advantage of a state of confusion and weak preparedness of some Western countries badly affected by the deadly virus. Some authors argue that "the pandemic is thought by many to be revealing of the weaknesses in neoliberal global capitalism and contemporary consumerism" (Marinković, 2020, p. 488). Obviously, there are many voices - from the far-right forces to Putin's Russia – who keep (mis)representing the current crisis as a failure of the liberal order, and praising authoritarian regimes for better tackling situations of emergency.

The much-discussed global crisis of the liberal order and its transformations appear to be a good terrain for studying the intermingling and interlacing of geo- and biopolitical worldviews. What is usually discussed as a geopolitical dynamic conducive to a de-centering of the West under a deeper scrutiny reveals important biopolitical characteristics. The geo-cum-biopolitical unpacking of the transitory dynamic of liberalism leaves ample space for the academic debates on post-liberalism and illiberalism, which requires a critical rethinking of Foucault's interpretation of liberalism as the hotbed for biopolitics. More specifically, one may look at the transformation of the liberal order through the lens of Agamben's re-conceptualization of the Foucauldian biopower as inherently embedded in the liberal understanding of politics and governance. Therefore, the contrasted juxtaposition of Foucault and Agamben might give us a valuable perspective on the more general debate about the structural conditions of illiberalism that, among other effects, evoked the rise of various forms of right-wing nationalism and populism.

The corona virus pandemic and its still unknown long-term repercussions gave some reasons to take the concepts of bare life and the camp away from the realm of purely academic debate to the real lives of millions of people. Indeed, in 2020 and 2021 we have clearly seen how easily our normal lives – with their routine habits and pleasures, but also rules and rights – were transformed into a constant concern about the very physicality of bare life, with strong focusing on health care, medicine, nutrition and alimentation. The precariousness of bare lives - real or potential "killable" human beings whose physical existence can't be guaranteed by any national and international laws, norms, or institutions – lucidly exposed by Agamben, should be extended to and paralleled by the symmetrical

vulnerability of sovereign power. It became evident that in times of crises power belongs to practitioners on the ground – medical doctors, health workers, epidemiologists and virus experts, volunteers, producers of medical equipment, etc. This trend is bound to establish a new balance between sovereignty and governmentality which however is likely to move the domain of international (bio) politics away from the normative preponderance of liberal values toward post-liberal system of governance with its focus on technical solutions, including new medical norms, rules, and practices. Some elements of the liberal ideal, such as de-securitization, de-bordering, equality of international actors and the growth of regional and cross-regional spaces of inclusive interactions, will be seriously damaged by the global rise of biopolitical concerns and agendas. As a structural condition of the international, this new post-liberalism will be adjusting its tools of governance to the growing number of situations of exception grounded in and justified by the logic of life protection and healthcare needs. In the post-COVID world the inherently biopolitical idea of responsibility to protect, being transplanted from its originally liberal to increasingly post-liberal milieu, is likely to serve as a key reference point for the different – and still nascent – versions of biopower as a major shaper of international and global politics, security relations and foreign policies of individual states.

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HUMAN NATURE AND THE POLICY PROCESS: EXPECTATIONS FROM BIOLOGY

Rebecca C. Harris

ABSTRACT

Studies of public policy, particularly the explanation and prediction of policy outcomes, are motivated by a desire to improve policy success. However, most policies fall far short of solving problems. Why is it so difficult for policy to succeed? Biology's answer: because we are human. Many natural tendencies are less than optimal for the policy cognition and behavior necessary to make effective policy popular. The portions of human nature which are most interesting for our purposes include the way humans think, the role of emotion, the power of interpersonal relationships, the power of belonging to a group, and the power of competition for status. These human realities anticipate ineffective policy development. Knowing something about humans might explain why it is difficult for policy to succeed.

INTRODUCTION

Solving problems with government is a *people-driven process*. Citizen-voters provide mass public opinion and lend (or withhold) public support for policy endeavors. Policy analysts deconstruct policy problems and develop policy solutions. Policymakers lend (or withhold) official support for policy endeavors. Policy targets are those humans or human organizations targeted by policy endeavors.

These four sets of actors are all humans, and as such, any knowledge about humans will inform our expectations about their behavior. Policy development

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and policy implementation (government as a verb) is a human endeavor. As such, it is constrained by human limitations, especially limitations hard-wired into humans as biological beings. These human realities anticipate ineffective policy development. Knowing something about humans might explain why it is difficult for policy to succeed. Accordingly, this chapter will introduce those tendencies leading human policymakers and citizens to sub-optimal choices.

WHAT DO WE KNOW ABOUT HUMANS?

Contemporary knowledge about human behavior arises from a variety of fields. Behavioral genetics is the study of the way DNA and genetics gives rise to human behavior. Neuroscience studies the brain and neural activity. Evolutionary psychology explores the way evolutionary processes contributed to the psychological development of human beings. These sciences allow us to study human nature in a scientific manner, and the discussion below will offer specific studies to support claims about human nature.

If the mind, which is the center of purposeful (and voluntary) human behavior, operates according to physical properties, and if thinking and behaving is a physical process, it is quite possible to conceive of the discovery of common human learning, thinking, and behaving patterns. Human beings are biological creatures, and those biological processes affecting human behaviors related to politics are very salient for our purposes. Neuroscience, as a discipline, is particularly informing. The key human behaviors of interest are human learning, memory and cognition, and each of these fields is particularly suited to explain and predict patterns of human behavior. Many natural tendencies are less than optimal for the policy cognition and behavior necessary to make effective policy popular. The portions of human nature which are most interesting for our purposes include the way humans think, the role of emotion, the power of interpersonal relationships, the power of belonging to a group, and the power of competition for status.

HOW HUMANS THINK

Human cognitive operation is at the core of human behavior. The way we think is directly responsible for the way we behave, and several aspects of human cognition are particularly important when we consider the way policy is formulated, supported, and implemented. Before outlining some key observations about the way humans think, it is good to consider several discoveries science has made with regard to brain operation. Like all scholarship, discoveries are subject to revision and calibration by later researchers, and careful theoretical use in political science research should consult the relevant experts in other scientific fields for state-of-the-art nuances and understandings of the proffered concepts. First, there is the concept of the mind as an information processing apparatus (called the computational theory of the mind). Of particular interest are

discoveries in three areas: how people learn and represent concepts, how people store and access information from memory, and a discovery of the rules people use to solve problems (Kunda, 1999, p. 2).

Second, there are "innate learning networks" in the brain (Pinker, 2002, p. 31). This discovery sees the mind as hard-wired to learn certain important forms of knowledge. For our purposes, language and social knowledge, particularly the ability to remember and distinguish individuals and groups, would be an important learning mechanism for the political world.

Third, there is the discovery of universal learning mechanisms, or programs, which are hard-wired into the brain. Such knowledge as language acquisition and status-appearance computations are universal and appear to be uniform throughout the world (Pinker, 2002). The behavior might vary (type of language, or certain forms of appearance are given status) but the computation will remain the same. The brain will understand grammar with the same algorithms, and the brain will process status partly as a function of appearance regardless of the culture or individual involved. When it comes to cognitive learning the brain is simply designed to learn some things better than others. As noted by Harris (2006, p. 10) "some associations are made more readily than others," such as associating someone's status with their appearance. Each of these discoveries could significantly advance our understanding of human behavior and the way in which particular operations are hard wired.

Brains operate at many levels and with different processes. Human brains can process at two levels, one fairly automatic and routine and one that is more deliberate and used for special circumstances (Restak, 2006, pp. 13–14). The bulk of the brain's work is done at the routine level, leaving the rare important work to conscious processes.

Human brains also use two types of information processes (Restak, 2006, p. 14). Cognition and emotion are the primary ways the brain receives and responds to information. Restak (2006) calls cognition "shorthand for all the ways we come to know the world" (p. 14). Emotional processes, by contrast, occur at a subconscious level and involve basic chemical signaling. Emotional processes are different and can overpower or even replace cognitive processing. Emotional processes do not occur at the conscious level, but rather arise almost without control, such as anger and fear. Rather than a process which is calculating, emotional processing is more about signaling.

In terms of intelligence, the human brain is wired for several important tasks which enhance survival prospects (Geary, 2005, p. 17). Human brains have the ability to process basic information at very high rates of speed, the ability to identify subtle variations in information, and a large working memory capacity. Human brains have the ability to focus attention. Intelligent individuals have the capacity to identify subtle variations in external info quickly and accurately. All humans are very sharp at processing information about the physical world and the social world. What comes harder is the abstract perception necessary for public policy formulation.

All of this might presuppose people to be quite uniform in their behavior. However individual responses in acute situations have infinite variation.

Accordingly, Harris (2006) argues: "People behave flexibly because they are programmed. Their minds are packed with combinatorial software that can generate and unlimited set of thoughts and behaviors" (p. 41). When we think of programming, we have to ask, what has done the programming? At the macro level of study, evolutionary psychologists point out the important of evolutionary processes, particularly natural selection, for the brain humans have today. These brains were forged in a competitive environment, and those which survived to reproduce likely performed essential survival tasks quite well.

While general processes are quite informative, much of the advanced work on human behavior is occurring at the molecular level. One particular field of interest, social neuroscience (Harmon-Jones & Winkielman, 2007) looks at the connection between physiological processes and social processes. Of particular interest is the way the nervous, endocrine, and immune systems are involved in numerous socially important processes. These include emotional processes, motivation processes, attitudes/social cognition, personal perception, stereotyping/prejudice, and interpersonal relationships (Harmon-Jones & Winkielman, 2007). This science uses quite advanced methods to understand how physiology creates behavior. If the physiological processes can be linked to the social process, patterns can be studied. Indeed, some of those will be highlighted below.

Cursory v. Elaborate

The study of human thinking has concluded that humans have a dual processing capability (Kunda, 1999, p. 107) when it comes to reasoning about a situation. Cursory thinking is a type of processing which uses little time. It is a strategy adopted to reach a quick, easy decision, and move on to the next thing – it does not take much effort, and it may often result in snap judgments and top-of-the-head reasoning. This is a good strategy for the numerous reasoning situations which arise in the course of an average day. The tradeoff is that solutions may be less than perfect but are often considered "good enough."

Elaborate, careful, detailed thinking is much more time consuming, and much more difficult. It requires us to devote all of our attention to the problem at hand. The tradeoff is a much greater likelihood of finding the "best" solution. According to Kunda (1999), individuals who are motivated to be accurate will continue thinking and reasoning until they arrive at the best conclusion. According to brain scientists, the frontal lobes are involved in these executive-type decisions, and they become activated in decisions requiring the time-consuming weighing of various options (Restak, 2006, p. 23). Obviously elaborate thinking is required for solving public policy problems.

Learning and Beliefs

Human brains learn in very carefully orchestrated ways. These ways, while essential for personal survival, do not always translate perfectly to corporate or public survival. The most important part of these learning mechanisms is the

detection of errors because these are used by the brain to update its beliefs about the world. "Our brains are the ideal observers when making use of evidence from our senses. When combining evidence from different senses, our brains behave just like an ideal Bayesian observer: weak evidence is ignored and strong evidence is emphasized" (Frith, 2008, p. 124).

According to Frith (2008), brains are very good at perceptual error detection. If they should see or smell or sense something and it is not there, or it is different, the brain can immediately recognize the difference. What makes this system work is the brain's ability to build models (or expectations) about the world and the way it *should* operate. "On the basis of its beliefs about the [sensory] world, my brain can predict the pattern of activity that should be detected by my eyes, ears, and other senses." According to Frith (2008), this cycle of prediction and updating is the primary way the brain learns what is there. "Prior knowledge creates a model of what to expect. When we perceive something we actually start on the inside with a prior belief, which is a model of the world" (Frith, 2008, p. 126). Reading notes that these models do not have to be accurate to be useful. "The object is to build a model (of the world) whose components are as compatible as possible – both with each other and with the outside world" (Reading, 2004, p. 27).

Models involve both sensory and symbolic representations (Reading, 2004, p. 25). Sensory representations encode sensory experiences. Symbolic representations encode words and numbers. All of these are combined to build a model of the world. While most humans have very accurate models of the physical world and information perceived by the senses, humans vary in the accuracy of their social and political models of the world. The quality of our judgment depends on the quality of our model. Psychologists refer to this as correspondence theory: good judgment is a function of the "goodness of fit between our mental representations and corresponding properties of the external world" (Tetlock, 2005, p. 9). As Tetlock (2005) notes, those with good judgment must be realists: "We credit with good judgment those who see the world as it is or soon will be" (p. 9). However, it is also possible to have inaccurate models of the world. As noted by Reading (2004), the "models we create may also misrepresent the world to greater or lesser degrees, leading us to harbor any number of false beliefs. The more erroneous our assumptions, the less accurate are the plans and expectations we base on them" (p. 30).

Humans also have a preference for simplicity in their models of the world. An extremely common error in human hypothesis testing is the desire for simple solutions. In Kunda's research, participants preferred explanations which are broad, simpler, and could be explained (Kunda, 1999, p. 142).

Because we are human, we also have a difficult time un-learning information. This is because the information nature taught us to learn is rarely wrong. The natural world rarely "lies" to us; one tends to experience "truth" in the natural world. If something leaves a bad taste in our mouth, it is probably truly bad for us. If something hurts or wounds us, it is probably to be avoided. In the natural world, where human nature and the ability to learn was forged, there is little room for mistakes or miscalculations. This implies that humans will be much

more successful at policy involving direct, immediate feedback from the natural world. For instance, pollution policy and erosion policy have been much more successful than education policy, at finding solutions that work. There has been a sense of significant gains in environmental policy since 1970 (much less erosion, much cleaner air and water) while social policy has floundered (elusive student achievement gains, for instance).

The ability to learn on a single encounter is very useful in the natural world. Nature rarely "lies" to us, so the quicker we learn to associate a bad experience with negative emotions (and thus avoid repeating the unpleasantness) the better we survive. This learning is controlled by chemical and biological processes in the brain. While initial impressions are generally fairly reliable in the natural world, social information is filtered through other humans, and thus subject to deception or error. Unlike the natural world, the social world cannot always be trusted.

These realities are particularly important in thinking about the social and political world. "Our understanding of the social world is influenced by our concepts, beliefs, and theories as well as by our goals and feelings" (Kunda, 1999, p. 4). The deeper and more fundamentally held our views, the more difficult it is to change our underlying models, even when new information fits the facts better" (Reading, 2004, p. 28). Unlearning something we have previously learned is much more difficult than learning something new, especially if it means having to modify an existing model (Reading, 2004, p. 28). This keeps us out of repeat trouble in the natural world but can be problematic for the perseverance of erroneous lessons in the social world (Kunda, 1999).

Experts v. Novices

Brains have the capacity to learn and adapt at variable rates, depending on prior experience and behavior. Those who are trained to think a certain way or behave a certain way (experts) will have vastly different brain functions than an ordinary, untrained or uninitiated individual. In their seminal study of expertise, Chi, Glaser, and Farr (1988) explain the way cognitive processes of experts differ significantly from novices:

- Experts excel mainly in their own domains.
- Experts perceive large, meaningful patterns in their domains. This provides a very important ability to organize knowledge, providing superior perceptual and filtering skills.
- Experts are fast and quickly solve problems with little error.
- Experts have superior short term and long-term memory. Automation frees up short-term memory.
- Experts see and represent a problem in their domain at a deeper (more principled) level than novices; novices tend to represent a problem at a superficial level.
- Experts spend a great deal of time analyzing a problem (experts typically try to "understand" a problem first). They will build a mental representation from

which they can infer relationships to define the problem. Then they will add constraints, thus reducing the search space.
- Experts have strong self-monitoring skills. They are more aware than novices when they make errors, fail to comprehend, or need to check their solution. They are also more accurate than novices in judging the difficulty of a problem and allocating their time accordingly. Experts are also likely to ask more questions.

Of particular interest is the way experts handle memory and cognition. They possess biologically created "skilled memories" and can absorb information in a meaningful way by encoding information using "existing semantic knowledge and patterns" (p. xxii). Chi et al. (1988) note the way this type of thinking requires a large amount of information (neurochemical pathways) in memory so that the expert thinker can find and use the appropriate knowledge to organize the problem. Another key part of the problem-solving ability is the capacity of expert to take the problem apart and identify the major factors causing the problem. This kind of systematic thinking is obviously more likely to find an effective solution. One key to expert success is the way experts can sort relevant from irrelevant information (using biological storage and connections) and use the relevant information to make their inferences. By contrast, novices are much more likely to use irrelevant information. Chi, Glaser, and Farr (1988) note the way this sorting is a direct result of expert capacity to successfully represent a problem in the first place (p. xxvi). This is not necessarily a revelation in public administration. Key training manuals for policy analysts note the importance of correctly defining the problem before gathering evidence and developing solutions (Bardach, 2008).

Even the experts can vary in their style of reasoning (Tetlock, 2005, p. 21), and this might mean some experts are more prone to errors than others. According to Tetlock (2005), expert political judgment comes in two forms: hedgehog and fox. Hedgehogs are intellectually aggressive expert thinkers. They know one big thing very well. This one thing, one model of how the world operates, is consistently stretched and expanded to cover new cases. Foxes, by contrast, "know many little things." They are not trying to stretch a meta-model to fit new cases. Rather they are content to improvise "ad hoc solutions" to keep pace with a rapidly changing world. As we might suspect, foxes do better at expert political forecasting because of their willingness to be flexible with their assumptions and application of models of the world. In terms of evolution and the study of human thinking and survival, neuroscience would agree that knowing many little things is closer to optimal brain operation (Reading, 2004). It has a much better chance to adapt to changing contingencies, since adaptation depends on our imagination and our imagination "depends on the richness of our storehouse of data and ingenuity with which we combine the elements" (Reading, 2004, p. 69).

Control

Obviously, the purpose of cognition is to further our interests. A key cognitive motivation is the desire to gain some measure of control over our lives. Thinking allows us to harness the world through our knowledge of it. "Humans have a basic motivation to achieve some level of control over relationships, events, and resources of significance in their lives" (Geary, 2005, p. 72). In fact, according to Geary (2005) our perfect world is one in which we are able to "organize and control social, biological and physical resources" (p. 14). Thus, we will adopt solutions which appear to maximize control and are based on simple, easily explained theories of how the world works (Kunda, 1999, p. 142).

Control, perception and prediction are intimately related in the way the brain works to process information and take action. When we know what is going to happen, we are relaxed and feel in control of a situation (Frith, 2008, p. 105). In terms of perception, our prior knowledge of the world tell us what to expect: "My brain discovers what is out there in the world by constructing models of that world. These models are not arbitrary. They are adjusted to give the best possible prediction" (Frith, 2008, p. 131). Impound most prediction and perception will be routine and correct. As noted above, what catches our attention is when things are not as they should be: "A message is most informative if it is unexpected or surprising" (Frith, 2008, p. 119).

Prone to Mistakes (Heuristics)

Many researchers have documented the way humans are susceptible to common cognitive mistakes. Referred to as heuristics, these mistaken ways of thinking are widely held to lead to less than optimal solutions in probabilistic thinking. The list of common cognitive errors is quite exhaustive (Kunda, 1999, pp. 53–110). These include representativeness (v. statistics), availability (top-of-the-head), and the use of irrelevant numbers to make judgments. Humans might also ignore disconfirming data and seek out confirmatory support for preexisting views. Or they can change their views in line with disconfirming data. Piaget spoke of this many years ago, and modern researchers use the term confirmation bias (Tversky & Kahneman, 1974) to explain that humans seek evidence to confirm their views.

Heuristics are related to elaborate thinking. The success of elaborate thinking depends on the extent to which people turn to strategies which are indeed better. According to Kunda (1999, p. 124), careful reflection can do more harm than good because it can provide more time for heuristics to kick in. Sometimes a quick, cursory decision is better than spending much effort.

Even for the most elaborate thinkers, it is difficult to overcome heuristic thinking. According to Tetlock (2005), a social psychologist and political science writer, "political observers could do better by thinking less" because of base rate neglect (p. 40). This particular intuitive reaction leads people to ignore the information they have when asked to apply it to a particular scenario. For instance, a known base rate for congressional elections is that incumbents win 80% of the time. As Tetlock (2005) notes, forecasters would do better sticking with these "truths" rather than attaching a high probability to a low frequency

event. According to Tetlock (2005), "These probabilities are not rooted in observations of relative frequency in the relevant reference populations of cases, but rather in case specific hunches about causality that make some scenarios more imaginable than others" (p. 40).

Instincts and Gut Feelings

Humans also have excellent instincts and gut feelings which make use of unperceived information to guide behavior. Brains also contain a great degree of "implicit knowledge" (Restak, 2006, p. 24). Much of this concerns the brain's ability to adjust to routine activity. "Once an activity becomes routine, it doesn't require conscious effort, but occurs automatically" (Restak, 2006, p. 24). Also of interest is the power of unconscious information. Unconsciously perceived information leads to automatic reactions that cannot be controlled by a perceiver (p. 31). Brain scientists have found that this is quite active in stereotyping and gut reactions to information (Harmon-Jones & Winkielmann, 2007). Researchers believe these findings suggest that much of the information processing involved in deliberation "likely operates below awareness" (Harmon-Jones & Winkielmann, 2007, p. 6) and does not necessarily rely on consciously perceived thought patterns.

Unconscious perception and reaction are the norms for humans. According to Restak (2006) this perception is quickly emotionally tagged as well. "Immediately and unintentionally a perceived object or event is classified as either good or bad," resulting in a behavioral predisposition toward the object or event (p. 56). Biologically, this is very useful and efficient. "Thanks to automatic processes, it is not necessary to consciously evaluate everything that's happening from moment to moment" (Restak, 2006, p. 56). We can rely on our brain and our emotions to guide our behavior.

In terms of many problem-solving tasks, research has shown that gut instincts may be more reliable than elaborate or cursory thinking processes. According to Restak (2006), we "sometimes do better by exerting less rather than greater mental effort" (p. 22). In a well-known study (Fletcher, cited in Restak, 2006, p. 23) of pattern detection, those subjects who learned the pattern without consciously trying to do so did better than those who put conscious effort into deriving it. This has led researchers to conclude the human brain often knows more than it can say (Restak, 2006, p. 24). Gut decisions work best for immediate, concrete cognitive and social tasks. Instincts are much less useful for thinking about complex policy problems, though a surprising number of policymakers cite their gut or their instincts when making policy decisions.

THE ROLE OF EMOTION

Cognitive processing is only part of the story. Gut feelings and automatic processes are dependent upon emotional signaling. According to Reading (2004):

> … emotions are part of a biologically ancient system that evaluates how we feel about incoming sensory information. The emotional system evaluates whether what we are experiencing is good or bad. By associating [the feelings] with perceived [good or bad] situations, animals learn to adapt to what they may encounter. The biological imperative is to maximize the experiences that feel good. (p. 43)

Because the brain works on chemically-controlled sentiment, not analysis, the analysis that occurs is usually associated with a sentiment. In other words, people recycle because it makes them feel good, not because of a cold calculation. Their brains have made the calculation, but their brains have also tagged the behavior with a chemical which makes them feel good when they do it, thus they are likely to repeat it. In most cases, it is irrational to recycle, just as it is irrational to vote, but the human brain finds sentimental reasons to do both.

The emotional system is very adaptive. As a simple system designed to maximize feeling good, the system can adapt quickly to incoming sensory data (Reading, 2004, p. 77). Furthermore, social perception and the emotional signals which make it possible are very important for group-oriented humans. "It can be dangerous not to read correctly the motives and interactions of others" as they may be cooperators or defectors (Norris & Cacioppo, 2007, p. 95). For example, fear is a common response to threatening stimuli and often results in avoidance. Emotions send information which is essential for processing social interactions (Norris & Cacioppo, 2007, p. 89). According to Kunda (1999), "The more an event deviates from its evolved norm, the more abnormal it will seem, and thus evince a stronger emotional reaction" (p. 143). Norms are very important in human social behavior. They are also important in the perception of events. People are more upset about an event when it is the result of exceptional, rather than routine, behavior due to their tendency to try to undo an event (Kunda, 1999, p. 148). Other researchers note that emotions serve an updating role in monitoring progress toward goals. Accordingly, positive emotions are experienced when progress is made, and negative emotions signal the loss of a goal (Norris & Cacioppo, 2007, p. 84).

Emotion and motivation can also influence the mode of processing, "whether we rely on quick and easy inferential shortcuts or rely on elaborate, systematic reasoning" (Kunda, 1999, p. 211). Other scholars agree that emotion has predictable effects on cognition. According to Harmon-Jones and Winkielman (2007), a three-part relationship is evident: "emotional experience engages particular cognitive strategies" (p. 15) which in turn influence response selection. Humans also practice mood-congruent judgment (Kunda, 1999, p. 246). According to Kunda (1999), individuals in a bad mood are more likely to use elaborate, systematic processing strategies, because their mood is signaling all is not well in the world. By contrast, a good mood informs us that all is fine with the world, and there is little need for a careful evaluation of our circumstances.

Harmon-Jones and Winkielman (2007) agree with this analysis: When people are feeling good, they are more likely to engage in "automatic" cognitive processes. Good moods can actually lead to routine cognitive mistakes and less than optimal response selection. By contrast, when people are feeling bad, they are more likely to engage in "effortful" cognitive processes. Under these conditions,

decision makers will react more slowly, overestimate risk (maintain a very conservative approach), and focus on negative explanations when making judgments (Harmon-Jones & Winkielman, 2007, p. 15). Sometimes emotion will provide more useful information than hard thinking, and other times emotion will bias cognitive processes (such as providing irrelevant information and misguiding judgment).

To those in political science, the idea that negative emotions exert a stronger impact on behavior is not new. Political advertisements in campaigns and elections use this knowledge for very sophisticated purposes. In his book, *Campaigning for the Hearts and Minds*, Tom Brader (2006) examines the way in which campaign ads affect behavior through the lens of emotion. Brader's research found a very interesting difference in the kind of behavior triggered by positive ads and by negative ads. Positive ads stirred feelings of hope and enthusiasm. These were feel-good spots. Negative ads stirred feelings of fear and anxiety.

As is congruent with above findings, positive ads tended to reinforce existing loyalties (Brader, 2006, p. 5). By contrast, when fear and anxiety were tapped Brader (2006) found an increased attentiveness to relevant information. Negative ads actually made people re-think their previous preferences and seek out more information. Respondents may not realize they are re-entrenching their beliefs after a positive ad or that they are suddenly doing more research and listening after a negative stimulus. According to Brader (2006), "Absent anything out of the ordinary," citizens will "get by on habits formed through years of socialization and embodied in their political dispositions" (p. 198). When it comes to the mass citizenry, sometimes they will be "inattentive partisans" and sometimes they will be the "reasoning voter" depending on their emotional state.

If we assume reasoning leads to support for more effective policies, we must conclude that times of fear and threat should generate better policy outcomes. In terms of our puzzle, Brader's (2006) research might explain the gap between effective and popular policy as a function of habit. Notice how agencies, policymakers and citizens get complacent when there is no real threat. When there is a threat, the human brain is more open to new ideas and ways of doing things. This might mean crises can improve policy if it causes what is popular to align more closely with what is effective. Overall, the role for emotion is much stronger than the role of information. Effective policy support isn't a matter of education (or the provision of information). Rather, it is necessary to have fear and anxiety induce attention and consideration. This implies policy problems effectively linked with fear and anxiety should more closely approximate effectiveness than those policies where little threat is perceived (assuming the threat is real).

The problem is how little we trust "emotional" reactions in policy support to generate better policy outcomes. Crisis policymaking has been derided as the most unreliable. According to Sunstein (2007) governments tend to either overreact to or utterly neglect potential catastrophes. How can we resolve these disparate outcomes? Part of the answer may lie in the research on deliberative versus implemental mindsets. Once a "solution" has been decided on, government actors (and perhaps the agreeable public) will be much less open to dissenting voices and contrasting evidence.

Human cognition and the role of emotion in human behavior is an untapped theoretical resource for the study of humans in the policy process. How we think (notions of dual processing, notions of cursory v. elaborate processes, notions of learning and beliefs, notions of expertise and control, notions of heuristics and gut feelings) and how our automatic emotional signaling processes work can provide new expectations for the study of public policy beyond the usual models available to policy scholars. Those models will be discussed briefly at the end of the conclusion of this chapter.

THE POWER OF INTERPERSONAL RELATIONSHIPS

While human cognition and emotion are at the core of human behavior, human activity is also the product of a species hard-wired for personal relationships. The human brain also works at a social level. If people decide to recycle or vote, much of the feeling good is due to the brain's awareness of how recycling or voting contributes to social interaction – both interpersonal and communal. We feel like part of the community and we have shared experiences in common with our personal social contacts. Any behavior with social significance is immensely important to the brain, and it will be remembered and stored as such, along with the appropriate emotional sentiment because humans operate and think in terms of individuals and relationships.

Interpersonal behavior begins in the brain. First, to successfully compete as a member of a group, individuals will "work out a long term strategy of behavior that is tailored to their own particular assets and liabilities" (Harris, 2006, p. 161). Second, we will treat known people as individuals (Harris, 2006, p. 164), with known strategies for each person. Strangers must be stereotyped and approached as the mode member of a group. This is why researchers have begun to discuss human interpersonal behavior as a factor of two disparate systems. One is the relationship system, which guides the way we behave toward specific individuals (Harris, 2006, p. 174). The other is the socialization system, which guides the way we behave toward groups – conformity to our group and hostility toward an out-group. We will discuss the salient parts of the relationship system first.

People Matter

Humans are hardwired to think in social terms. Think about the way a human being operates in a social context where a policy problem is being discussed. The human will be thinking about the problem but will also be thinking about the people in the room, upstream and downstream of the decision, about the way this decision affects their group and other groups, and about the way this decision will affect their status. One can imagine how this would work in a diplomatic negotiation between leaders who know each other well and have worked together for some time, versus strangers new to the role or adversaries who care little for each other. The same might be said for negotiations on a committee in Congress (or between veteran lobbyists and career bureaucrats in an enforcement setting),

where a history of bad blood or friendship is also part of the thinking. Some of this is conscious, but the majority of it is unconscious or almost so quick as to be unconscious. As soon as the problem is given relationship or group meaning, the ability to engage in detached, cognitive thinking is colored by the emotional meaning attached to various courses of action.

One of the known problems with the way humans treat known individuals is their tendency to view those individuals as more consistent than they are. Yet, because people behave differently toward different people, we should not expect consistent behavior. This is why we are often surprised or in error when someone does not behave according to our expectation. As Harris (2006) points out, there is some rationality to expecting consistent behavior: absent any other information, past behavior is the best gauge of future behavior (p. 165). Kunda (1999) puts it another way: "There is surprisingly little consistency in people's friendliness, honesty, or any other personality trait (across situations)" (p. 395). Individuals will not have consistent behavior from situation to situation. Rather, they will tailor their responses to the context.

Context Matters

Obviously, group categorization, behavior and status depend on the social context or the situation (Harris, 2006, p. 195). Research demonstrates that the consistency of individual behavior across situations is quite low (Kunda, 1999, p. 417). Part of this is because a rational decision is context specific (Restak, 2006, p. 181). The circumstantial nature of human decision-making flies in the face of a traditional assumption about economics (Restak, 2006, p. 182). Circumstances, not logic, determine rational choice.

Gossip

According to Harris (2006), we collect information about people and pass on information about people to know how to behave toward that person. In this spirit, gossip becomes a commodity: "a medium of exchange by which we favor people" (Harris, 2006, p. 173). This lexicon allows us to behave appropriately when we encounter the person, based on our understanding of who the person is. It is very important to be as accurate as possible when building a lexicon of those we know. Hence, information about people (gossip) becomes indispensable (Harris, 2006, p. 173). Because negative information is much more important, Harris (2006) notes that much of what we pass on about others is negative. That is the information others want (or need) to know, so that is the most valuable information.

In terms of relationships, the particular individuals involved in a policymaking context can affect the outcome. Policymakers will be making calculations based on individual relationships. According to Harris (2006, p. 242), the purpose of the relationship system is to establish and maintain favorable relationships. This goal can lead us to collect information about specific people and to be concerned with the way those people feel about us. It motivates us to acquire knowledge about

other people and to share that knowledge. What is important here is that policymaking cannot occur outside the context of relationships – face to face, individual-level interaction with real people in ongoing relationships. Public policy outcomes undoubtedly reflect these micro-dynamics. And it is very likely these dynamics often lead to less than optimal choices. The key problem here for effective policy is that the best solution might fail for personal reasons – because of how it will affect the personal, relational prospects of the individual involved.

Mind-Reading

As part of their interpersonal survival, humans are hard wired to read the minds of others. Humans have a unique ability to infer other's goals and replicate their intent (Pinker, 2002, p. 61). This allows us to see others' feelings, expectations, beliefs, and intentions (Harris, 2006, p. 148). According to research, we do this mainly through visual perception. We look at the way something is moving and we can infer its intentions (Frith, 2008): "Even simple movements can reveal something about goals and real intentions" (p. 140). In this way our brains tell us what the other person is likely up to. "Reading others based upon their bodily movements is one of the most perceptual activities we engage in" (Restak, 2006, p. 69). This is particularly important to detect someone who may not have our interests in mind. The ability to detect anxiety, sadness, impatience, and disapproval is an important survival tool (Restak, 2006, p. 69). When we read other people's minds we can also tell what they are thinking about us (Harris, 2006, p. 224). This not only warns of danger, but also provides information about our status. The ability to read what someone else has recorded about you allows you to figure out what other people are thinking about you and how they regard you. "Put that together with information collected from many different sources to give you a picture of yourself" (Harris, 2006, p. 226). In this way, humans are constantly adjusting their behavior to respond to the intent or thoughts they are reading in the minds of others.

For our purposes, the capacity to read minds and the power of caring what other people think or believe about us can cause us to behave in particular ways. People will take relationships into account when considering a course of action. Citizens and policymakers alike may have personal reasons for their decisions. The broader point is that humans are hard wired to care about relationships and to manage them strategically. In fact, relationships – when present in a decision making context – will rank very high in terms of influencing behavior. Numerous relationship reasons are given for behavior among citizens and policymakers alike. Thus, we can conclude relationships are one of the ways our humanness can lead us to choose less than optimal policy.

THE POWER OF BELONGING TO A GROUP

As with interpersonal relationships, group identity is another part of the social hard wiring of human cognitive and emotional capacity. Humans are hard wired

to affiliate with others, conform to their norms, and think in terms of group categories when reasoning about the behavior of others. One important survival mechanism in the social world is the formation of in and out groups – to make it easier to know who to trust. It makes sense for us to develop these affinities based on those who are like us. We are more likely to trust those in our group – however it may be defined. We may trust those in our profession, or those in our political party, or those in *our* state (vs. *their* state). Because of the way our brains are wired, these initial attachments and affinities are very difficult to change.

When this attachment to an in group is coupled with the fact that many policies are focused on out groups (such as criminal law or immigration policy), it is easy to see how difficult it is for citizen policymakers to change their ways. Because we are human, we have a hard time seeing and thinking through a problem in a rational, detached way – particularly when it applies to a group for which we have negative feelings. One can see this at so many levels. Citizens may not trust youth, and hence be unwilling to see the way a skate park would actually solve the problem of downtown youth loitering.

Affiliation

Humans are hard wired to identify with groups. The greatest threat to group survival is a rival group. Humans show a strong inclination to form groups and to readily distinguish their group from another (Harris, 2006, p. 157). Humans are hard wired to treat strangers (who might dress, behave or speak differently) with suspicion or even hostility (Harris, 2006, p. 157). Childhood survival made it especially imperative for children to learn to distinguish familiar individuals from strangers (Harris, 2006, p. 158).

According to Reading (2004, p. 98), the need to belong to a group is hard wired and affiliation has been linked to chemical processes (Taylor & Gonzaga, 2007). It is almost impossible for humans to refrain from organizing themselves into "tribe-like" groups (Reading, 2004, p. 98). Reading explains the way "modern rituals" continue this need for group membership: sports teams, fraternities, corporate identity at work, are all soft forms of group identity. Harder forms would require true sacrifice for the sake of the group, and these forms tend to exist more in political and power situations. The desire to belong to a group has also been conceptualized as the impulse to affiliate with others (Taylor & Gonzaga, 2007, p. 454) particularly under circumstances of threat or stress.

Coming together as a group, instead of fleeing or fighting on one's own, would provide more hands for defense. There are good reasons to believe humans have evolved to use social relationships as a primary source to deal with stressful circumstances (Taylor & Gonzaga, 2007, p. 456).

In terms of hard wiring, researchers have used recent physiological findings to document chemical signaling under stress. Taylor and Gonzaga's (2007) research has pinpointed a particular chemical known to vary with affiliation behavior.

Affiliation is a powerful guide in human behavior. Group formation and identity requires only two categories: us versus them (Harris, 2006). Humans typically identify with groups of strangers as well as known individuals. Sports

fans and political partisans feel a strong identification with their group. As Harris (2006) notes, it is not necessary to be personally acquainted with members of your group to feel an affiliation for members and hostility toward non-members. Affiliation is the source of powerful emotions. Psychological researchers have long noted that team play can evoke stronger emotions than individual play (Harris, 2006), and there is little expectation of victors to demonstrate any sort of mercy to the losers (Harris, 2006). Individuals are strongly motivated to die or work for the group (Harris, 2006).

Researchers have long noted how the desire to be accepted can trump the desire to be correct (Harris, 2006, p. 210), and people will do most anything to avoid being cast out by their group. According to Harris (2006), "Self categorization causes you to favor (your) own social category over others and to use this social category to set standards for yourself" (p. 195). It is easy to imagine how this standard way of thinking can affect policy support and policy development. Members of a bureaucracy will act according to their agency's norms. Members of the public will vote according to their group's norms and standing. In terms of being hard wired, this attention to group survival is important. For the socialized or "adapted" individual, survival depends not only on individual prospects, but on how his or her group does relative to other groups (Harris, 2006, p. 198). In this way, we must include the power of affiliation as part of the policy puzzle.

Cooperation and Conformity

Humans are hard wired to conform. Humans have to learn the values and norms of their group to survive. Harris (2006) calls this group socialization theory: the idea that human children are socialized by peer groups, rather than parents, to ensure successful living in the group or society where the child lives. She notes that in ancient societies, children learned the rules of social behavior from other children, not parents. The ability to learn culture is the ability to adapt to one's group (Harris, 2006, p. 161). As Harris (2006) notes, a baby must learn the appropriate behavior for her society in order to be successful. Thus, we are hard wired to learn and adopt group norms. According to Harris (2006), all humans have a socialization mechanism that provides "the motivation to go where the group goes and do what the group does" (p. 183). According to Harris (2006), "The socialization system signals a discrepancy between her behavior and that of the prototype for her social category and will motivate her to reduce that discrepancy" (p. 200).

This type of cultural adaptation has also been documented when adults join organizations or workplaces. Organizations have a specific culture, as well. For an adult to successfully integrate and thrive in an organization, he or she must adopt the skills, knowledge, language, and customs of the organization. Scholars of public administration (Carpenter, 2001; Sabatier & Hunter, 1989) have long recognized that organizations shape the values of members and personnel. Studies have shown that employee values can be predicted by agency membership in the federal government (Meier & Nigro, 1976; Sabatier & Zafonte, 1999). One scholar notes that organizational outcomes are actually the result of "established

definitions of problems and solutions that are enshrined in organizational rules, norms, and habits" (Maynard-Moody, 1989, p. 140). Other scholars have noted agencies can perpetuate an organizational ideology (Romzek, 1990, p. 377). "An organizational ideology serves as a perceptual screen on the outside world and ties the members closely to the organization and its goals" (Meier & Bohte, 2007, p. 70). Of particular interest is the way group power and survival depends on successful commitment to and identification with the group. In public agencies, scholars have called this agency "cohesion," and some agencies are better at it than others (Meier & Bohte, 2007, p. 70). Those agencies which thrive will be those agencies that motivate their members with "appeals to common goals" (Meier & Bohte, 2007, p. 70).

Conformity is very useful for survival as well. According to Pinker (2002), emulating the behavior of others serves informational and normative goals. First, by acting as others do, it is possible to benefit from their knowledge and judgment. Second, it enables the individual to follow community norms and thus do better in their community interactions. Pinker (2002) explains the role of norms as social facts. These are agreed upon "facts" about the conditions under which the community will confer power, status, and honor.

In terms of socialization, the groups involved in policymaking context can affect the outcome. The goal of the socialization system is to be a member of a group. The key error is to underestimate with-in group variation and to automatically regard one's group as good and other groups as bad. What is important here is that policymaking about human behavior will invoke these basic human tendencies. This implies that policies about people will be complicated by us v. them thinking and acting on the part of participants in the policy process. (These participants could be citizen-voters, policymakers, and bureaucrats.) A key portion of this basic human tendency is the way almost every political interaction can be perceived as a team sport, where one's team (or group) is winning or losing with respect to a particular policy outcome. These processes work at the individual level, where support is generated in terms of group win/loss calculations. These processes are also at work at the systemic level, where groups are motivated to act on the political system. The key problem here for effective policy is the way us v. them thinking will interfere with the best choice, because it may appear to benefit "them" at "our" expense. (Think of drug intervention programs.) Hard-wired capacities to conform to group norms can also lead citizens and policymakers to support policy simply because "the team" supports it. This is not limited to political parties, but also to social groups or particular government agencies. Much policy support might simply be an outgrowth of perceived group identity. The individual will reason "My group or agency values x and supports y. As a member of that group or agency I should likewise value x and support y."

Stereotypes and Prejudice

The power of belonging to a group also means humans are hard wired to think in terms of groups and group probabilities. According to Pinker (2002, p. 147), it is rational for humans to take group probabilities into account when reasoning

about the behavior of others. This is exactly the kind of rationality assumed by Bayes Theorem. Indeed, thinking in terms of group averages and probabilities is quite efficient: "From a resource-conservation perspective, our ability to categorize individuals into meaningful social groups is quite useful" (Ito, Willadess-Jensen, & Correll, 2007, p. 401). Humans will use "whatever information we associate with the group to guide impressions about and behavior toward those individuals". This kind of thinking "greatly facilitates our ability to make sense of the people around us".

We often know more about groups than commonly supposed. According to Kunda (1999, p. 395) we are very good at gauging the distribution of various reactions in a population. This skill allows us to anticipate the way a group will respond to an event or message. We are also "remarkably accurate" with regard to the distribution of key social variables in large, social groups "especially if we are familiar with the group in question" (Kunda, 1999, p. 414). And, according to Kunda (1999), we can be especially good at knowing the distribution of attitudes, traits and behaviors within large groups. Where we are weak is in predicting or explaining any particular individual's behavior. We do not even use our group knowledge to our benefit. When asked to predict the behavior of a particular individual, most people will ignore consensus information – information about the way most people behave in a given situation. We are also weak at predicting our own behavior. According to Kunda (1999), intimate and extensive knowledge we have about ourselves does not justify predictions that "defy" population base rates. "When you expect that you will behave differently from most people, you run a substantial risk of being wrong" (Kunda, 1999, p. 66).

What some consider the dark side of group conceptualization, prejudice, is actually quite practical as a starting point according to how the brain works. When we are interacting with a member of a group, we are hard wired to anticipate words and actions (Frith, 2008, p. 167). As Frith (2008) puts it, our brains try to "guess" the person's intentions and predict what he or she will say next. "Prejudice enables us to start our guessing" (p. 167). The reason our brains are hard wired this way is because reading the intentions of others is a survival tool. When an individual is unfamiliar, the best guess about their intentions and behavior is from our knowledge of group averages. In this way prejudice begins with stereotypes: "Social stereotypes provide the starting point for our interactions with people we do not know" (Frith, 2008, p. 168).

Another useful tool is our own behavior. As Frith (2008) notes, our best knowledge of how someone will behave in a situation is first our knowledge of how we would behave in the situation: "I predict what you are going to do on the basis of what I would do if I were in the same situation. If you are different from me, my prediction may be wrong" (p. 168). Between our stereotypes and the degree of difference between us and someone else, our guesses and predictions from what Frith (2008) aptly describes as "this limited knowledge" (p. 168) will not be very good.

Fairness

As an important group value, fairness has a very high position in human thinking. Humans are hard wired to value fairness. It is one of the only universal values humans share. We are emotionally rewarded (e.g., we feel good) when we are behaving in a fair manner toward others. Likewise, we are emotionally punished (upset) by the unfairness of others (Frith, 2008). Restak (2006) likewise notes the human tendency to place a high value on fairness (p. 181). Laboratory studies have demonstrated individuals will forgo a gain in order to punish another's greed. The willingness to take a loss in order to punish unfair behavior is an emotional, rather than rational, response (Restak, 2006, p. 181). Fairness also means "we seek to fine tune our punishment so that it only applies to people who could have been deterred by it" (Pinker, 2002, p. 183). We do not punish those who were unable to understand the policy or inhibit their behavior accordingly.

Thus, the power of belonging to a group means humans are hardwired to affiliate with a group, conform to a group's norms, engage in "us versus them thinking," judge others based on their group membership, and to value fairness in social interaction. Each of these innate human tendencies have important implications for policy development and implementation. Actors at all levels will have group processes influencing political behavior and decision making. As will be discussed below, it is possible to outline the precise ways these innate tendencies can interfere with the development and implementation of successful policies.

THE POWER OF COMPETITION FOR STATUS

Human interaction is mediated by a status system (Harris, 2006, p. 175). Humans are hard wired to monitor their status with regard to other humans. Most social creatures form dominance hierarchies, and humans are no different. All humans desire to be better than the next one in the group, but the goal is not to destroy other group members, but simply to dominate, or have higher status than they do (Harris, 2006, p. 210). In terms of the status system, the desire to be better than one's rivals can cloud the policy decision-making context – a member of Congress may be seeking party leadership within the chamber, a career bureaucrat may be hoping for a promotion to an appointed office, and both may pursue a course of action to improve their personal status, not necessarily to resolve the policy problem. According to Harris (2006), the status system specializes in collecting information about oneself and ones status within the group (p. 210). This system motivates us to compete and to strive to improve our status. The key problem for effective policy is the way this competitiveness may interfere with support for the "best" policy, particularly if the policy appears to reduce our status.

IMPLICATIONS FOR THE LIMITS OF POLICY SUCCESS

Now we can step back and examine what this knowledge of human behavior and reality means for public policy. Successful policy requires information, educational capacity (the ability to learn), and institutions structured for effective policy development and implementation. However, the realities of human biological processes mean (1) information will be valued for its social use more than its substantive use and (2) institutions will be structured to serve interpersonal, group competition, and/or status needs rather than the needs of substantive policy outputs.

Let's examine the implications of biological hard-wiring for each political actor. Then we will return to our two key implications.

Citizens

In terms of cognition, citizens will use cursory thinking for most political questions, and their opinions will likely differ from experts (policy analysts). Like experts, however, citizens will prefer policy options which increase their sense of control and provide a simple, broad framing of a situation and its solution. However, effective policies are often complex and do not lend themselves to simple explanations. We might also expect citizens to support most policies out of habit – regardless of effectiveness. Thus, we can conclude popular policy and effective policy will rarely align.

In terms of emotion, citizens will seek out information when there is a threat perceived, and times of crises can cause elaborate thinking and investigation about an issue. Negative events will preferentially attract citizen attention. This also means that education absent a threat will be useless an ineffective as it takes fear and anxiety to induce attention. Threats can also make citizens receptive to changing their habitual policy support. Citizens will also want to avoid that which makes them feel bad, and they will seek to find a solution to end the discussion and thought process as much as to end the problem. Thus, we can conclude citizens will be complacent and habitual about most issues, regardless of benign education campaigns. We can also conclude that citizens will be vulnerable to manipulation from policymakers and policy targets (interest groups) seeking to induce threat or crisis thinking.

In terms of interpersonal relationships, citizens will experience a mediated relationship with policymakers. These will be one-way, but meaningful in the mind of the citizen. Citizens will build lexicons and store knowledge they perceive about individual policymakers, particularly presidents and congressional leaders who are consistently in the news. Citizens will expect consistent behavior from "known" policymakers and will fundamentally attribute their actions to their individual personalities. Policymakers and policy targets can manipulate this information for policy gain. Thus, the public will be easily shocked and surprised when individual policymakers act out of character. Citizens who have relationships with policy targets will likely associate real people/stories with policy options and view policy preferences in the context of those interpersonal relationships. Thus, we can conclude that policy preferences will be a function of

perceived relationships with policymakers and a function of the connection between policy targets and citizens. We can also conclude that information networks will provide gossip and mind-reading about policymakers, rather than policies.

In terms of group identity, citizens will view policy as a function of their group identity. This identity is subject to manipulation by policymakers or policy targets. Citizens will value conformity and group acceptance more than being correct or right about an issue or situation. Group acceptance and conformity will likely trump personal rationality with property and prospects. Citizens will support interest groups and political parties as a function of group identity – not necessary rational calculation of policy support. Groups who are outsiders or who are in the minority will experience greater cohesion than groups who are insiders or in the majority. Citizens will use averages (stereotypes) when thinking about groups they do not belong to, and they will value fairness above all else in politics and policy consideration. Thus, we can conclude that citizen policy support will be a function of group identity and group competition – not necessarily rational evaluation of policy outcomes.

In terms of status, citizens will primarily see their status as a function of group identity and competition. They will be motivated to behave an act in politics when it is framed as group competition or as a game. They will be acting to win the game, not necessarily to solve the policy problem. Thus, citizens will evaluate policies relative to their representativeness of group success or failure. In terms of personal prosperity, citizens will be unwilling to do anything that will diminish their perceived status among their peers.

Policymakers

In terms of thinking, policymakers will also use default-level thinking for most questions. Policymakers will likely have different preferences than citizens or experts. While they might be closer to citizens on the substance of a policy, they will be experts on implementation, and they will possess an expert-level understanding of the politics of a problem – especially when it comes to the people and institutions responsible for executing the policy. Policymakers, like citizens, will also seek to increase their personal control over a situation, and they will favor policies which increase their institutional power.

In terms of emotions, policymakers will continue with business as usual when times are good. They will get complacent when there is no threat, and routine policymaking (the absence of creativity) will be normal in the absence of a threat. While threats could be substantive (such as terrorism), the most compelling threats will be political. In other words, threats to the public will upset the status quo, presenting a political threat to policymakers. Elaborate thinking can be triggered by perceived political threats, but it will be elaborate thinking about the political (rather than the substantive) threat. Substantive policy problems are defined in terms of their political importance, not their substantive importance. Party and government elites will use political threats to motivate their rank and file. Because humans do not think hard when times are good, policymakers who

are fresh off of election wins or flying high in their personal lives will be prone to mistakes. Thus, we can conclude that the choice of a policy will suit political goals rather than substantive goals, and change will occur when policymakers are politically, rather than substantively, threatened. Change will only go so far as to alleviate the political threat, not the substantive threat.

In terms of interpersonal relationships, policymakers will greatly value their relationships with each other and with the public. They will work hard to manage their public image, and they will keep careful tabs on their friends and enemies in government. When it comes to decision-making or implementation by policymakers, interpersonal relationships will rank very high in their consideration of alternative courses of action. Mind-reading, gossip, and information about other people will form a valuable currency in daily interaction. Thus, we can conclude that institutions will be structured to provide information about the positions and characteristics of other players, not policy.

In terms of group identity, policymakers, like citizens, will view policy action in terms of their group identity. Conformity and acceptance will be important features of policymaker activity. Policymakers will experience greater affiliation under threat conditions, such as when their institution or their party is under attack. Minorities and outsiders will have greater cohesion than majorities and insiders, and they will fight harder, risk more, and experience greater solidarity in their ranks. Policymakers will also value fairness, and they are not likely to let unfairness go unpunished. Thus, we can conclude that policy actions by policymakers will be a function of group identity and group competition. Groups in the majority will experience less solidarity than those in the minority. Institutions will reflect this affinity for affiliation in their function and structure.

In terms of status, policymakers will be motivated to increase their status within their groups and among their groups. Thus, policymakers are unlikely to support policies which will decrease their status, either personally, or in terms of their group or institution.

Policy Targets

Unlike citizens and policymakers, policy targets will engage in elaborate thinking about the substance of a policy. They will possess expert knowledge about policy operations on the ground. They will be motivated to control substantive outcomes, and the perception of a policy threat will mobilize policy targets to engage in elaborate, strategic thinking. Policy targets will also be motivated to compete with any effective tool, especially political tools. If unsuccessful, policy targets will be motivated to think elaborately about adapting their behavior to make a policy ineffective. Policy targets will network extensively about substantive policy implementation and adaptation strategies. In terms of their interpersonal relationships and group identity, policy substance will dominate their conversation and activities. Policy targets will experience solidarity and cohesion under threat, and they will be better positioned to launch effective counterattacks to policy substance. Conformity and socialization among policy targets will shape their

norms, values, and behaviors. Policies not grounded in policy target values, norms and goals will likely fail.

Policy Analysts

Policy analysts will engage in elaborate thinking about policy problems but will possess inferior data about policy target activities. Policy analysts' proposals will threaten policy targets and likely mobilize policy targets to mobilize against consideration and implementation. Policy analysts will also possess inferior data about political information and policymakers. Failure to account for interpersonal and group identity will make recommendations less likely to be considered or implemented. Policy analysts' focus on the problem will invariably lead them to propose changes to policy institutions – threatening policymakers to mobilize to protect group identity and status. Policymakers will engage in elaborate thinking about the political implications of policy solutions to equal or master policy analysts.

IMPLICATIONS FOR POLITICS

The Role of Information

Information about a policy can have two functions: it can be used for substantive or for social purposes. Substantive use will rationally apply the information to the problem at hand. Social use will use the information for its interpersonal, group competition or status use. Because information can have two uses, it is important to ask which use will matter most to the humans in the policy process. As described above, most communications among humans will serve the social use. Communications about people, about group identity and competition, and about status will be the most useful and the most valued.

In terms of citizen information networks, the professional media (in competition for viewers and readers) will tailor its information to citizen market demands. Thus, we will see media discussions about politics likely dominated by interpersonal (the name of the President's dog), group (who is blame, who is losing/winning), or status (our program/product will make you more informed) concerns. There should be little substantive information in professional media discussions of policy. When there is substantive content, it should be less read and less valued than other content (e.g., less viewers, less circulation, etc.). Substance will be more likely when threat is perceived, as market demand will ask for substance.

Private conversations and interpersonal networks among citizens should be dominated by social concerns: gossip, group competition, or status comparisons. Discussion of policy substance should be rare, unless citizens perceive themselves as policy targets.

In terms of policymakers' information networks, we would likewise expect these to be dominated by social concerns. Information about people (especially gossip), group competition (especially partisan or institutional wellbeing), and

status should dominate policymakers' information networks, both formal and informal. Policymakers' informational outlets, such as press releases, websites, and speeches should have more content about social concerns than substantive concerns.

In contrast to citizens and policymakers, policy target information networks will be dominated by substantive policy discussions– as policy substance directly threatens group identity and group status. When large groups of citizens perceive themselves as policy targets, they will be motivated to seek out substantive information about policy substance, and organizations fulfilling this demand will grow. Thus, we should see a growth policy target information substance.

The Structure of Institutions

Political institutions will serve interpersonal, group, or status needs over substantive needs. Legislative, administrative and judicial institutions will serve social over substantive needs.

Legislatures will function to serve interpersonal, group, or status needs. Mayhew (1974) classically noted the way Congressional committees, offices, and parties are structured to serve members reelection needs, not policy development needs. Committee hearings and committee work is likewise more about turf guarding and grandstanding than effective policy development. The ease with which members can propose legislation likewise serves status needs – regardless of whether the bill ever becomes a law. Members themselves value the relationships and social side of congress more than the policy work and often cite waning relationships as a primary reason for leaving. (This can also be said of administrative agency personnel.)

In terms of administrative agencies, institutional arrangements will serve agency social needs. Leadership will be people-driven and the protection of agency identity and status will be paramount. Competition among agencies will be driven by group and status concerns, rather than policy concerns. Public activity will be about image-building and marketing to increase status and power (Meier & Bohte, 2007).

In terms of judicial activity, caseloads will be a function of group competition at the appellate level. At the trial level, particularly in local criminal trials, relationships and work groups will dominate judicial outcomes (Nardulli, Flemming, & Eisenstein, 1984). Relationships at the appellate level among justices will also be important to judicial outcomes.

In terms of substance, policy targets will dominate the proceedings of all three institutions. Committee hearings and administrative public comments will be dominated by policy targets. Judicial cases will be the instruments of policy target competition and status.

CONCLUSION: HOW OTHER MODELS OF THE POLICY PROCESS FALL SHORT

There are seven main models of the policy process (Dye, 2008; Sabatier & Hunter, 1989): (1) Institutionalism, (2) Process, (3) Rationalism, (4) Incrementalism, (5) Group Theory/Advocacy Coalitions, (6) Elite Theory, Public Choice Theory, and (7) Game Theory. Each of these models has been useful for explaining and predicting policy outcomes as the result of (1) institutional structure and rules, (2) a rational calculation, (3) what came before, (4) group competition, (5) elite (vs. mass) preferences, (6) collective choices, and (7) strategic thinking. However, they vary in their congruence with a human analysis of the policy process. To the extent with which these models recognize the biology of cognitive capacities, emotional thinking, personal relationships, group identity and belonging, and competition for status they will approach better explanatory and predictive power. These models can be placed on a continuum of closest to furthest from the human model. Group theory and public choice theory are the closest. Both recognize the way self-interest motivates policy targets threatened by public policy. Game theory and elite theory understand the competition for status, but they miscalculate the reasons behind the desired preference. Political and substantive reasons can guide elite thinking and choices here. Institutionalism understands the role of institutional arrangements, but it does not explain their function in human terms, thus losing some of its predictive and explanatory power. Process models follow the development and evaluation of policy from the substantive view of the policy analyst. Rationalism simply demonstrates the gap between popular policy and effective policy by demonstrating the lack of attention by citizens and elites to substantive outcomes, but it does not tell us why – seeming to imply that education or a change in values should do the trick.

Studies of public policy, particularly the explanation and prediction of policy outcomes, are motivated by a desire to improve substantive policy success. However, most policies fall short of solving problems. Public policy development and policy implementation (government as a verb) is a human endeavor. As such it is constrained by human limitations. This could be groundbreaking for public policy scholarship, since it often takes humans out of the equation. A large body of public policy work discusses why the policy does not work, but does not explain why that policy was chosen in the first place. The scholarship will offer a "better" policy, but not a better way to get that policy enacted and implemented. If it does explain the how the policy came to be, it uses the models of behavior and institutions above, perhaps missing more fundamental tendencies in human hard-wired behavior operating on those contexts. For example, a biopolitical approach to explaining election outcomes would discuss the power of negative ads to sway voters, as has been demonstrated in Brader (2006) or a different biopolitical application could use work on social status to explain the social constructions of farmers and farming as the reason for differences in American versus European farm policy, as has been demonstrated in Skogstad (2008). Developing explanatory models with biological processes could be especially helpful for understanding individual leadership decisions in committees, agencies

or administrations. Scholars who use interview data often learn "the real reason" something happened, a reason biology might have caught but conventional models missed (see for example Ashworth's (2001) public service primer and its emphasis on personal relationships in political outcomes). Each of these approaches could explain why effective policy was left on the table in favor of a sub-optimal choice.

As our model of human interaction in the American policy process demonstrates, effective policy will be rare because we are human – and because of the way human tendencies limit our institutions in the face of determined policy targets. The way humans think (using cursory or elaborate thinking, updating beliefs with learning, expert versus novice differences, the role of heuristics and instincts), the role of emotion (especially negative emotion), the power of interpersonal relationships, the power of belonging to a group, and the power of competition for status – each of these realities anticipate ineffective policy development. Knowing something about humans explains why it is difficult for policy to succeed.

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NEUROTOXICANTS AND BEHAVIOR: IMPLICATIONS OF 'TOXICOGENOMICS' FOR PUBLIC POLICY

Roger D. Masters

ABSTRACT

Research at the intersection of neurotoxicology, cognitive neuroscience, genetics, and behavior – "toxicogenomics" – promises to improve understanding of behavior and public policies. Many toxicants modify neurotransmitters with effects depending on genotype, development, and experience. For example, lead and manganese downregulate dopaminergic or serotonergic function, weaken behavioral inhibition, and are positively correlated with hyperactivity (ADHD), substance abuse, or violent crime. Within this context, the chapter argues that neurotoxicology holds great promise for improving public policies in areas such as criminal justice and education. After discussing research methods, the chapter surveys previous work in neurotoxicology as it pertains to educational outcomes and to crime. Data are summarized linking: (1) children's blood lead levels with poor educational performance; (2) hair and blood levels of heavy metals with violent crime; and (3) uptake of multiple toxicants with pollution from abandoned mines. The chapter concludes by drawing lessons for ongoing research agendas at the intersection of neurotoxins, behavior, and policy.

INTRODUCTION: NEUROTOXICANTS AND BEHAVIOR

Although there has long been a widespread interest in the association between toxic chemicals and such diseases as cancer and diabetes, attention to research

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linking environmental poisons to brain chemistry and behavior is growing. Based on scientific understanding of the functions and interactions of such neurotransmitters as serotonin, dopamine, norepinephrine, medications like Prozac and Ritalin are taken by millions of Americans and have become household names. Ironically, political scientists have generally ignored these developments, often persisting in research based on traditional theoretical frameworks (Pinker, 2002). Although Ben Franklin (1987) learned from British printers that lead reduces intelligence and learning ability (Lemay, 1987, pp. 1163–1166), most contemporary educators also don't take toxins seriously.

One consequence of this paradox is that educators, social scientists, and public policy specialists usually ignore the work of neurotoxicologists who have explored the associations between lead uptake, neurotransmitter function, and poor impulse control, learning disabilities, or violence (Bryce-Smith, 1983; Cook et al., 1995; Cory-Slechta, 1995; Needleman, 1989). While an estimated 11 million American children take Ritalin to counteract hyperactivity (ADHD), evidence that toxicants are often associated with learning disabilities and other neurological diseases (Gottschalk, Rebello, Buchsbaum, Tucker, & Hodges, 1991; Rogers & Walsh, 2002) is also not considered by most physicians (Denworth, 2002). Failure to understand such effects is especially unwise because, in some instances, exposure to lead and other toxicants is due to human activities and can be exacerbated by governmental policies (Wollan, 1968). Arguing that neurotoxicology holds great promise for improving public policies in areas such as criminal justice and education, this chapter draws on data from the 1970s through the 1990s and reveals important insights and hypotheses upon which a revitalized neuropolitical research agenda could emerge.

In contemporary neurotoxicology, research on exposures and effects of toxicants relies heavily on "biomarkers" whose utility and limitations differ from the diagnostic tests of contemporary medical practice. Analysis of biomarker reliability distinguishes between: (1) "biomarkers of exposure" (which serve as "dosimeters or markers of biologically effective dose" of a harmful toxicant from the environment); (2) "biomarkers of effect" (which measure "alterations of an organism that can indicate a potential or established health impairment or disease"); and (3) "biomarkers of susceptibility" (which "indicate individual factors that can affect response to an environmental toxicant") (NCER, 2002).[1] These perspectives need to be linked with the analysis of pathways of exposure because

[1]Compare the National Academy of Science definitions: *biomarker of exposure*: "an exogenous substance or its metabolite or the product of an interaction between a xenobiotic agent and some target molecule or cell that is measured in a compartment within an organism"; *biomarker of effect*: "a measurable biochemical, physiological, or other alteration within an organism that, depending on magnitude, can be recognized as an established or potential health impairment or disease"; *biomarker of susceptibility*: "an indicator of an inherent or acquired limitation of an organism's ability to respond to the challenge of exposure to a specific xenobiotic substance" (Rhomberg, 1993, p. 35).

"biomarkers of effect … can be affected by other environmental exposures" (NCER, 2002). In addition to synergistic effects between toxicants (Schubert, Riley, & Tyler, 1978), some chemicals can increase uptake of other toxicants from environmental exposure (Masters & Coplan, 1999a; Masters, Coplan, Hone, & Dykes, 2000).

This complexity indicates why uptake of a single element often has varied effects. In addition to contributing to diseases, toxicants can produce behavioral dysfunctions by interfering with neurotransmitter function and brain structure (Angier, 1993; Bryce-Smith, 1983; Cory-Slechta, 1995). For example, bodily burdens of lead (with or without interactions with other toxicants) have been linked to hyperactivity (ADHD) and other learning disabilities (Bellinger, Leviton, Alfred, & Rabinowitz, 1994; Cordova, Crinella, & Ericson, n.d.; Geier, Kern, & Geier, 2017; Kahn, Kelly, & Walker, 1995; Minder, Das-Smaal, Brand, Orlebeke, & Jacob, 1994; Needleman, 1999; Needleman & Gatsonis, 1991; Pihl, Doak, & Vrama, 1980; Tuthill, 1996), to higher rates of substance abuse (Masters, 2001c; Nevin, 2000), and to increased likelihood of violent behavior (Gottschalk et al., 1991; Masters, Hone, & Doshi, 1998; Stretesky & Lynch, 2001).

Unfortunately, many studies of toxicants focus solely on cancer or other diseases without considering cognitive and behavioral harm. Because ethnic diversity and population mobility often make it difficult to assess these factors, especially in sites with multiple toxicants (Reif, Ramsdell, DuTeau, Anger, & Tsongas, 1993), biomarkers of exposure, of effect, and of susceptibility are often more useful in assessing overall risks to populations than in diagnosing individual cases.

At the individual level, however, the evidence linking lead with behavioral dysfunction is greatly reinforced insofar as therapeutic interventions can often reverse some of these effects. For example, in cases of ADHD associated with excessive levels of lead, therapeutic nutrient therapies can often lower blood lead levels and bring hyperactivity under control without medication (Walsh, 1999).[2] Given risks that Ritalin may be misused as a recreational drug and lead to lasting

[2]Dr William Walsh is Director, Pfeiffer Treatment Center in Illinois, tel. 630 505 0300. A personal experience attests to the paradoxes that follow from the failure of social scientists, physicians, and policy-makers to consider the implications of research linking neurotoxicity, brain chemistry, and learning disabilities. Recently, Doctor Walsh summarized years of treating children diagnosed with ADHD who carry high bodily burdens of lead, noting that of over 2000 such cases approximately 80% were no longer hyperactive after six months of therapy (with no use of Ritalin). Yet when I mentioned this example when giving a seminar on brain chemistry and learning disabilities at the Harvard Graduate School of Education, not only was such a treatment unknown to faculty and students but three participants firmly denied that ADHD or ADD exist.

substance abuse, it is unfortunate that attention has not been given to therapeutic detoxification by nutrients (Rogers & Walsh, 2002).

To illustrate how neurotoxicology can help us understand dysfunctional social behavior and improve public policies, research in three areas is reviewed: (1) lead and educational failure; (2) lead or manganese and violent crime; and (3) multiple toxicants at Superfund sites. Established findings on toxicants and behavior at the individual level can be treated as hypotheses that explain educational failure, violent crime, or other problems at the population level. Multivariate analyses of actual data can be used to test such hypotheses and show whether, controlling for other socioeconomic and demographic risk factors, mechanisms identified in the laboratory can help design more effective responses to costly social problems. For this purpose, analytical studies need to be repeated on multiple datasets, subjecting each one to different statistical tests (e.g., multiple regression and analysis of variance).[3] Where precise mechanisms of toxicity are not already established, multivariate statistics on population-level data can indicate issues that need further study. For policies concerning behaviors associated with education, substance abuse, and crime, this approach offers a means of gaining new insights and discovering effective interventions to issues that have traditionally been decided in terms of ideological commitments rather than scientific evidence.

LEAD UPTAKE AS A FACTOR IN POOR EDUCATIONAL OUTCOMES

Despite extensive research on the association between lead neurotoxicity and learning disabilities, implications of neurotoxicology for educational policies have not usually been analyzed in conjunction with other factors known to influence educational performance. For communities in Massachusetts, average scores in state-wide educational tests were compared to a survey of children's blood lead levels and census data for the same communities. To do so, test scores and blood lead averages were integrated with census information about each Massachusetts community (population size and density, per capita income, welfare families, ethnic composition, and sources of environmental exposure to toxicants such as levels of lead in public water supplies, number of toxic releases cited by the EPA, or percent of old housing as an index of exposure to residues of lead paint). If a school serves children in two or more towns, all data from those towns were combined for the school grades involved. Conversely, if children from

[3]This need will explain the number of charts and tables below, which are intended to emphasize the importance of extensive replication when proposing a major change in technologies.

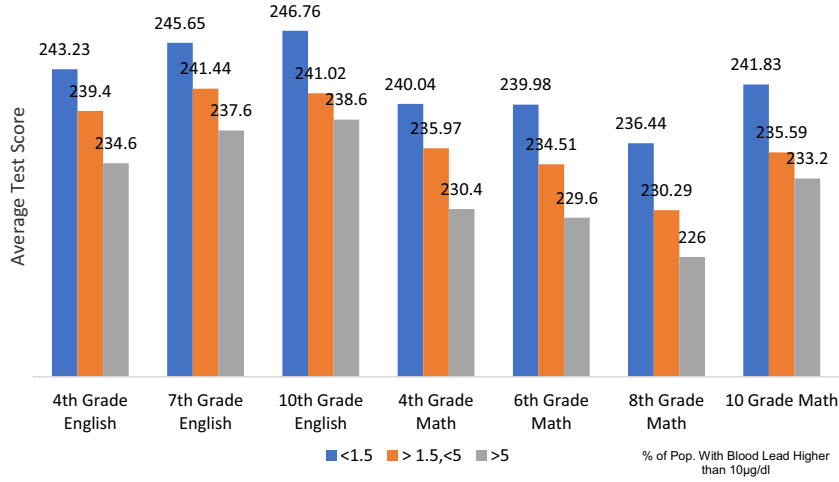

Fig. 1. Massachusetts Educational Testing Percent of Population With High Blood Lead and MCAS Scores. *Note*: Analysis of variance shows significant association of silicofluoride usage with lower test scores ($p = 0.001$ for all tests above: see Table 1). For multiple regression confirming this result with 20 independent variables, see Table 2. *Source*: Masters (2002).

a single community can go to two or more schools in the same grades, test scores for those schools were combined since in these cases there was no other way of assessing the demographics associated with students going to an individual school (Fig. 1).

The standardized Massachusetts educational scores (MCAS) were available for nine tests: third grade reading, fourth grade English, fourth grade Math, sixth grade Math, seventh grade English, 7th grade Math, 8th grade History, and 10th grade Math. The first step in assessing the impact of lead toxicity on these educational tests is a simple correlation between the average blood lead level in each community and test scores by subject and grade. All correlations between average lead levels and test scores were negative ($r > -0.4207 < -0.5063$) with widely varying test scores in communities with low blood lead and uniformly poor MCAS averages where blood lead was high. For example, in towns with 0–2% children with blood lead above 10% μg/dL fourth Grade English scores ranged between 230 and almost 255 (highest for the state); in the few communities where over 8% of children had equally high blood lead, scores were always below 235. In one-way analysis of variance, with percent children over 10 μg/dL blood lead trichotomized, for each MCAS test a negative association between average scores and blood lead was significant; for each of the nine tests, $p = 0.0001$, with

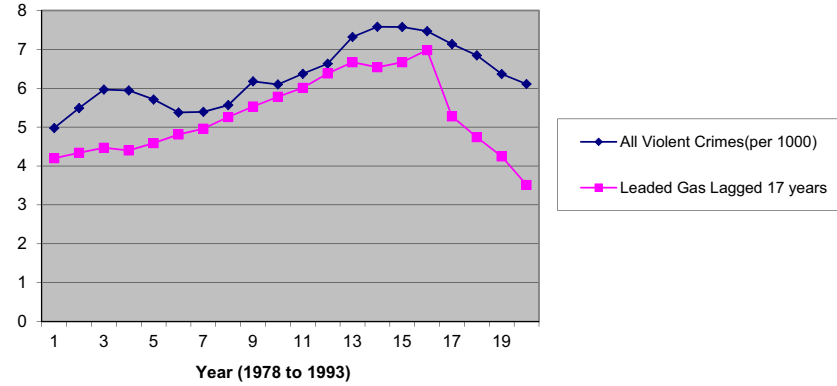

Fig. 2. Leaded Gasoline Sales and All Violent Crimes 17 Years Later. *Source*: FBI Crime Reports (http://www.fbi.gov/ur/Cius_97/97crime/97crime2.pdf), p. 59. Note the definition of "violent crime": "Violent crime is composed of four offenses: murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault. All violent crimes involve force or threat of force" (FBI Crime Reports, p. 11). Crime rates are represented per 1,000 population; leaded gasoline sales in millions of gallons per day. Correlation of leaded gasoline sales and violent crime rate 17 years later: $r = 0.901$.

F values between 27.0489 and 17.5294.[4] To reduce inequality of cell sizes, a second trichotomy was analyzed with results again consistently significant at $p = 0.0001$ (Table 1).[5] With these results in mind, we can be confident that elevated blood lead levels have a negative impact on learning.

Comparing the effect of blood lead and school size to check for educational environment, using two-way ANOVA, blood lead for every test was significant

[4]The frequencies in each of these categories for third and fourth grade tests were: $< 1.5\%$ over 10 μg/dL = 121; $>1.5\% < 5\%$ over 10 μg/dL = 45; $<5\%$ over 10 μg/dL = 10. For sixth grade scores, there were only 116 schools in the $<1.5\%$ over 10 μg/dL category whereas the others were the same. For seventh and eighth grade scores, there were 98, 38, and 10 schools in the three categories respectively; for the 10th grade scores, the frequencies were 88, 38, and 10. Because the grade scoring on the third grade reading test were not comparable to the other MCAS scores they are omitted from the Figure. For the 121 communities where less than 1.5% of children had blood lead over 10 μg/dL, the average score on this test was 32.2975; for the 45 communities with between 1.5% and 5% of children's blood lead over 10 μg/dL, average third grade reading was 30.4889; and in the 10 communities where over 5% had blood lead over 10 μg/dL, reading scores averaged only 28.5. Similar differences were evident in the eighth grade History test. On the association between the percent of children with over 10 μg/dL of blood lead and the frequency of intermediate levels of lead (between 5 and 10 μg/dL), which makes this a useful measure of a community's overall risk from lead uptake, see Figure 8 below.

[5]This trichotomy classified communities as having average blood lead levels under 0.6824 μg/dL ($n = 78$), between 0.6824 and 1.7434 μg/dL ($n = 50$), and over 1.7434 ($n = 47$).

Table 1. Analysis of Variance: Association of Community Average MCAS Test Scores and Percent of Community With Blood Lead Over 10 μg/dL.

% of Pop >10 μg/dL	*n*	MCAS Score	*n*	MCAS Score
	3rd grade Reading		*4th grade English*	
<0.6824%	78	32.4744	78	243.5256
>0.6824, <1.7434%	50	31.88	50	242.46
>1.7434%	47	29.9787	47	238.3191
Prob.	0.0001		0.0001	
	7th grade English		*10th grade English*	
<0.6824%	59	246.0169	52	247.8269
>0.6824, <1.7434%	44	245.0909	41	245.0244
>1.7434%	42	240.2381	41	240.2195
Prob.	0.0001		0.0001	
	4th grade Math		*6th grade Math*	
<0.5824%	78	240.3077	74	240.5676
>0.6824, <1.7434%	50	239.42	49	238.5306
>1.7434%	47	234.5957	47	233.4681
Prob.	0.0001		0.0001	
	8th grade Math		*10th grade Math*	
<0.5824%	59	236.9322	53	242.3585
>0.6824, <1.7434%	44	235.3182	41	240.7561
>1.7434%	42	229.1667	41	234.6585
Prob.	0.0001		0.0001	
	8th grade History			
<0.5824%	59	228.0508		
>0.6824, <1.7434%	44	227.25		
>1.7434%	42	222.9524		
Prob.	0.0001			

Source: Masters (2002).

($p < 0.0005$) whereas school size (<450; 450–535; >535) was significant for only four of the tests ($p < 0.05$). Perhaps more important, there was a significant interaction effect ($p < 0.05$) for four tests with the remaining scores showing a tendency for higher lead levels to reduce test scores to a greater extent in larger schools (Masters, 2002; Fig. 2a–c). It would seem that individualized attention to students pays off since test grades are similar in smaller schools where children have either high or low blood lead, whereas in the schools with over 535 students scores often average 10 points lower for towns with high blood lead. Finally, it also can be argued that the policy problem is the educational approach rather than lead level.

Multiple regression equations predicting scores on each MCAS test used 20 variables, including population size, population density, and number of students in school district. The percent of children with over 10 μg/dL of blood lead was the only variable significantly associated ($p < 0.10$) with all nine tests, with $p < 0.06$ in six cases. Number of toxic spills was significant for five tests, with $p < 0.05$

in four. Community percent urbanized was significant for seven tests, and per capita income was only significant for four – while none of the remaining 16 variables was significant for more than a single MCAS test (Table 2).

Factor analyses suggest that these results were influenced by intercorrelation between the predictor variables, which produced a negative coefficient between per capita income and test scores. As a check, six predictor variables not strongly correlated with each other were therefore chosen for another multiple regression analysis: percent of children with blood lead over 10 μg/dL, population, median household income, students per school, percent of Black, and first draw Water Lead in public water supplies. Using this second set of variables to predict test scores, population size and high blood lead were the only variables significant for scores on multiple regression for all nine MCAS tests, with median household income significant on four tests, students per school on three tests, and percent Black on only one test. Controlling for high blood lead, there is no additional contribution of the first draw levels of lead in public water supplies; as a result, uptake of lead seems to be a more important predictor of poor educational performance than mere presence of lead in the environment. Since the standardized coefficient for this factor is higher than for any other variable (Table 3), blood lead probably influences test outcomes independently of other demographic and socioeconomic factors.

As a final test of the hypothesis that blood lead is linked to low educational performance, stepwise regression on grade four English MCAS scores used nine variables, including students per school, percent of welfare households, and toxic spills 1996–1998. In this analysis, children's blood lead was the first variable removed (adj. $r^2 = 0.3016$, F 33.8166). Other variables removed were number of toxic spills 1996–1998, students per school, and median house income. Of the four variables significant in this analysis, children's blood lead again had the highest standardized coefficient (-0.4705).[6]

In contrast to the view of some medical toxicologists, behavioral epidemiology indicates harmful effects of lead neurotoxicity even when average blood lead levels are below the conventional medical threshold of 10 μg/dL.[7] More

[6]In addition to supporting the other statistical analysis summarized above, this result reinforces the importance of focusing on biomarkers of exposure to toxicants as distinct from measures of mere physical presence of these toxicants in the environment.

[7]At the ATSDR Head Hair Panel, for example, Sharon Seidel – medical toxicologist from the California State Health Department – described "measurable health effects" of group exposure to lead as "unlikely unless very high exposure" (*ATSDR Head Hair Panel*, p. C-71). Since the data in Fig. 2a show neurotoxicological harm below the level of 5 μg/dL, such an assessment would seem to refer only to diseases (though even in that regard, interaction effects of multiple toxicants to be discussed below would seem to challenge the conclusion). The limited knowledge of scientific evidence for behavioral effects of lead among medical toxicologists is illustrated by the comments of three members of the ATSDR panel on head hair as a biomarker of toxic exposure (Daniel Pascal, Thomas Clarkson, and Sharon Seidel). ATSDR: 5-5 and esp. C-53, where Pascal speaks of the need to "move beyond 'anecdotal' levels of documentation" of the association between manganese and "behavioral disorder or violence."

Table 2. Variables Associated With MCAS Scores – Multiple Regression (20 Variables, Nine Tests).

Independent Variable	Significance and Standarized Coefficient of Variable by Grade and Test				
	$p < 0.005$	$p = <0.01$	$p < 0.05$	$p < 0.10$	Not Significant
High blood LEA % >10 μg/dL	3rd Gr.Reading (−0.4189)	4th grade English (−0.4589) 7th grade English (−0.5055)	8th grade Math (−0.3098) 4th grade Math (−0.4272)	10th grade English (−0.3899) 6th grade Math (−0.3098) 10th grade Math (−0.3881) 8th grade History (0.0576)	
Toxic spills 1996–1998		4th grade English (−0.4042)	6th grade Math (−0.3232) 3rd grade Reading (−0.3058) 4th grade Math (−0.3731)	7th grade English (−0.2505)	10th grade English (−0.2559) 8th grade Math (−0.1824) 10th grade Math (−0.104) 8th grade History (−0.1867)
Per capita income			4th grade English (−0.7786)	4th grade Math (−0.6647) 6th grade Math (−0.6748) 8th grade Math (−0.8153) 3rd grade Reading (−0.4894)	7th grade English (−0.6094) 10th grade English (−0.4836) 10th grade Math (−0.5882) 8th grade History (−0.3493)
% Urbanized			4th grade English (+0.284) 7th grade English (+0.2833) 6th grade Math (+0.3124) 8th grade Math (+0.3275)	4th grade Math (+0.2862) 10th grade English (+0.306) 10th grade Math (+0.2678)	3rd grade Reading (+0.1183) 8th grade History (+0.2256)
% BA/GRAD			3rd grade Reading (+0.6734) 4th grade English (+0.6968) 4th grade Math (+0.822) 6th grade Math (+0.8519)	8th grade Math (+0.7754)	7th grade English (+0.6232) 10th grade English (+0.4246) 10th grade Math (+0.5958) 8th grade History (+0.3907)
Student in district					All 9 tests

Table 2. *(Continued)*

Independent Variable	Significance and Standarized Coefficient of Variable by Grade and Test				
	$p < 0.005$	$p = <0.01$	$p < 0.05$	$p < 0.10$	Not Significant
Schools in district					All 9 tests
Population					All 9 tests
Population density					All 9 tests
Use of silicofluorides					All 9 tests
Student per school					All 9 tests
Median house income					All 9 tests
% Black					All 9 tests
% Asian				7th grade English	All 8 tests
% Hispanic					All 9 tests
% Puerto Rican					All 9 tests
% High School Dropout					All 9 tests
% Welfare houses					All 9 tests
#Contaminated sites				3rd grade Reading	Other 8 tests
#EPAcitations					All 9 tests

Source: Masters (2002).

Table 3. Multiple Regression (6 Nonconflicting Variables) Predicting MCAS Education Scores – Selected Mass. Cities.

	Probability Values of Less Than 0.10 Are in Bold							
Indep. Variable	Std. Coeff.	Prob.	Std. Coeff.	Prob.	Std. Coeff.	Prob.	Std. Coeff.	Prob.
	3rd grade Reading		*4th grade English*		*7th grade English*		*10th grade English*	
Median house income	0.0927	0.1581	**0.1728**	**0.0116**	**0.1667**	**0.0217**	0.1105	0.1461
% Black	**−0.1202**	**0.068**	−0.0695	0.3065	−0.1192	0.1006	0.05	0.5114
Students per school	**−0.12**	**0.0661**	**−0.1528**	**0.0243**	−0.0628	0.3766	**−0.1289**	**0.0815**
Water lead, first draw	−0.0663	0.3001	−0.055	0.4062	−0.0037	0.9577	0.0043	0.9537
% >10 μg/dL	**−0.3766**	**0.0001**	**−0.4193**	**0.0001**	**−0.3722**	**0.0001**	**−0.3476**	**0.0001**
Pop (thousands)	**−0.292**	**0.0001**	**−0.1773**	**0.0196**	**−0.2572**	**0.0014**	**−0.3326**	**0.0001**
Adj. *R*-square	0.3972		0.3537		0.35		0.3372	
Equation Prob.		0.0001		0.0001		0.0001		0.0001
No. Cities.	155		155		138		129	
	4th grade Math		*6th grade Math*		*8th grade Math*		*10th grade Math*	
Median house income	**0.1226**	**0.087**	**0.1669**	**0.025**	0.1195	0.1168	0.1163	0.1333
% Black	−0.0937	0.1905	0.0248	0.7375	−0.0115	0.8804	−0.0547	0.4788
Students per school	−0.103	0.1467	−0.0892	0.2225	−0.0615	0.4112	−0.1007	0.1807
Water lead, first draw	−0.0862	0.2169	−0.0766	0.2892	−0.0452	0.5414	0.0299	0.6889
% >10 μg/dL	**−0.3992**	**0.0001**	**−0.3332**	**0.0001**	**−0.3615**	**0.0001**	**−0.3193**	**0.0001**
Pop (thousands)	**−0.1471**	**0.0647**	**−0.2065**	**0.0124**	**−0.2527**	**0.0029**	**−0.3111**	**0.0003**
Adj. *R*-square	0.2848		0.247		0.2772		0.309	
Equation Prob.		0.0001		0.0001		0.0001		0.0001
No. Cities.	155		152		138		130	
	8th grade History							
Median house income	0.0728	0.3419						
% Black	−0.0371	0.6292						
Students per school	−0.0294	0.6961						
Water lead, first draw	0.0097	0.8962						
% >10 μg/dL	**−0.351**	**0.0001**						
Pop (thousands)	**−0.2683**	**0.0017**						
Adj. *R*-square	0.2651							
Equation Prob.		0.0001						
No. Cities.	138							

Source: Masters (2002).

important, in addition to its therapeutic value, research associating lead uptake with learning disabilities has implications for public policy. While environmental pollution is usually linked to cancer or other diseases, reducing exposures to lead and other toxicants could benefit many children with learning disabilities.

Moreover, other behavioral effects of lead greatly reinforce the need to consider neurotoxicology when assessing the policy implications of exposure to toxicants.

HEAVY METALS AND VIOLENT CRIME

Because aggressive impulses are an integral part of the primate behavioral repertoire, loss of impulse control due to lead and other toxicants can contribute to violent outbursts. Individuals imprisoned for violent crime often have higher levels of lead and manganese in their blood or bodily tissues than other offenders or law-abiding citizens (Gottschalk et al., 1991). Just as lead downregulates dopaminergic functions including cognition and impulse control, manganese downregulates both serotonin, whose effects have become widely known due to the popularity of Prozac, and dopamine. At the population level, therefore, violent crime statistics can be used to test neurotoxicological hypotheses concerning the behavioral effects of specific toxicants and their interaction (Masters et al., 1998; Masters, in press; Master et al., in press).

In the Massachusetts communities studied above, children's average lead levels (as a biomarker of exposure) are significantly associated with higher rates of violent crime. In 117 communities having less than 1.5% of children with blood lead over 10 μg/dL, violent crime rates averaged 28 per 10,000. Where there were between 1.5 and 5% of children with similarly high blood lead ($n = 36$), violent crimes averaged 34 per 10,000 population. In the nine communities where more than 5% of children had over 10 μg/dL blood lead, violent crime rates averaged 46 per 10,000, 64% higher than the crime rate where less than 1.5% had such high blood lead (cf. Figure 9 below).

Because this sample is small and geographically selective, it is preferable to use the national rates of violent crime from all 3,141 counties in the United States. While national data on children's blood lead are not available, data from the EPA's Toxic Release Inventory (TRI) show that, controlling for socioeconomic and demographic factors, counties with industrial releases of these two heavy metals have significantly higher rates of violent crime (Masters et al., 1998). Counties with neither lead nor manganese TRI averaged 277 violent crimes per 100,000 population, while this rate was 348 with manganese TRI and 358 with lead TRI. Both associations are statistically significant ($p < 0.0001$) as is their interaction: where both lead and manganese TRI were recorded, counties averaged 540 violent crimes per 100,000. Multiple regression analysis indicates that, controlling for 11 socio-economic and demographic risk factors, these effects are statistically significant ($p = < 0.01$), and – perhaps more convincing – there are additional interactive effects between either lead or manganese TRI and the alcohol death rate (Table 4).

The hypothesis that lead can play a causal role in violent behavior is further supported by relating sales of leaded gasoline to lead uptake (Schuhmacher, Belles, Rico, Domingo, & Corbella, 1996) and annual rates of violent crime in the United States (Masters, 2001a; Nevin, 2000). The time series data for crime rates before and after the Congressional ban on leaded gasoline suggests that the

Table 4. Multiple Regression Analysis of Violent Crime Rates in the United States – 1991.

Variable	Unstandardized Coeff.	*T*-Ratio	Probability
Population density	82.42	20.24	<0.0001
Per capita income	−0.0007	−2.74	<0.0001
Unemployment	Not significant		
% Black poverty	40.06	2.33	<0.05
% Hispanic poverty	62.11	2.79	<0.005
Police per capita	153,423	16.56	<0.0001
Infant death rate	1.813	2.78	<0.005
% housing pre-1950	526.75	−13.43	<0.0001
Public water/cap	225.34	4.07	<0.0001
Median grade complete	24.68	3.50	<0.005
Lead TRI present	40.80	4.67	<0.0001
Manganese TRI	58.71	6.68	<0.0001
Alcohol death rate	101.62	11.55	<0.0001
#Alcohol & lead	21.48	2.54	<0.05
#Alcohol & manganese	55.40	6.54	<0001
#Lead & manganese	34.89	4.11	<0001
#Alcohol & lead & manganese	19.21	2.27	<0.05

Note: Adjusted *R*-square: 0.369; *F* 97.45; DF 17.2783; *p* – 0.0000; # - interaction terms.
Source: Masters et al. (1998), Table 3.

harmful effects of leaded gasoline were strongest during an infant's early neurological development. While the correlation between each year's sales of leaded gasoline (as a measure of average exposure to fumes from tetraethyl lead) and that year's crime rate is strongly negative, the correlation declines almost to zero and then rises sharply as the time lag between a year's leaded gas sales and annual violent crime rates is extended. With a time lag of 18–21 years between these variables, the correlation is over 0.96 (Table 5). Since young children rarely engage in violent crime, the overall effect of leaded gas sales and violent crime rates 17 years later (Fig. 2) and the more precise parallels by age of offender (Fig. 3) point to fetal or neonatal exposure to lead as a significant but not generally noted factor in violent crime.

This approach shows how an understanding of neurotoxicology could improve current and future policy choices. Behavioral dysfunctions due to synergistic interactions between neurotoxicants (Masters & Coplan, 1999b; Masters, in press) need attention in the social sciences because the medical profession seems to be dominated by a scientific paradigm that could be called "one germ, one disease." The problem with such a perspective is particularly great when considering public screening and policy issues, as will be evident from consideration of the synergistic effects associated with chemicals added to water supplies and exposure to multiple toxicants at abandoned mine sites.

Table 5. Correlations Between Gasoline Sales and US Violent Crime Rates Lagged by Increasing Time Intervals (1976–1997).

Year Lag	Correlation	*N*	Year Lag	Correlation	*N*
0	−0.906	26	25	0.910	24
1	−0.897	27	26	0.900	23
2	−0.88	28	27	0.885	22
3	−0.85	29	28	0.882	21
4	−0.79	30	29	0.878	20
5	−0.74	30	30	0.874	19
6	−0.675	30	31	0.859	18
7	−0.610	30	32	0.856	17
8	−0.542	30	33	0.868	16
9	−0.465	30	34	0.878	15
10	−0.369	30	Average 25–34: 0.879		
11	−0.247	30	35	0.891	14
12	−0.111	30	36	0.880	13
13	0.050	30	37	0.819	12
	Average 0–13: −0.57		38	0.728	11
14	0.236	30	39	0.642	10
15	0.431	30	40	0.439	9
16	0.618	30	Average 37–40: 0.702		
17	0.778	30			
	Average 14–17: 0.516				
18	0.902	30			
19	0.961	30			
20	0.979	29			
21	0.964	28			
22	0.956	27			
23	0.939	26			
24	0.919	25			
	Average 18–24: 0.95				

Source: FBI, Supplementary Homicide Reports, 1976–1997, Masters (2001a, p. 354).

MULTIPLE TOXICANTS AT SITES OF ABANDONED MINES

The statistical analyses of education and violent crime, which show significant differences between communities, indicate the value of studying the effects of neurotoxicants at the population level. Such research is particularly important when assessing the consequences of exposure at severely polluted locations. Because multiple toxicants can have cumulative or synergistic effects, attention cannot be focused on a single element of concern. Ratios between elements can be of great importance, as illustrated by research linking copper/zinc ratios to mental illness and violent behavior (Walsh, 1999). Uptake of multiple toxicants is often more dangerous than a single one, as illustrated by a small opportunistic sample

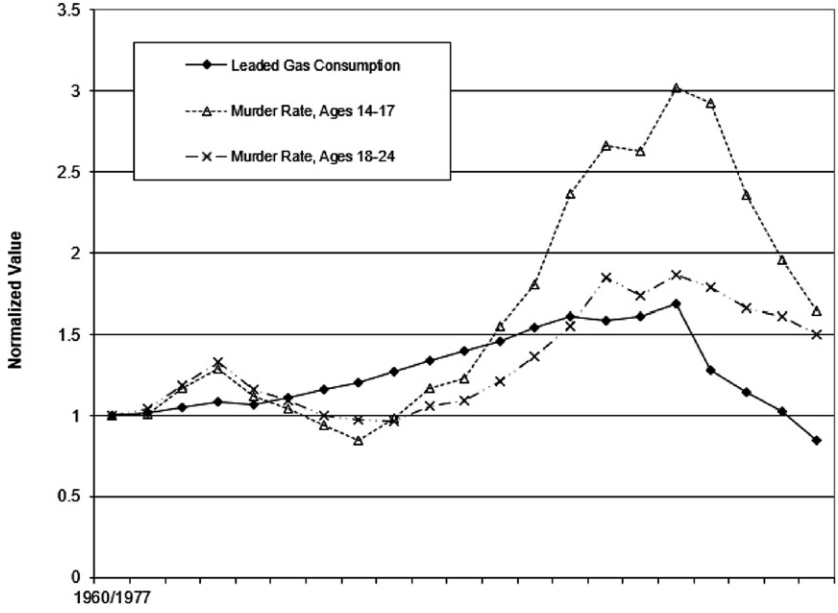

Fig. 3. Leaded Gasoline Exposure Versus Teen Murder Rates Lagged 17 Years. *Source*: Masters (2001a, p. 356).

of university students with serious learning disabilities all of whom had four or more toxicants above the 67th percentile and most had three or more above the 95th percentile. Often described as "cumulative loading" (Goldberg, 1998) or "multiple chemical sensitivity" (Johnson, 2000), additive or synergistic effects on a single functional system are of particular danger.

The methods and feasibility of population screening for such analysis at Superfund sites or other severely polluted locations was explored in preliminary research at two abandoned mines in Quebec. To analyze the diverse effects of serious environmental pollution, geological measures of toxicants in soil and water were combined with measures of uptake of these toxicants and evidence of their effects. For such sites, these measures and composite statistics (of which examples are given in Figures 4 and 5 below) are relevant to decisions to fund immediate preventive measures and complete clean-up of the site. For individuals in the exposed population with behavioral or health problems diagnosed with other methods, levels of biomarkers of exposure to multiple toxicants are relevant to remediation and treatment.

This research in Quebec, initiated by Christopher Covel (a professional geologist), made it possible to assess environmental levels and effects of multiple toxicants released from abandoned mines with minimal confusion due to genetic diversity and mobility of the populations at risk. The Oujé-Bougoumou Cree, living near Chibougamau, Quebec, are exposed to residues from abandoned

copper and gold mines. The Kanesatake Mohawk, living near Oka, Quebec, are affected by contaminated soil and water due to what was the world's largest mine for niobium (a rare metal used to harden steel). At both sites, Covel and Masters (2001) found toxicants in soil and water in extremely high levels. To screen uptake of toxicants to which the local population was exposed, analysis of head hair from small exploratory samples in each community provided an inexpensive and noninvasive biomarker revealing dangerous levels of multiple toxicants in many children and adults (Covel & Masters, 2001).

Although objective scientific data on most behavioral or disease outcomes have been difficult to locate for the two communities, rates of asthma and wheezing among Kanesatake Mohawk children aged 0–18 showed a prevalence of asthma (20.6%) almost twice that for Canadian children (11.2%) and triple that in the United States (6.91%). This finding also deserves attention within the policy context of the United States because heavy metal toxicity has been linked to asthma. With respect to the Kanesatake community, children often carry levels of toxicants more than one standard deviation above the US median. Combined with informal reports of high rates of hyperactivity or other behaviors and diseases linked to toxicants, further study is badly needed to find out whether, in both communities, exposure and uptake of multiple toxicants is linked to harmful effects on health and behavior as frequently as preliminary data indicate (Covel & Masters, 2001; Masters, 2001b).

Study of Oujé-Bougoumou Cree

The first of the two exploratory studies was undertaken at the request of the Grand Council of the Oujé-Bougoumou Cree community. Funding did not permit more than preliminary research to determine whether toxicity was as serious a problem as the community feared. Tailings piles and surface water runoff from three abandoned mines near Chibougamau, Quebec, were examined to determine if they negatively impact the environment and health of the local population of Oujé-Bougoumou Cree. Although no longer officially active, records of the Québec Ministry of Natural Resources indicated that the Joe Mann Mine (JMM), Campbell Point Mine (CPM), and the Copper Rand Mine (CRM) collectively produced approximately 49,143, 417 tons of gold and copper ore – or over three million ounces of gold and three billion pounds of copper – since 1956. To assess the effects of contamination from these mines, 16 mine tailings and sediment samples, 13 surface water samples, and 10 fish samples were analyzed for heavy metals and levels of these toxic elements were measured in the head hair of a sample of the local population.

Sediment samples collected and analyzed from the Nemenjiche River, Doré Lake, Obatogamau Lake, and Chibougamau Lake contained heavy metal concentrations exceeding Canadian standards (CCME ISQG and CEQG) in 12 of the 16 samples. Surface water samples collected and analyzed from the same bodies of water contained heavy metal concentrations exceeding CCME ISQG and CEQG standards in 11 of the 13 samples. Fish samples collected and analyzed from the Nemenjiche River, Doré Lake, Obatogamau Lake, and

Chibougamau Lake contained elevated concentrations of heavy metals in 10 out of 10 samples.

To assess the uptake from these sources, head hair was collected from an exploratory sample of 23 Oujé-Bougoumou residents and sent to Doctor's Data Laboratory in St. Charles, Illinois. Individuals of differing age and sex were selected from various residential locations. Seven individuals were between the ages of 12 and 19, four between 20 and 45, nine between 46 and 75, and three 76 or older. Although more were male than female, proportions of each sex were almost equal in each of the age groups except for those between 20 and 45.

In this exploratory sample of Oujé-Bougoumou, levels for nine different toxic elements were very high and well beyond levels that normally justify an intensive effort to identify and avoid the sources of environmental toxicity. Where averages of a number of elements in a local population are more than twice averages in large baseline samples from the general US population, the source could well be contamination in need of remediation. Where these toxic levels appear to be higher for individuals living or formerly living in areas where sediment and surface water samples exceeded Canadian standards (CCME ISQG and CEQG), one can presume a link between exposure to specific contaminant sites and accumulation of toxic metals. This is the case among the Oujé-Bougoumou Cree, showing the utility of preliminary screening as a means of determining sites in need of more extensive research and remediation.

Nine heavy metals that are substantially higher in the 23 Oujé-Bougoumou than in comparable head hair analyses of approximately 10,000 normal males from the United States (Table 6). These elements include toxicants that have been linked to health and behavioral dysfunction. Among them are mercury (which has multiple harmful effects and is present among the Cree at exceptionally high

Table 6. Toxins With High Levels in Head Hair Among Ordinary Americans and 12 Oujé-Bougoumou Cree.

Element	Average 10,000 US Normals (ppm)	Oujé-Bougoumou (ppm)
Lead	0.4	1.65
Cadmium	0.06	1.08
Zinc	137	172
Manganese	0.51	0.85
Selenium	0.32	0.97
Aluminum	1	5.13
Tin	0.3	0.6
Titanium	0.27	0.69
Mercury	0.2	6.42

Note: Levels of the following elements are not higher among the sample of Oujé-Bougoumou Cree than among normal Americans: arsenic, chromium, beryllium, cobalt, nickel, bismuth, vanadium, silver, antimony, palladium, platinum, tungsten, uranium, gold, tellurium, germanium, titanium.
Source: Covel and Masters (2001).

levels) as well as lead, cadmium, manganese, and aluminum (chemicals which have been linked to learning disabilities, substance abuse, aggressive behavior, and disease). Because many other elements are not present in excessively high levels among the Cree, these results do not seem to be an artifact of sampling or analytical processing.

The dangers of mercury toxicity, which has been widely discussed due to the effects of many dental amalgams, concern both "significant oxidative damage in the body" and interference with "the body's capacity to quench" other toxicants. Among the 23 Cree sampled, mercury levels are 32 times those found in a baseline sample of 10,000 normal Americans. The role of fish in the Oujé-Bougoumou diet and high levels of mercury in soil and water are likely to be responsible.

Because mercury has the effect of inhibiting the natural mechanisms of detoxification (such as glutathione), absorption of high levels of this toxin can make exposure to other toxic heavy metals more dangerous than otherwise. To illustrate the magnitude of the effect, the ratio of the remaining eight heavy metals abnormally high among the Oujé-Bougoumou is compared to typical US residents (Fig. 4). In this figure, a ratio of 1.0 corresponds to similar levels of a toxin among the Cree and Americans. Among the Oujé-Bougoumou Cree, levels of aluminum (often implicated in Alzheimer's disease) are over 5 times those in the American sample, and levels of lead (associated with hyperactivity, substance abuse, and violent crime) are 4 times those in the United States. Although the functional effects of high levels of selenium and tin are not well understood, higher levels of manganese and cadmium have also been associated with higher rates of aggressive behavior and substance abuse. More study is obviously needed.

Results of Preliminary Study of the Kanesatake Mohawk

The environment of the Kanesatake Mohawk community, just west of the town of Oka, is impacted by toxicants from an abandoned niobium mine. In addition to extensive mine tailings and contaminated water in open mine pits, the site was used for dumping drums of toxic waste. Although published data indicate levels above Canadian governmental guidelines for aluminum, iron, fluorides, manganese, and nitrites in liquid mine residues and for manganese and zinc in mine tailings, potentially dangerous levels of many other toxicants are also reported and the location of these samples is not fully specified. There can be little doubt, however, that toxicants are dispersed through a broad area. For example, in supporting the request of Niocan to reopen the mine in question, one recent legal document explicitly refers to contamination in agricultural lands near the abandoned mines.

To gain evidence of the potential for dangerous uptake of these toxicants, head hair collected from an exploratory sample of 28 Kanesatake Mohawk was sent to Doctor's Data Laboratory. For over half (54%) of this sample, five or more elements were more than one standard deviation above the American median, and just under three-fourths (71%) had one or more elements over two standard

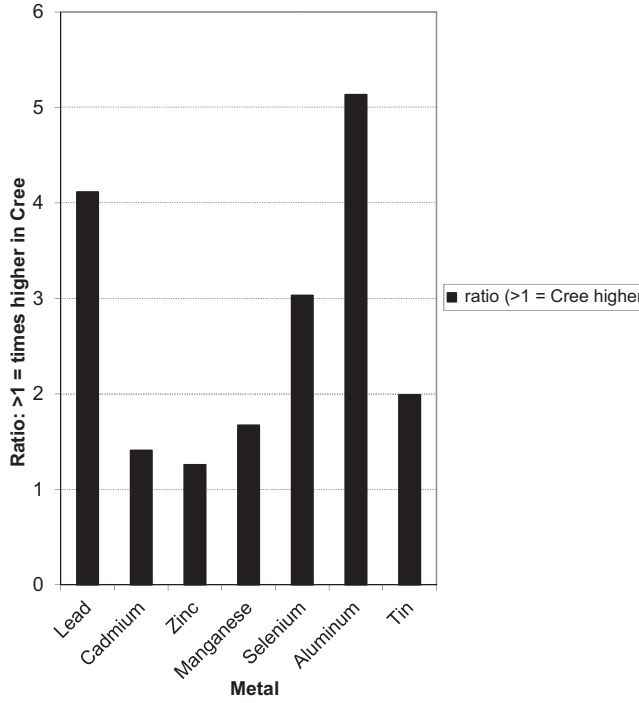

Fig. 4. Ratio of Seven Toxins Higher in Oujé-Bougoumou Cree Than 10,000 US Normals. *Note*: Ratio of 1.0 = average level of each element in Oujé-Bougoumou Cree sample is comparable to level in reference sample of 10,000 US tests. Four elements (lead, selenium, aluminum, and tin) are at least double the US average among the Cree – and for all seven shown, levels are higher among Cree than in United States. *Source*: Covel and Masters (2001).

deviations above the American median (Covel & Masters, 2001). This toxic burden was also indicated by the Total Toxic Exposure Index (TTEI), a measure used by Doctor's Data to estimate the overall threat posed by an individual's uptake of toxicants. Using this measure, 63% of the Kanesatake sample had a toxic load above the 68th percentile (one standard deviation above the median for US samples), and a 22% were above the 95th percentile (two standard deviations above the median).

Two toxicants – manganese and antimony – are found in head hair more often than others. Manganese levels are more than one standard deviation above the US median in 16 of the 28 individuals tested, and above two standard deviations (over the 95th percentile) in 12 individuals. High uptake of antimony exists at similar frequency: 14 individuals are above one standard deviation and 7 are above two. Other toxicants are also often at dangerous high levels.

Measures of potency are important as well as measures of the frequency of dangerous levels of toxicants. Of the metals tested in head hair, the Agency for

Toxic Substances and Disease Registry (ATSDR) considers arsenic the highest priority based on both the relative toxicity per gram and the frequency of exposure at the national level. Although arsenic does not occur as frequently as manganese and antimony among those sampled, those with uptake of high levels of arsenic (over one standard deviation above the US median) are also likely to have been exposed to many other toxicants (Fig. 5). For example, among those with high levels of arsenic, 5 out of 7 have similarly high levels of lead (considered second highest priority by ATSDR). Given the possibility of synergistic interactions among toxicants, head hair is a useful biomarker of exposure because it provides data on multiple elements and compares uptake to levels in a reference sample.

Identification of individuals who are particularly at risk makes it reasonable to recommend further examination and, if needed, treatment. In the opportunistic sample of Kanesatake Mohawk, such cases are illustrated by six individuals (here be identified only by initials) who are above the 95th percentile for Total Toxic Exposure Index. (1) TL (male, age 4) is above the 95th percentile for antimony, and above the 68th percentile for arsenic, lead, copper, silver, aluminum, and gold. (2) SB (male, age 5) is above the 95th percentile for arsenic, antimony, and

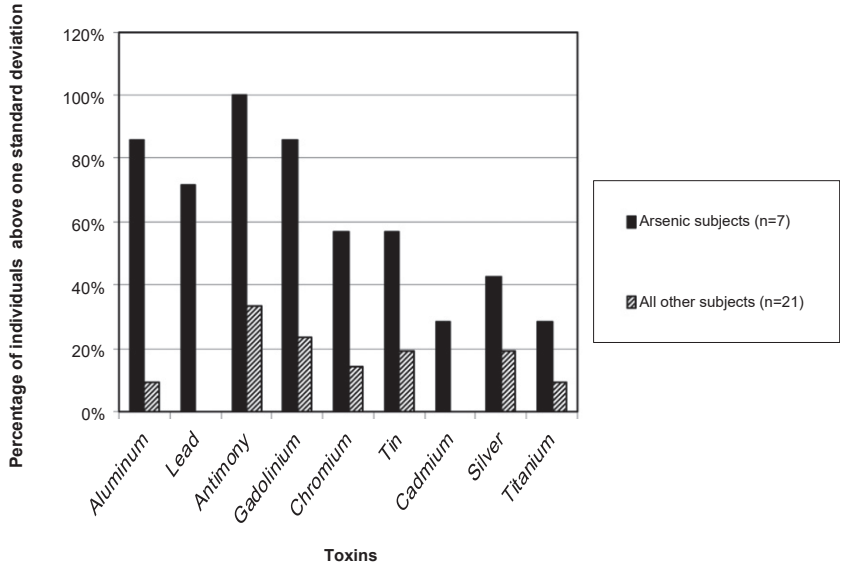

Fig. 5. High Levels of Nine Toxins for Individuals With High Levels of Arsenic and Other in the Kanesatake Mohawk Sample (High = >1 Standard Deviation Above Median). *Note*: High arsenic subjects in Kanesatake Mohawk sample defined as individuals over 1 standard deviation above the median for arsenic levels in reference sample. Results show that those with uptake of high levels of arsenic are also likely to have high levels of other toxins. *Source*: Covel and Masters (2001).

tin, and above the 68th percentile for lead, cadmium, chromium, selenium, silver, aluminum, uranium, and gadolinium. (3) LB (female, age 33) is above the 95th percentile for antimony and gadolinium, and above the 68th percentile for arsenic, lead, cadmium, cesium, manganese, palladium, and tin. (4) DD (male, age 35) is above the 95th percentile for chromium, silver, antimony, aluminum and gadolinium, and above the 68th percentile for lead, zinc, manganese, palladium and titanium. (5) PB (male, age 41) is above the 95th percentile for arsenic, manganese, and antimony, and above the 68th percentile for lead, aluminum, tin, and gadolinium. (6) DN (male, age 49) is above the 95th percentile for antimony and tin, and above the 68th percentile for arsenic, chromium, manganese, aluminum, titanium, and gadolinium. Since two in this category are young boys, identification is clearly feasible for children whose development would otherwise be compromised by heavy toxic disorders.

Implications of the Cree and Mohawk Samples

Levels of toxicants found in the head hair of these preliminary Cree and Mohawk samples are usually associated with exposures that pose serious dangers to health, normal cognition, and behavior. Dangers of lasting effects are particularly severe for very young infants, for whom toxicants can disturb normal development of brain structures and hence have lifelong effects (see above, Table 5 and Fig. 2). While detailed epidemiological data for health and behavior are not available for either community, anecdotal evidence of high frequencies of behavioral and health dysfunctions and data on asthma among the Kanesatake Mohawk show the need and potential of further research among these populations and the potential for such research to reveal hitherto unrecognized hazards at superfund sites. Finally, linking toxic exposure with behavioral abnormality among children is especially valuable because nutrient treatment is proving highly effective in individualized treatment. A study from the Pfeiffer Treatment Center entitled "Biochemical Therapy and Behavior Outcomes" suggests that the completion of treatment reduced the frequency of assaults and resulted into significantly less destructive incidents, and verbal explosions (Walsh, pers.com.).

To benefit from such intervention, population screening with a biomarker of exposure for multiple toxicants with established baselines is necessary. Experience with such studies seems urgent insofar as chemical terrorism affecting a large population will create the need to survey and treat those most seriously affected and it is not clear whether public health authorities are always aware of the procedures and methods that would be needed.

CONCLUSIONS: NEUROTOXICOLOGY AND PUBLIC POLICY

Data concerning a number of social problems have been analyzed to reveal the probable role of toxicants in dysfunctional behavior or disease. The principal examples related to public policy decisions are:

- Community averages of children's blood lead are highly significant predictors of differences in local educational performance on standardized tests. Neurotoxic effects of lead and other heavy metals have been implicated in hyperactivity and other learning disabilities due to downregulation of dopamine, serotonin, or other neurotransmitters. As a result, where learning deficits can be associated with high levels of lead or other toxicants, nutrient detoxification treatments or chelation can be of great value and should be considered as an alternative to Ritalin or other medications.
- Individual violent offenders often have absorbed abnormally high levels of lead or manganese, and geographic areas polluted by releases of these neurotoxicants often have higher levels of violent crime. Parallel evidence implicates the same neurotoxicants in substance abuse as measured by rates of alcoholism or the frequency of cocaine use at time of criminal arrest.
- Two Native American communities living at sites of abandoned mines are at great risk due to high levels of multiple toxicants in soil and water. Although extensive testing of toxic uptake has yet not been possible in these communities, small test samples show excessive levels of multiple toxicants that may be related to reports of adverse health and behavior.

These findings, based on statistical examination of population data, do not pretend to establish causal pathways but rather support the use of neurotoxicology in formulating improved public policies. Knowledge of the role of neurotransmitters in behavior creates the potential for important gains in our understanding of environmental factors that modify behaviors as diverse as educational test scores, substance abuse, and violent crime. Moreover, discovery of similarities between the function of neuronal and immune responses underscores the importance of extending geographical analysis to the links between environmental toxicants and disease.

These methods suggest more effective ways of treating and reducing the incidence of behavioral dysfunctions or diseases, but they can have additional benefits in the formulation and execution of public policies. For some politicians, environmental protection seems to be viewed as a costly policy aimed primarily at aesthetic benefits. Given the immense dollar cost of health care, violent crime, and educational failure, further evidence of any one of the relationships assessed above could well transform debates and policies relating to environmental pollution at all levels.

Equally important, these findings suggest the importance of developing better linkages between neurotoxicology and other disciplines. Social scientists must finally recognize that behavior can be influenced by alterations in brain chemistry in ways that help us understand causation, prevention, and treatment. Physicians and public health specialists need to assess more carefully the role of multiple toxicants as factors in behavior and disease. In both areas, evidence of pathways linking neurotoxicants with harmful effects on humans does not exclude other causal processes that can produce similar negative outcomes. Individual differences in genetic susceptibility, development, and current environment all can

have phenotypically similar effects to those suggested for toxicants. In short, as the revolution in contemporary biology transforms our understanding of human behavior and disease, neurotoxicology holds the promise of pointing toward an integration of hitherto isolated disciplines in a manner than could provide immense practical benefits for future generations.

To conclude, the analyses presented here point to three concrete policy goals:

- Research on environmental causes of poor educational performance should include consideration of lead and other toxicants. More specifically, funding for research on nutrient therapies or chelation for removing neurotoxicants associated with ADHD and other learning disabilities should have the highest priority at the federal and state level.
- Evidence that exposure to lead, manganese, and other neurotoxicants plays an important role in violent crime indicates the need for greater enforcement of pollution legislation and further research on the contribution of environmental toxins to higher rates of crime.

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STUDY OF OXYTOCIN IN BIOPOLITICS

Seyoung Jung

ABSTRACT

In recent decades, oxytocin (OT) has been extensively studied across disciplines. Yet, the role of OT has been discussed little in the context of politics. This chapter proposes that studying the role of this hormone can enrich and advance the study of politics. The chapter reviews the previous findings on OT categorized into two sections: one that focuses on the biological mechanisms and therapeutic potentials and another that focuses on the effects on social behaviors. This review is not exhaustive but is intended to bring political scientists up to date with the progress in OT studies. Next, this chapter highlights that studying the role of OT in political context will benefit both the OT and political science literature, since there is currently a great interest in the context-dependent nature of OT. I highlight several research questions that can be answered at this intersection. Rather than waiting for other disciplines to complete unfolding the precise role of OT, students of biopolitics can make important contributions. Political science can further understand the biological underpinnings of concern for others and partisan behaviors, while OT applied to real-world settings would demonstrate how different contexts shape its effects.

INTRODUCTION

Hormones influence behaviors and behaviors influence hormone concentrations. Understanding this relationship would be helpful, if not essential, as political science studies the motivation and behavior of citizens. A handful of studies in biopolitics explore the relationship between endocrinology (the study of

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hormones) and political attitudes and behaviors (Apicella & Cesarini, 2011; Friesen, Gruszczynski, Smith, & Alford, 2020; Stanton, LaBar, Saini, Kuhn, & Beehner, 2010; McDermott, 2011; Stanton, Beehner, Saini, Kuhn, & LaBar, 2009). Building on this growing body of research, this chapter brings attention to OT studies and proposes it as a useful tool of choice for the students of biopolitics.

This chapter consists of three parts. First, it explains what OT is and the methods of studying its effects. Understanding the choice of method is important as it has to do with the aim of the study. For example, some studies focus on identifying the causal effects of OT while others are more interested in comparing the OT levels between individuals. Second, it provides a general overview of the previous studies that focused on the biological mechanisms and therapeutic potentials and those that focused on the effects on social behaviors. The overview exhibits a vast scope of the roles this seemingly multi-talented hormone plays in our body and highlights slightly different directions of research in each discipline. Third, it proposes avenues for exploring how OT affects political attitudes and behaviors. Given the context-dependent nature of OT effects, the political environment provides a dynamic context such as those on other-regarding policies and partisan behaviors. Students of biopolitics can make important contributions in this area as well as uncover the biological underpinnings of the fundamental questions of political science.

What Is Oxytocin?

This neuropeptide hormone is produced in the hypothalamus and released to the brain and bloodstream. OT modulates several peripheral functions and acts as a neurotransmitter, transmitting signals in the nervous system. Traditionally, OT has been known primarily as a reproductive hormone, that is released during childbirth, breastfeeding, and sex. However, scholars have uncovered that the role of OT goes beyond the reproductive system (Choleris, Pfaff, & Kavaliers, 2013). Its role in social bonding gathered great attention not only within academia but from the public as well, and the hormone was given multiple nicknames such as the "love hormone" and the "social hormone" (Alleyne, 2010).

OT is released in response to specific stimuli, including both reproductive and non-reproductive stimuli. For example, OT increases after a skin-to-skin contact (Vittner et al., 2018) or watching an emotional video (Barraza & Zak, 2009). Oxytocin measured in plasma is reported to have a half-life from 1 to 5 minutes. Without stimuli, the basal OT level is quite low and is stable over time within individuals. Nonetheless, there are individual differences in the level of the baseline OT. For instance, baseline OT is higher in females than males, and on average, females release more OT for the same stimulus than males do (Barraza & Zak, 2009). Yet, beyond sex differences, a robust measure of individual differences in the basal OT level and the amount of OT released in response to a stimulus requires more investigation to understand the meaning of such variability.

The methods of studying the effects of OT involve measuring endogenous OT level or manipulating OT level by administering OT exogenously (Nave, Camerer, & McCullough, 2015). The choice of method often depends on the aim of the study, where endogenous OT focuses on measuring individual baseline OT levels and their relationship to biological and behavioral outcomes of interest. Furthermore, exogenous OT is used as an experimental manipulation to learn about its effects.

Endogenous Oxytocin

Measuring either a baseline or the released amount responding to a stimulus would allow us to (1) compare the level of OT between different groups (e.g., males vs. females), (2) compare the changes in the level of OT responding to different stimuli (e.g., safe vs. dangerous context), and (3) observe the correlates of the OT (e.g., positive correlation between estrogen and OT levels; Salonia et al., 2005).

It is almost impossible to directly measure OT release in the brain. Alternatively, studies measure endogenous OT levels from blood, urine, and saliva. These methods of indirectly measuring OT release are called peripheral measures. Compared to urine and saliva, blood draws are considered a more reliable way to capture the release of OT (Rydén & Sjöholm, 1969); therefore, most studies use blood samples. Urine or saliva samples have the advantage of using a noninvasive method, and a few studies have used urine (Samuni et al., 2017) and saliva (Vittner et al., 2018).

However, some researchers have discussed challenges and concerns regarding the validity of utilizing plasma measures of the OT (MacLean et al., 2019). First, there is a weak correlation between the OT levels in the brain and blood. This is due to the blood-brain barrier, where the level of OT in the blood diverges from that in the brain as OT in the blood circulates through the body. A recent review showed that there was no association between the OT levels in the brain and blood under basal conditions, but a positive association after an environmental stimulus (Valstad et al., 2017).

Also, different approaches to sample preparation and measurement have generated a lack of correlation between OT levels using these techniques (Young & Anderson, 2010). McCullough, Churchland, and Mendez (2013) and Nave et al. (2015) point out methodological concerns with using the commercially available immunoassays due to the high variability. They also suggest that an extraction step is required and compare the results of the studies with different methods. Whereas Zhong et al. (2012) observed a U-shaped relationship between non-extracted plasma OT level and the level of trust, Christensen, Shiyanov, Estepp, and Schlager (2014) found no significant associations between the trusting behaviors and extracted plasma OT levels.

Recently, using radioimmunoassays along with an extraction step, Terris, Beavin, Barraza, Schloss, and Zak (2018) examined whether endogenous OT release is associated with ingroup bias. Participants provided blood samples before and after they engaged in a group task that reinforced group membership

(e.g., group conversation, singing, etc.). More than half of the participants showed an increase in OT following the group task, with an average increase of over 25%.

However, another issue remains when identifying the effects of OT using endogenous methods: the inability to control for unobserved confounders in individuals (Quintana et al., 2021). For this purpose, numerous studies turn to utilizing exogenous OT to tease out its actual effect. Nevertheless, it is still meaningful to examine how OT is produced and released within individuals. Measuring how individuals respond to endogenous OT changes and then confirming such a finding using exogenous OT would contribute to the robustness and reliability of studies.

Exogenous Oxytocin

OT manipulation studies use random assignment of exogenous OT to identify its role. We can make a valid causal inference of the OT effects when we use it in a controlled setting where OT treatment precedes the behavior, and assume there are no systematic differences between the groups apart from the OT treatment.

Exogenous OT can be administered either intranasally or intravenously. Intravenous OT administration is often used in animal studies and gynecology studies, but other studies typically use intranasal OT administration. The biggest difference between the two methods is that OT injected into the blood circulates the body crossing the blood-brain barrier, while OT infused through the nose reaches the brain more directly. Regarding social cognitive effects, which have to do more with OT activating certain regions of the brain, Quintana, Alvares, Hickie, and Guastella (2015) demonstrated that these effects were only observed after an intranasal administration and not an intravenous administration. Direct nose-to-brain delivery of OT increased the activity in the central nervous system and brought about social cognitive and behavioral effects (Quintana, Smerud, Andreassen, & Djupesland, 2018, 2021).

Additionally, the procedure of intranasal administration is simpler than intravenous. Participants can self-administer OT using a nasal spray. After infusion, participants have to wait until the level of OT is substantially elevated in the cerebrospinal fluid (Born et al., 2002). In terms of dosage, most studies use a 24IU (Grace, Rossell, Heinrichs, Korsachia, & Labuschagne, 2018; Wang, Yan, Li, & Ma, 2017). A few studies systematically examined various doses of OT on brain responses, yet the conclusion seems to be that the effect is contingent on various factors (Quintana et al., 2021). Quintana et al. (2016) reported that 8 IU is the most efficacious intranasal OT dose to elicit an amygdala response to emotional faces, whereas Spengler et al. (2017) identified that a dose of 24 IU is the most effective in decreasing amygdala response. In terms of timing, most studies measure the outcome of interest between 40 to 70 min after administration. The half-life of exogenous OT in the cerebrospinal fluid is estimated to be about 19 minutes, but the peak elevation is measured later on, meaning that exogenous OT induces endogenous OT production (Quintana et al., 2021). The overall increase in OT can last up to three hours.

For healthy individuals, intranasal OT produces no reliable side effects and is not associated with adverse outcomes. The reported number of side effects is not significantly greater than those of placebo (for a review, see MacDonald et al., 2011). Long-term OT administration is practiced in clinical studies without severe adverse events (e.g., Kosaka et al., 2016). However, for pregnant women, an increase in the level of OT increases the possibility of miscarriage. Therefore, many OT manipulation studies on humans have only male samples to circumvent this potential issue. Nevertheless, with careful screening questions, non-pregnant women can be included in the sample. Recently, more studies are including females in the sample (e.g., Ten Velden, Daughters, & De Dreu, 2017).

Individuals may differ in response to exogenous OT. For example, there are sex differences in the distribution and density of OT receptors in the brain (Dumais & Veenema, 2016). Prenatal estrogen exposure is associated with reduced effects of intranasal OT (Kret & De Dreu, 2013). Sex differences were also observed in the way that OT affects social perception (Fischer-Shofty, Levkovitz, & Shamay-Tsoory, 2013; Rilling et al., 2014). Fischer-Shofty et al. (2013) showed that OT improved kinship recognition in women and competition recognition in men. On the other hand, when looking at the relationship between OT administration and cooperation, Ten Velden, Daughter, and DeDreu (2017) found no evidence for moderation by sex. As well as sex differences, studies are investigating other moderators of OT, such as personality traits (e.g., extraversion) (Andari, Schneider, Mottolese, Vindras, & Sirigu, 2014).

OT infusion studies can demonstrate the causal effect of OT on behavior and may even be used as part of an intervention. At the same time, it is also important to understand how OT can be induced outside the laboratory and how the induced OT interplays with other biological and environmental factors. Taken together, exogenous and endogenous OT studies can complement each other.

OXYTOCIN IN DIFFERENT DISCIPLINES

This section reviews previous OT studies and categorizes them into two sections. Included under the category of biology and psychiatry are the studies that focus on biological mechanisms and therapeutic potentials. Studies included under the category of economics and psychology describe OT effects on social behaviors. This categorization is not meant to be negligent of the interdisciplinary nature of this field, but to highlight slightly different directions in studies. Furthermore, this helps segue into the next section, where I suggest some of the questions biopolitics studies can focus on.

Before the overview of this seemingly multi-talented hormone, we should be wary of too much scientific excitement or overoptimism. Like any other scientific advancement, OT studies have repeated progress and setbacks. OT studies are still in a relatively novel stage. Suggestive results go through waves of agreement and disagreement and become more refined and nuanced. While some findings have been replicated, other findings should be considered suggestive or inconclusive.

Biology and Psychiatry

In biology, studies have identified the various functions of OT in nonhuman mammals and humans. The animal literature is based on vigorous experimental manipulation and sometimes uses methods that are difficult to apply to humans in the same way. The findings of the animal studies should be interpreted carefully as they may not translate to human studies. Yet, they can help contextualize the studies on humans in terms of social behaviors that are homologous.

Findings from animal studies suggest that OT impacts a wide range of outcomes from health conditions to group behaviors. With the findings that mice lacking OT or OT receptor caused reduced bone formation, Tamma et al. (2009) showed that OT is a direct regulator of bone mass. In terms of recognition, male rodents engineered to lack oxytocin receptors no longer discriminated between familiar and novel stimulus females (Macbeth, Lee, Edds, & Young, 2009). Numerous studies point to the role of OT in anxiety reduction. For example, OT reduced social vigilance in the rhesus macaque (Ebitz, Watson, & Platt, 2013), and the release of OT in rats modulated stress-coping behaviors (Ebner, Bosch, Krömer, Singwald, & Neumann, 2005). Another stream of studies reports its role in strengthening social affiliation. Madden and Clutton-Brock (2011) showed that OT administration in meerkats increased cooperative behaviors directed at their own clan. Bosch, Meddle, Beiderbeck, Douglas, and Neumann (2005) found that OT motivated maternal aggression against intruders when rats were bred for high anxiety, and OT reduced maternal aggression against intruders among rats bred for low anxiety. Carter and Perkeybile (2018) discussed how OT may be associated with social monogamy which can be understood as a type of social system. Relatedly, OT has strong links with the reward circuitry, which may also be critical for regulating social interaction (Hung et al., 2017).

Consistent findings have been reported in human studies as well (for a review, see Carter, 2014; Churchland & Winkielman, 2012). Functional MRI experiments showed the intranasal dose of OT reduced the autonomic and behavioral response to fear (Kirsch, 2005). The combination of intranasal OT and social support reduced both self-reported stress level and endogenous cortisol level (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003). In terms of parenting behaviors, intranasal OT administration enhanced the perceptual salience of social and emotional stimuli in mothers (Peltola, Strathearn, & Puura, 2018). OT also has a role in the immune system, promoting wound healing and suppressing stress-associated immune disorders (Li, Wang, Wang, & Wang, 2017). Furthermore, in genetics studies, there has been great interest in the structural genes that encode the sequence for OT (Bakermans-Kranenburg & van IJzendoorn, 2014; Ebstein, Knafo, Mankuta, Chew, & Lai, 2012). Israel et al. (2009) reported that genetic polymorphisms for OT receptors (OXTR) in the brain are associated with prosocial fund allocations.

Clinical evidence of OT has suggested the therapeutic potential of this hormone. Studies have investigated whether OT can be the cure for several disorders with associated social deficits, such as autism and schizophrenia (Meyer-Lindenberg, Domes, Kirsch, & Heinrichs, 2011; Striepens, Kendrick,

Maier, & Hurlemann, 2011). Copious studies have identified an association between OT level and autism spectrum disorder (Modahl et al., 1998; Parker et al., 2014), and have found that peripheral oxytocin is associated with reduced symptom severity in schizophrenia (Rubin et al., 2010). Also, scholars are investigating whether OT can be used as a therapeutic intervention for reducing anxiety and stress. OT has anxiolytic effects on a generalized social anxiety disorder (Labuschagne et al., 2010), and it attenuates and prevents post-traumatic stress disorder symptoms (Pitman, Orr, & Lasko, 1993; van Zuiden et al., 2017).

Economics and Psychology

The seminal piece by Kosfeld, Heinrichs, Zak, Fischbacher, and Fehr (2005) was one of the first publications to report a causal link between exogenous administration of OT and trust. Study participants were asked to make decisions in a trust game interacting with an anonymous player with real monetary stakes. The findings showed that those who received OT made higher money transfers than those in the placebo group. Following this paper, numerous studies have attributed many positive roles to OT in prosocial attitudes and behaviors (for a review, see Feldman, 2012). Studies examined the effect of OT on generosity, empathy, and cooperation while individuals made monetary exchanges in economic games (Barraza, McCullough, Ahmadi, & Zak, 2011; Barraza & Zak, 2009; Zak, Stanton, & Ahmadi, 2007).

Later, as more refined theorizing of the social effects of OT continued, studies acknowledged the context-dependent nature of the effect of OT (Bartz, Zaki, Bolger, & Ochsner, 2011). Mikolajczak et al. (2010) showed how the contextual cues of reliability condition OT effects. Each participant played the trust game with a reliable, neutral, and unreliable player. OT effect sizes were small or even absent when their partner was described as untrustworthy. Moreover, a series of studies highlighted the role of OT in parochial cooperation, increasing ingroup favoritism, and even ethnocentrism (De Dreu et al., 2010; De Dreu, Greer, Van Kleef, Shalvi, & Handgraaf, 2011; De Dreu, Shalvi, Greer, Van Kleef, & Handgraaf, 2012; Xu et al., 2019) which seemed inconsistent or even paradoxical with previous findings. New findings generated discussions on whether the effects of OT were pro- or anti-social (Evans, Dal Monte, Noble, & Averbeck, 2014; Nave et al., 2015). Since then, the focus has shifted from such a dichotomous framing of OT effects to understanding the underlying core processes of OT (Bethlehem, Baron-Cohen, van Honk, Auyeung, & Bos, 2014).

One way to summarize the effects of OT is that it enhances social salience (Pfundmair, Zwarg, Paulus, & Rimpel, 2017; Shamay-Tsoory & Abu-Akel, 2016) and upregulates group psychology (De Dreu, 2012; De Dreu & Kret, 2016). OT is involved in most social interactions, such as encoding, categorizing, and decision-making. For example, intranasal OT made a face in memory more familiar (Rimmele, Hediger, Heinrichs, & Klaver, 2009), increased sensitivity to the emotional state of others (Domes, Heinrichs, Michel, Berger, & Herpertz, 2007; Fischer-Shofty, Shamay-Tsoory, Harari, & Levkovitz, 2010; Guastella, Mitchell, & Dadds, 2008), and facilitated social recognition (Bielsky & Young, 2004).

Particularly, when social salience is augmented, individuals are more aware of the group distinction and tend to have a bias for their ingroup members. Myriads of studies show that effects of OT have group-serving tendencies and are ingroup bounded. Individuals tend to take into consideration the benefit of the ingroup: encode emotions faster and more accurately from ingroup members than from outgroup members; downplay the shortcomings and defects of ingroup members; lied more to benefit their group; and cooperate with ingroups more than with outgroups (Balliet, Wu, & De Dreu, 2014; Ellemers, 2012; Shalvi & De Dreu, 2014). These discriminatory tendencies are reflected in the role of OT. OT raises sensitivity to group membership and shifts the focus from the individual's self-interests toward the interests of the ingroup (De Dreu & Kret, 2016; Ten Velden, Baas, Shalvi, Kret, & De Dreu, 2014). OT modulated the parochial altruism of "tend and defend" in a series of tasks, including Intergroup Prisoners' dilemma-maximizing differences game, Implicit Association Test, infrahumanization task, and Moral Choice Dilemma Task (De Dreu et al., 2010, 2011). Nevertheless, the motivation for intergroup discrimination is defensive and is not intended for outgroup derogation (De Dreu et al., 2010; Shamay-Tsoory & Abu-Akel, 2016; Van IJzendoorn & Bakermans-Kranenburg, 2012).

Relatedly, OT enables compliance with group norms and cultural practices (Daughters, Manstead, Ten Velden, & De Dreu, 2017; Huang, Kendrick, Zheng, & Yu, 2015). Stallen, De Dreu, Shalvi, Smidts, and Sanfey (2012) provided participants the information on what their ingroup and outgroup members said while they worked on the rating tasks. The ratings of participants given oxytocin conformed with the ratings of their ingroup but not of their outgroup. OT induced conformity toward the ingroup only worked when the two groups provided opposing rates but not when both had similar views.

It is important to note that OT alone does not promote dishonesty, competition, or aggression, but it stimulates those behaviors under the situation where the ingroup is threatened by an outgroup. Current studies investigate how a competitive environment conditions the role of OT. For example, Aydogan, Jobst, D'Ardenne, Müller, and Kocher (2017) found that OT amplifies discriminatory attitudes and behaviors especially in a competitive environment. In competitive interactions, OT promoted cooperative conflict resolution only with ingroup members, but not with rival group members (Ten Velden et al., 2014). On the other hand, absent a competition prime, OT is more likely to be associated with an increase in benefits for both in- and outgroup members compared to placebo (Israel, Weisel, Ebstein, & Bornstein, 2012; Marsh et al., 2017). Terris et al. (2018) investigated the relationship between ingroup bias and endogenous OT in a non-competitive environment. They showed the changes in the level of ingroup bias in the context that required perspective-taking. Those whose OT did not increase after a group salience task showed ingroup bias but those who did showed no bias. When group identification became high, the bias recurred.

OXYTOCIN IN POLITICAL SCIENCE

OT studies in other disciplines have introduced thought-provoking questions on social salience and group psychology. These questions are relevant and intriguing for political science research as well and can be applied to understanding citizens' policy preferences and partisan behaviors.

Studying OT in the context of politics would be a great contribution to the OT literature as well as the political science literature. There is a growing interest in political science in uncovering biological mechanisms that drive political attitudes and behaviors (Ksiazkiewicz & Jung, 2020). Political decisions are shaped by the interplay between biological and environmental factors and, given the context-dependent nature of OT effects, the political environment would be a new arena to test how OT affects the attitudes and behaviors of individuals. Among many factors, politics involves competition, group association, and concern for others, which are known to be relevant to the efficacy of OT.

As of now, Merolla, Burnett, Pyle, Ahmadi, and Zak's (2013) is the only study in political science readily available in the referred literature that investigates the relationship between OT and political attitudes. The authors tested the effects of OT beyond the context of economic trust games and looked at the generalized interpersonal trust, trust in political figures (from both political parties), and trust in government. They found that those who received a dose of OT had a higher level of generalized interpersonal trust compared to those who received a placebo. There was an increase in trust for political figures and trust in the federal government, yet the effects were primarily from Democrats whose initial ratings of interpersonal trust were low. When trust in three Democratic political figures was measured, in two out of the three cases (Hillary Clinton and Barack Obama) the level of trust was higher for the OT group. However, trust in John Edwards was lower for the OT group relative to the placebo group, which was driven by Republican partisans. They interpreted that it may have to do more with Democrats being more responsive to OT than partisans reacting more favorably to their group. Individual differences in terms of OT responsiveness between those with different political orientations are convincing and an interesting topic on its own. At the same time, as more OT studies have suggested that OT effects on trust are contingent on group membership, more research is needed to uncover the effect of OT on how partisans interact with others.

I would like to highlight two research topics where OT studies can be applied to political science studies: studying the biological basis of political decisions on other-regarding policies and partisan behaviors.

Other-Regarding Policies

Human behaviors are motivated by self-interest and/or altruism. Trying to explain the genesis of a single behavior as either purely altruistic or selfish would be extremely challenging, if not impossible. Yet, activities for survival, competition, and prosperity are considered to be more self-regarding, whereas cooperation, charity, and sacrifice are considered to be more other-regarding. Scholars have sought to understand how and why individuals engage in other-regarding

behaviors. In terms of the biological underpinnings of other-regarding behaviors, studies looked at genetic bases (Sturgis et al., 2010; Wilson, 2015), brain activities (Mathur, Harada, Lipke, & Chiao, 2010), and the role of hormones (Hu et al., 2016).

Politics is an arena where people decide who gets what, when, and how (Lasswell, 1936). Policies often involve sharing resources with other members of society. Social-welfare issues involve distributing tax revenues for healthcare, public education, or disaster relief. There are also non-material resources such as political rights. For example, admitting new members to the society, whether they are documented or undocumented immigrants, refugees, or asylum seekers, can fall under other-regarding policies. Deciding on who should or should not be allowed to exercise civil liberties is another important political decision.

Addressing the biological underpinnings of political behaviors regarding these policy issues would be an invaluable avenue for biopolitics research. It broadens our understanding of human behaviors and will further contribute to effective policymaking. There are great examples of these studies. Aarøe and Petersen (2013) found that individuals who were induced low blood glucose levels expressed stronger support for social welfare, suggesting that short-term fluctuations in hunger influence the attitudes regarding social welfare. Aarøe, Petersen, and Arceneaux (2017) presented that behavioral immune sensitivity explains anti-immigration attitudes. They also demonstrated that this association is substantially attenuated when people are primed about disease protection (see also Helzer & Pizarro, 2011; Huang, Sedlovskaya, Ackerman, & Bargh, 2011).

Likewise, a series of questions need to be further identified: *when do individuals consider the well-being of others?* and *what influences the variation in the level of support?* Oxytocin studies can be one of the tools to address these questions. Does an increase in the level of oxytocin, either by exogenous manipulation or by engaging in oxytocin-inducing activities, affect other-regarding policy preferences? Does the effect vary by types of policies, ones that involve material resources and non-material ones? Furthermore, other-concern is a multifaceted construct (De Dreu et al., 2012). Individuals may be genuinely concerned for others' outcomes and interests, they may want a society that values fairness, or they may be thinking strategically for mutual benefit. Providing different contexts that motivate support for other-regarding policies and testing mechanistic hypotheses to determine the effects of OT would help identify how individuals make decisions. Furthermore, it would help in specifying what OT does when it increases sensitivity for social cue saliency.

Partisan Behavior

Group behavior is another research theme germane to OT studies, as OT plays a role in each step of the process. Human beings form and maintain social groups, because they benefit from the security and social support and to efficiently obtain and process information. They have developed a capacity to distinguish the group they belong to and the one they do not belong to.

Group behavior has always been a major component of politics (Berelson, Lazarsfeld, & McPhee, 1954), but it is more significant than ever with the rise of identity politics. Citizens view issues through the lens of different identity-based groups and defend the interest of the group. Among different types of identity (race/ethnicity, gender, religion, etc.), partisanship is one of the important affiliations that explain political behaviors. Especially in this era of polarization, partisan affect has intensified in the United States (Iyengar & Krupenkin, 2018). Partisanship is understood as an expressive social identity (Greene, 1999; Huddy, Mason, & Aarøe, 2015) and partisan cues are often used to process information and form political attitudes (Kam, 2005; Lau & Redlawsk, 2001). Recently, Druckman, Klar, Krupnikov, Levendusky, and Ryan (2021) found a strong association between partisanship and attitudes about the pandemic. They highlighted that not only focusing on policy description but also addressing affective partisan hostility is necessary for contemporary political discourse. Given this situation, affective polarization has two underlying components: ingroup favoritism and outgroup animosity (Iyengar, Lelkes, Levendusky, Malhotra, & Westwood, 2019). As reviewed earlier, whether OT influences outgroup animosity or not is one of the major topics. Observing partisan behaviors regarding ingroup favoritism and outgroup animosity and testing whether and in what context OT operates would be an interesting and important project for both political scientists and OT scholars.

Studying how individuals interact with their copartisans will be a new contribution to the OT literature as well, adding another example of an ingroup. In most of the OT studies, participants were given a randomly generated group in the lab setting or a co-ethnic group that was assumed to be their ingroup. Copartisans are an actual group individuals are attached to, which can be checked with a direct measure of partisan identity strength. Since previous research showed the effect of OT even under arbitrary conditions, we can check whether the effects would be stronger when applied to actual preference.

Relatedly, one of the interesting features of group psychology is that compliance rather than convergence is likely to occur. Compliance is when individuals go along with the view of the group, but they still hold previously held beliefs of their own. Edelson et al. (2015) showed evidence of immediate compliance where individuals given OT rather than placebo more often adopted the erroneous judgment by their ingroup members. However, when individuals were tested again one week later without social influence, they reverted to the correct response, which is evidence suggesting that OT motivates compliance, not conversion. Applying a similar design to partisan behaviors would help us further understand compliance and convergence among copartisans. Furthermore, if an increase in the OT level affects group conformity, studying whether that effect can be tempered or reversed would also be meaningful.

Moreover, another layer of context can be added: competitiveness of the environment. The tension of intergroup competition among partisans heightens, especially around the election season, so the election cycle can be a great example of varying competitiveness. For example, Eifert, Miguel, and Posner (2010) showed that as the presidential election approached in Africa, individuals were

more likely to identify in ethnic terms. This could contribute to ongoing research on the heterogeneous effect of OT depending on the various level of competition.

Lastly, another important question would be identifying whether the OT effect size varies depending on the types of ingroups. Individuals have multiple ingroups at different levels, illustrated in a diagram of concentric circles drawing the contextual nature of social identity (Brewer, 1991). This means that different levels or sizes of circles are thought to coexist and overlap, such as a circle representing gender and a circle representing partisanship. Individuals may put more weight on one social identity than the other either because the issue is momentarily salient, or because narrower groups are more distinctive and intimate. OT studies are also interested in the relationship between a narrower ingroup and a broader one. Israel et al. (2012) showed that individuals given OT contributed to their own group as well as to the broader collective group. One example of manipulating the scope of the ingroup would be comparing the OT effect sizes when considering copartisans as the ingroup or more broadly, all the citizens. Studying the role of OT in these various contexts would broaden our understanding of the basis of group attachment.

One of the ways to address the questions on other-regarding policies and partisan behaviors is to pair the OT study with the vignette experiment. The benefit of this design is that exogenous manipulation allows us to make a causal claim between the context, OT, and the outcome of interest, while we also observe the context-dependent nature of OT effects. For example, in a two-by-two design (Treatment & OT, Treatment & Placebo, Control & OT, and Control & Placebo), participants will be randomly assigned to either an OT or placebo group. They will take a single dose of 24 IU of either OT or normal saline from a nasal spray. After waiting for about 45 minutes, they will be randomly assigned to either a treatment or a control vignette. Comparing the levels of the outcome measure will tell us if the finding supports the hypothesis or not.

CONCLUDING REMARKS AND RECOMMENDATIONS

In a relatively short period of time, OT has become one of the most studied molecules in behavioral biology (MacLean et al., 2019) and has gone through several waves of excitement and concern. Numerous scholars across disciplines are currently trying to identify a more nuanced role of OT, further investigating individual differences and contextual factors. The list of confounders is limitless, including biological factors, social factors, and the interaction between the two. One aspect that would be of interest to comparativists is how the response to OT varies among different cultures. For example, seeking emotional support in times of distress is favored in American culture compared to Korean culture, and Kim et al. (2010) found differences between Korean and American participants in the association between OT receptor polymorphism and psychological distress. Likewise, introducing more micro- and macro-covariates to OT studies would enrich our understanding of social behaviors.

Beyond understanding individual attitudes and behaviors, there is emerging interest in the application of these findings. Although exogenous OT treatment is an appropriate option for several clinical cases, it is rarely a practical option in other settings. Studies have pointed to a few ways that stimulate the release of OT, such as skin-to-skin contact (Vittner et al., 2018), highly emotional speech (Barraza & Zak, 2009), and group conversation and singing (Terris et al., 2018). More work on identifying these methods and linking them with the outcome of interest would be another new pathway forward for this area of research.

While there is much room for new questions on OT to be raised and answered, ethical concerns with studies that involve human participants cannot be stressed enough. One way to address this issue is to increase transparency between the researcher, participants, and other scholars. At the research design stage, sufficient conversation on the benefit of the research and the research protocol should take place. At the administration stage, the researcher should fully explain OT to the participants and there should be enough room for participants to inform their health conditions. After the research is completed, researchers should make efforts to update the study guideline with a critical reflection on the conducted study. Also, data sharing with the consent of the participants can be another way to minimize OT administration with human participants.

Lastly, I would like to underscore the importance of interdisciplinary research. There is a great dynamic in academia where various disciplines collaborate bringing in different perspectives. Interdisciplinary subfields have been created by merging one with another, such as psychobiology, neuroeconomics, and neuro-anthropology. Reflecting on the past 50 years of biopolitics, it is time to pay more attention to the study of OT that is vibrantly being investigated across many fields. To that end, this chapter reviewed previous OT studies in other disciplines and highlighted several research questions that can be answered at the intersection of biology and politics. Bringing the fundamental questions of political science will contribute to the study of OT, which will broaden the scope of biopolitics and pave the way for the next generation of biopolitics.

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REPRODUCTIVE AND GENETIC TECHNOLOGY POLICYMAKING AND CITIZENSHIP RIGHTS

Sandra Reineke

ABSTRACT

This chapter examines how lawmakers had to grapple with whether and how to regulate medically assisted reproduction after the 1988 Baby M court case in the United States propelled surrogate motherhood and related reproductive technologies onto the public policy stage. The chapter compares the public policy approaches of two countries, France and Germany, with the regulatory structures in the United States where the Baby M court case that garnered international attention took place. Specifically, the chapter provides an in-depth examination of the legal and historical contexts of each country's policy approaches in the form of existing national marriage, family, and adoption laws as well as policies regulating human reproduction. Lawmakers' task became even more pressing once citizens began using the court system and traveled abroad to either gain access to proscribed technologies or use them for a lesser fee elsewhere. As a result, Germany developed one of the most restrictive national laws in the world while France established certain legal proscriptions, which are still more far-reaching than the regulatory structures in the United States. Along the way, this developing policy area contributed to the creation of international frameworks governing medically assisted reproduction and the development of national bioethics advisory councils.

In 1987, a dramatic news story broke in the United States that captured readers worldwide, one that detailed a married couple's experiences and the surrogate mother who refused to hand over the baby. The story followed a New Jersey couple who went to court to obtain custody of the baby girl delivered by the surrogate (Whitehead v. Stern, 1988). The court case

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surrounding Baby M, as the child became known, propelled surrogate motherhood and other medically assisted reproductive practices onto the national and international public policy stage (Allen, 1988; Feldman, 2018). This first case of a publicly acknowledged surrogate motherhood contract not only made for extensive media coverage worldwide, but compelled lawmakers in the United States and many other countries to ask whether and how they should regulate these reproductive technologies. In France, the Baby M case, and a similar "French" Baby M instance that was discovered by the authorities around the same time, prompted the government to declare that it wished to "put a stop to it" (Herman, 1987). Relatedly, after learning about the Baby M case, the German media quoted politicians there declaring their intent to criminalize surrogate motherhood and related medical practices (Mein Gott, 1987).

Arguably, surrogate motherhood was more critical than other assisted reproductive technologies used before, such as artificial insemination in the late eighteenth century, in-vitro fertilization roughly 200 years later in 1978, and gamete cryopreservation (the conservation of donor sperm and the beginning of commercial sperm banks in 1954). Surrogate motherhood became more critical for lawmakers because it raised important questions about who a parent is and whether citizens could access these new technologies. Most urgently, it created *ipso-facto* a case of third-party adoption via a contractual arrangement that potentially or actually conflicted with existing family, marriage, and adoption laws and reproductive policies. Lawmakers' responses took a variety of forms that, in some instances, were codified in national laws falling onto a public policy continuum that ranges from very restricted to largely unrestricted. The unrestricted category includes countries that have not developed national laws governing reproductive technologies, such as the birthplace of Baby M, the United States (Behm, 1999; Pol, 2017).

This study explores the public policy approaches of two countries that developed comprehensive federal laws that are more restrictive than regulatory structures in the United States. Specifically, the study examines the national laws of France, which implemented certain proscriptions, and Germany, which developed one of the most restrictive national laws in the world. The study builds on Engeli's theoretical framework that emphasized the historical and legal contexts in analyzing lawmakers' task when regulating surrogacy and related reproductive technologies (Engeli, 2004, 2009). In more concrete terms, the study is an in-depth examination of how existing family, marriage, and adoption laws and policies governing human reproduction – which in turn are influenced historically by a country's political landscape – shaped lawmakers' policy options in important ways. In so doing, the study offers valuable added insights to existing comparative analyses of policymaking processes and institutions (Bleiklie, Goggin, & Rothmayr, 2004; Montpetit, Rothmayr, & Varone, 2007; Rothmayr & Ramjoue, 2004). Specifically, the study shows that understanding countries' legal contexts can help explain policy similarities and differences across place and time.

As we shall see below, while French bioethics laws allow many forms of medically assisted reproduction, both countries continue to prohibit surrogacy over 30 years after the Baby M case. Lawmakers in both countries object to surrogacy on ethical grounds, but the French prohibition is also grounded in a unique aspect of French family law, the law of filiation, that continues to pose a legal hindrance to making surrogacy arrangements legal. Similarly, Germany's abortion law that defines a human embryo as a legal person that must be protected by the state under its Basic Law, continues to prohibit most reproductive technologies as they involve the creation of human embryos. As the study hopes to show, detailed knowledge about the legal frameworks policymakers must consider when approaching medically assisted reproduction refines our theoretical understanding of where a country may fall on the policy continuum from restrictive to permissive. Before considering each case in more depth, the study first turns to the history of medically assisted reproduction and the United States context of the Baby M case that prompted initiatives to regulate them.

MEDICALLY ASSISTED REPRODUCTION: WHEN AND WHAT TO REGULATE?

Medically assisted reproduction began in the late eighteenth century with the case of the British doctor Sir John Hunter, who succeeded in a patient's artificial insemination (AI) in-vivo in 1790 (Poynter, 1968). The medical technology used by Hunter and other doctors to achieve a pregnancy without sexual intercourse was relatively simple and has been used by non-medical practitioners throughout time. Regulation of medically assisted reproduction was not much of an issue until the twentieth century, particularly with the technological invention of gamete cryopreservation—the conservation of donor sperm—in 1954. This invention began a proliferation of sperm donor banks first in the United States that made AI a growing branch of medical services and raised important questions related to the status of donor-conceived children under existing marriage and adoption laws (Clarke, 2006). For instance, a 1964 court decision in the State of Georgia in the United States required medical providers using donor sperm to obtain prior written consent from the woman's husband, making him the legal parent of their donor-conceived child (Kamlet, 1975).

Importantly, by 1978, about 200 years after Hunter's case of artificial insemination (which was not so much a technology than a form of non-sexual reproduction), two British doctors succeeded in the first in-vitro human egg fertilization that resulted in a live human birth, Baby Brown (World's first IVF baby, 2018). In the United States, the first in-vitro conceived baby was born in 1981, and in France and Germany in 1982 (Amandine, 2013; Cohen, 1981; Stichtag, 2007). This new medical technology made possible gestational surrogate motherhood, as opposed to traditional surrogacy when the surrogate mother is genetically related to the offspring. Baby M was born via traditional surrogacy.

In this case, the New Jersey Supreme Court had to decide who constituted the child's legal parents: the biological mother of the baby, who functioned as the

surrogate mother to a married couple. Or the couple's husband, who was the biological father of the baby while his wife was not at all related to it. The court ultimately decided that the biological mother, the surrogate, would only have visitation rights, while the biological father and his wife were the child's legal parents (Chesler, 1988). This decision against the biological mother of the child, who acted as a surrogate mother to the couple, contributed in the United States to the proliferation of gestational surrogacy in which the child and the surrogate mother are not genetically related. It did so because after this court case clinics and patients believed that gestational surrogacy would more likely elude the legal pitfalls brought about by a surrogate who is also the biological mother of a child as it had been the case with the biological mother of Baby M (Sanger, 2007).

Importantly, the use of in-vitro fertilization by 1978 and the production of human embryos in reproductive medicine raised new ethical and legal questions surrounding the status of human embryos. Furthermore, the invention in 1984 of pre-implantation genetic diagnosis (PGD) that can be used in conjunction with in-vitro fertilization and surrogacy to select viable embryos, including embryos of a particular sex, raised the issue of doctors' and patients' ethical obligations (Stern, 2014). Patients' interest in using these new reproductive and genetic technologies (NRGTs) has been remarkable. About 40 years after the first in-vitro conceived child was born, the European Society of Reproduction and Embryology (ESHRE) found that about 9 million babies have been born worldwide using this reproductive technology. European countries are leading this development. In some European countries, including Slovenia, Austria, Denmark, Belgium, and Estonia, over 4% of all babies born are conceived using in-vitro fertilization. By contrast, the rate of babies born this way in the United States is about 1% of all births (ESHRE, 2018). As a result, many citizens travel to other countries that do not regulate these services as strictly as their home country or offer medical services at a lesser fee.

In response to medical tourism and its underlying socio-legal questions, countries began coordinating their policy responses as early as the 1990s by creating international biomedicine frameworks. The leading international frameworks are the Council of Europe's Oviedo Convention from 1997 and the United Nations' Universal Declaration on Bioethics and Human Rights from 2005 (Convention, 1997; UNESCO, 2005). The Oviedo Convention, the Convention for the Protection of Human Rights and Dignity of the Human Being with Regard to the Application of Biology and Medicine, is a legally binding document seeking to protect human dignity from possible harm through science and medicine. The convention has important implications in reproductive medicine: it forbids sex selection in a human embryo (except for severe hereditary diseases) and the creation of human embryos for scientific research purposes and human cloning. While the convention has been ratified by 29 countries, only France has done so of the countries under consideration for this study (Adorno, 2005; Convention, 1997). The second existing international framework, the Universal Declaration on Bioethics and Human Rights, addresses ethical issues

in biomedicine, including human dignity, consent, and privacy matters. UNESCO member states adopted the declaration, but it is not legally binding (Kirby, 2009).

In addition to medical tourism, citizens use the court system in their home countries to access these technologies, especially to those technologies and practices that are more controversial, such as surrogate motherhood, which was the basis of the Baby M legal battle in the United States. As seen in the Baby M trial, absent a national law regulating surrogacy, the intended parents sued the surrogate mother to enforce the surrogacy contract. The New Jersey court awarded the commissioning couple custody, but on appeal, a higher court judged that surrogacy contracts were invalid in the state of New Jersey. The higher court nonetheless awarded custody of the baby to the intended parents following standard custody decisions at the time of the trial (Sanger, 2007).

In the United States, absent a federal law governing reproductive technologies, fertility clinics where patients undergo in-vitro, surrogacy, and other reproductive services, are monitored by the guidelines issued by the medical providers' professional associations, such as the American Medical Association or the American Society of Reproductive Medicine. Additionally, three federal agencies, the Center for Disease Control (CDC), the Food and Drug Administration (FDA), and the Centers for Medicare and Medicaid Services (CMMS), regulate their practices. Importantly, due to its federal structure, each state has the power to regulate or not regulate these medical service providers through licensing and other mechanisms. In this way, some states have enacted less restrictive laws governing reproductive technologies than others, and patients, especially those coming from abroad, may choose specific states for certain treatments (Frith & Blyth, 2014).

Lawmakers in the United States sought advice related to ethical considerations surrounding these medical developments from national bioethics commissions that were either already in place or created for that purpose. The United States Congress created the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research as early as 1974. In 1978, Congress created the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, which focused more specifically on biomedical issues. Later, United States Presidents created distinctive bioethics commissions, including President George Bush's President's Council on Bioethics in 2001 (Elgharieb, 2015). This council issued a report related explicitly to medically assisted reproduction in 2004. Absent a United States federal law governing medically assisted reproduction, including surrogacy and related medical services, the report recommended improving the work of the federal agencies mentioned above, such as the CDC's national data collection of in-vitro fertilizations and other reproductive services provided. The report further recommended that because each state has the power to not regulate medical service providers that the professional medical societies should improve their oversight over medical licensing to heightening consumer safety (President's

Council on Bioethics, 2004). As impersonal as the concern for consumer safety expressed in the report may sounded, surrogacy arrangements, and their related medically assisted reproductive services had raised new ethical and legal questions for lawmakers. Those questions included the potential or actual conflict of surrogacy arrangements with existing family, marriage, and adoption laws. Moreover, the issue surrounding the legal status of human embryos were codified in existing abortion laws or related court decisions. Accordingly, the 1973 Supreme Court decision Roe v. Wade shaped lawmakers' policy considerations related to surrogacy and reproductive technologies with its decision that a human embryo is not considered a person and thus not protected by the state under the 14th Amendment of the United States Constitution (Roe v. Wade, 410 US 113, 1973). (At the time the article was written, the Supreme Court decision Roe v. Wade had not been overturned.)

By contrast, and as we shall see below, lawmakers in France faced a divergent legal concept of personhood stemming from existing abortion law (see Table 1). It entails a more ambiguous status of legal personhood and framed NRGT regulation as protecting human dignity from possible harm. In Germany, lawmakers grappled with yet another legal approach encapsulated in existing German abortion law. The law posits that human life begins at conception and bestows legal personhood onto human embryos. By extension, German NRGT regulation is framed as protecting human embryos (Rothmayr & Ramjoué, 2004).

Table 1. Existing Legal Frameworks Governing Human Reproduction in the United States, France, and Germany and Their Relevance for NRGT Policymaking.

Country	Legal Framework	Designation of Human Embryos in Legal Framework	Relevance of Legal Framework for NRGT Policy	Where Does NRGT Regulation Reside – On the Federal/Central, State, or Other Level?
United States	U.S. Supreme Court Decision from 1973 (Roe v. Wade).	Human embryos are not legal persons.	Human embryos are not protected by the state.	There is no federal law. Medical services are regulated by three federal agencies,[a] by the individual states, and the providers' professional associations.
France	Federal abortion law from 1979 (Loi no. 79-1204).	Human embryos enjoy human dignity.	Human embryos' dignity is protected by the state.	Centrally with three national laws from 1994; revised by the national bioethics law from 2021.
Germany	Federal abortion law from 1976 (StGB §218).	Human embryos are legal persons from the time of conception.	Human embryos must be protected from harm by the state from the time of conception.	Federally with two national laws from 1989 and 1990.

[a]The U.S. federal agencies are the Center for Disease Control (CDC), the Food and Drug Administration (FDA), and the Center for Medicare and Medicaid Services (CMS).

FRENCH REPRODUCTIVE TECHNOLOGY POLICY

France's regulation of NRGTs is connected significantly to the state's role to protect fundamental societal values related to family and adoption law through the French civil code. Concerning medically assisted reproduction, French courts ruled as early as 1991 that surrogacy contracts are illegal in France because they violate existing French family law related to filiation (Cass. Ass. plen., May 31, 1991). The French legal concept of filiation relates to the documented legal parent of a child (Rabinowitz, 2012). Yet public debates about the social and moral implications of medically assisted reproduction surfaced in France as early as 1982, when the first French in-vitro conceived baby, Amandine, was born (Amandine, 2013). The following year, the French government created France's national bioethics committee, the National Consultative Ethics Committee for Health and Life Sciences (CCNE, *Comité Consultatif National d'Éthique pour les sciences de la vie et de la santé*). The committee was charged with advising lawmakers about developing areas of reproductive technology and embryonic research. The group of 40 experts released reports in 1984 and 1986 urging the government to take regulatory action in biomedicine and health (Comité Consultatif National d'Éthique, 1984, 1986).

The ensuing parliamentary work proved to be lengthy, including a draft report by the State Council (*Conseil d'État*) and the first bill in 1988 (Conseil d'État, 1988). In 1990, a new prime minister commissioned three more parliamentary reports, which created the foundation for a distinct national draft law in 1993. Finally, in 1994, the French parliament debated and voted on the draft bills regulating human organ donation, medically assisted reproduction, and biomedical research. The laws are law no. 94-630 on research and procreation (JO du 26 juillet 1994), law no. 94-653 on respecting the human body (JO du 30 juillet 1994), and law no. 94-654 on bodily donation and medically assisted procreation (JO du 30 juillet 1994). The laws prohibited using the human body or body parts for commercial purposes, thus outlawing surrogate motherhood, and allowing egg and sperm donation only without remuneration and anonymously. All forms of human cloning are prohibited along with research on human embryos, with the narrow exception of specific prenatal diagnostics to prevent severe hereditary diseases. Furthermore, artificial insemination and in-vitro fertilization must be carried out by medical providers only (Maio, 2004).

France's national laws reflected the court's ruling from 1991 that surrogate contracts are illegal. They violate French societal norms and regulations related to family and adoption that specify who is the legal parent of a child (filiation) and, by extension, that children and the bodily elements that are involved in human procreation cannot be traded, sold, or bought because it is contrary to French public order. It is noteworthy that in the making of the new laws, politicians had to deliberate about what constitutes a human embryo for procreative and research purposes in the making of the bioethics laws. Lawmakers used an approach central to a new French abortion law from 1975 (revised and made permanent in 1979), which avoided defining a human embryo as a person.

Instead, the abortion law, and now the new biomedicine laws, extends the state's commitment to protect human dignity (Loi no. 79-1204; Maio, 2004, p. 586).

Since the laws went into effect, the French state has tried a few individuals for criminal wrongdoing related to the prohibition of surrogacy. In contrast, most French citizens who are seeking surrogacy services have traveled abroad. A rare criminal trial of a French woman took place in March of 2016. The woman had taken out advertisements in local newspapers for two surrogate contracts, one in 2011 and the second in 2012. But instead of handing the babies to the intended couples, she sold the children again to two other couples (Surrogate mother, 2016). In addition to clandestine surrogacy, French family law leaves children conceived via surrogacy outside of France in legal uncertainties because the French law of filiation does not recognize the parental relationship.

French couples finding themselves in this situation have gone all the way to the European Court of Human Rights (ECHR). In 2014, the ECHR ruled that the French state cannot deny a citizen the recognition of their parent-child relationship even if the child was born under arrangements not legally recognized in its home country. In this case, a French married couple, the Mennessons, traveled to California in the United States, where a surrogate mother was impregnated with Mr Mennesson's sperm and gave birth to twins in 2000. The California court entered Mr Mennesson and Mrs Mennesson as the legal parents of the children on their birth certificates and passports. Still, the French state refused to acknowledge them as legal parents and enter them in the birth register because of the prohibition of surrogacy in France. The Mennessons went to court, including the European Court of Human Rights. Upon appeal in France 19 years after the twins were born, the French appeals court ruled that United States birth certificates are valid. The French filiation documentation ought to reflect the Mennessons as the legal parents of the children born via surrogacy (Mennesson v. France, 2014).

While this and other court cases have not necessarily forced lawmakers to enact changes to the biomedicine laws, they have contributed in part to the debates surrounding the scheduled revisions of the laws every five years as specified in the original bill. To date, there have been three revisions of the bioethics laws from 1994. The first took place in 2004, the second in 2011, and most recently in 2021. During the 2004 revisions, the law dealing explicitly with reproductive technologies, law no. 94-654, was renamed into the law on bioethics (Mathieu, 2020). Its latest revision into law no. 2021-1017 on bioethics, included a substantial change allowing single and gay couples access to artificial insemination and in-vitro treatments, reflecting another recent change in French law that since 2013 enabled gay couples to marry and adopt children (JO du 3 août 2021). (In 2017, a French court ruled that the gay partner of a biological parent whose child was born outside of France by a surrogate mother may adopt the child to be their legal parent (French high court rules, 2017)).

Overall, the scheduled parliamentary revisions of the laws allow lawmakers to remain committed to the original aim of the federal laws: to protect French citizens from commercial forces surrounding biomedical technologies and treatments based on the protection of human dignity while adjusting the law to

technological advancements in the area and changing societal views and patients' interests. Despite some adjustments, such as direct adoption of surrogacy babies for legal partners, French law continues to outlaw surrogacy contracts.

GERMAN REPRODUCTIVE TECHNOLOGY POLICY

Germany's restrictive federal laws regulating the use of NRGTs are based on protecting all forms of human life, including developing life in the form of human embryos. To date, Germany has two federal laws that regulate NRGTs: the 1989 Act on the Arrangement for the Adoption of Children and the Prohibition of Surrogate Motherhood (*Adoptionsvermittlungsgesetz*, AdVermiG) and the 1990 Embryo Protection Act (*Embryonenschutzgesetz*, ESchG). (Germany later also enacted a federal law governing human embryonic stem cells research, the Stem Cell Act (*Stammzellgesetz*, StZG) from 2001.) Together, the two laws outlaw almost all NRGTs, including embryo transfer and surrogacy, egg cell donation, human embryo creation except for producing a pregnancy, post-mortem fertilization, sex selection, the legal use of in-vitro fertilization, and the creation and importation of human embryonic stem cells after a specific cut-off date. In-vitro fertilization, covered in part by the national statutory health insurance, is available for married, and since 2016, for unmarried heterosexual couples (BGB1. I S. 2016 and BGB1. I S. 2746).

Like in France, German NRGT regulation began as early as the 1980s and centered around the issue of who can legally be the parent of a child born via reproductive technologies. Similar to French lawmakers, German lawmakers had to consider existing civil and criminal laws in the area of family and adoption law, along with the post-WWII German Basic Law's mandate that the state must protect all forms of human life, including that of the unborn, based on Germany's past experience with eugenics laws during the Nazi era. It started with developing a new adoption law, the *Adoptionsvermittlungsgesetz* (AdVermiG), the Act on the Arrangement for the Adoption of Children, and the Prohibition of Surrogate Motherhood that was finalized in 1989, a year before German unification (BGB1. I S., 2016). While the East German state did not regulate NRGTs, several court cases in the 1980s in West Germany drew the public and lawmakers' attention specifically to surrogate motherhood and prompted this new federal adoption law.

In Germany, surrogacy arrangements violate the existing German civil code (Bürgerliches Gesetzbuch, BGB), which mandates that all adoptions, surrogacy being a form of adoption, must be managed by a state agency, not private agencies, such as fertility clinics. Furthermore, the civil code mandates that the woman who gives birth to a child is its legal mother (BGB Sections 1741–1772 and Section 1591). In the first court case in 1982, the German state prosecuted a citizen, a health worker, for advertising private, commercial surrogacy arrangements. In the second case in 1985, a German couple went to court to sue the surrogate mother they had privately contracted with after finding out that the surrogate's husband instead fathered their child. In both court cases, the court

ruled the surrogacy arrangements illegal because they violated Germany's civil code (Brandt, 1985; Hentschel, 1985). The court cases contributed to lawmakers' rising concern that absent a federal surrogacy law, judges, not policymakers, would decide who can be a legal parent of a child born using reproductive technologies. As a result, the Federal Ministry of Justice commissioned a study, the Brenda Report, that explored the possibility of a federal criminal law regulating NRGTs (Rothmayr & Ramjoué, 2004).

German lawmakers' view that a federal law was needed was again underscored by another court case in 1988, which involved an American citizen doing business there. Due to the case's centrality to Germany's federal regulation of surrogacy, it is worth detailing here. This case surrounded Franklin Torch, who in October of 1987 had opened an overseas branch in Frankfurt a. M. of his Michigan-based American surrogacy agency called United Families International. Torch's landlord in the city of Frankfurt in West Germany, a banking business, quickly filed a complaint with the city's mayor's office against Torch because it objected to sharing a building with a company that engaged in commercial surrogacy. The mayor's office took Torch to court, accusing him and United Families International of illegally providing commercial adoptions in Germany through surrogate mothers in the United States. The lawsuit claimed that Torch's business was illegal because it enticed German clients to circumvent German adoption law. Specifically, it alleged that German couples seeking surrogacy finalized adoption papers overseas under American law that violated the German civil code stipulating that the woman who gives birth to a child is its legal mother and that the German state oversees all adoptions. Torch countersuit the city of Frankfurt because the German state did not systemically prosecute all cases of surrogacy contracts. Eventually, a higher court ruled in favor of Frankfurt, and Torch closed his business and left the country (Brill, 1988).

After Torch departed, the federal Minister of Youth, Family, and Health (*Bundesminister für Jugend, Familie und Gesundheit*), Rita Süssmuth, supported the court's ruling calling it a win for women and children. For her, the verdict protected against economic exploitation and international trade in children (Ein Sieg für Frauen und Kinder, 1988). Importantly, in 1988 Süssmuth took this case as an opportunity to revise existing German adoption law to prohibit all forms of surrogacy contracts. The new law, the above-mentioned Act on the Arrangements for the Adoption of Children and the Prohibition of Surrogate Motherhood, prohibits natural and artificial insemination and embryo transfer to obtain pregnancy in a surrogate mother as well as advertisement for and entering into a contract of commercial or non-commercial surrogacy relationships as a violation of morality. Breaking the law is punishable by a prison term of up to three years for the surrogacy brokers, not the intended parents or the surrogate mother. Additionally, the law stipulates that prior consent by the biological mother to a later adoption is not binding (Schreiber, 2002).

In the same year as the new adoption law was created, the unfolding of the Baby M case in the United States, which was closely followed by the German public, contributed to German lawmakers' intentions to develop a national law. Within this context, German lawmakers began developing the above-mentioned

Embryo Protection Act. The Act went into effect in 1990 and prohibited most forms of NRGTs except for artificial insemination and in vitro fertilization for married couples (since 2012, unmarried couples may also receive partial health insurance coverage for in-vitro treatment) (Richtlinie, 2012). The new law defined a human embryo as any fertilized human egg and any totipotent embryonic cell that can develop into an individual, including human embryos created in-vitro before implementation into the womb. In this way, in-vitro created human embryos are protected under the state's constitutional protection enshrined in the German Basic Law (Deutsches Grundgesetz, 2020). By extension, the new law prohibits artificial insemination without consent and post-mortem, egg donation, embryo transfer, sex selection, surrogacy, and therapeutic and reproductive cloning (BGB1. I S. 2746).

As we have seen, in Germany, legislative regulation of NRGTs stemmed partly from the interest of citizens and doctors looking to use the new medical treatments and the ensuing court cases surrounding their uses (Trappe, 2017). What is also noteworthy is that the creation of a federal bioethics council happened relatively late in Germany in comparison to the creation of the councils in France and the United States. The German government created the first federal bioethics council, the *Nationaler Ethikrat* (NER), in 2001. The council was renamed in 2007 by an act of the federal parliament into *Deutscher Ethikrat* (DER) (Köhler, Reis, & Saxena, 2021).

CONCLUSION

In Germany and elsewhere, surrogate motherhood and the medical technologies involved in it remain politically contested. In the three countries under consideration in this study, the United States, France, and Germany, lawmakers had to consider existing laws and regulations regarding family, marriage, adoption, and human reproduction. In the case of Germany, the country's restrictive federal law that prohibits surrogacy follows the state's constitutional obligation to protect all human life, including the life of the unborn, from possible scientific and medical harm that was already codified in Germany's abortion law. In France, lawmakers' middle-of-the-road approach resulting in the prohibition of certain reproductive technologies, including surrogacy, follows the state's commitment to protect human dignity from possible scientific and medical exploitation or harm that dovetailed with a legal approach taken in France's abortion law. As a result, some long-standing French civil laws were amended, such as the laws related to filiation or parent–child relations. In the United States, lawmakers did not codify surrogacy or reproductive technologies on the federal level based, in part, on United States case law, including the Supreme Court decision Roe v. Wade that declared citizens' reproductive choice to be a private matter.

Examination of each country case shows how the national approach to reproductive technology policymaking remains demarcated by a distinctive legal context that contributed to the regulatory choices made. Continued interest by patients, doctors, and scientists to use these new technologies contributed at times

to court decisions and international medical tourism, putting existing policies to the test and/or enacting policy changes. The highly publicized Baby M case constitutes a rare albeit powerful example of the policy dilemmas and developments created in this area. Looking ahead, lawmakers and citizens could view the case studies surrounding the regulation of reproductive technologies examined here as policy options within their country's distinctive restrictive or non-restrictive legal contexts.

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NEOLIBERAL GOVERNMENTALITY OF IMMUNIZATION: A BIOPOLITICAL PERSPECTIVE ON THE VACCINES IN TURKEY

Başak Akar

ABSTRACT

This chapter argues that neoliberal governmentality in immunization relocates the Turkish state's position regarding vaccine and immunization policies. Neoliberalism is often discussed in the context of privatization, performance, and effectiveness separately. However, more attention should be paid to the set of strategies that are employed in public policy processes to manage populations in terms of immunization, while intertwining power with knowledge. Following Foucault's concept of governmentality and taking it further within the context of biopolitics, this chapter focuses on different knowledge practices regarding vaccine and immunization policies in Turkey. In doing so, this case study applies a post-structural analysis to examine vaccine production, vaccine know-how, and immunization policies inscribed in policy documents as a form of knowledge practice. The analysis sheds light on the reflexive transformation of the concept of biopolitics, which is moving from state-oriented knowledge practices toward a neoliberal governmentality of immunization.

INTRODUCTION

For many years, Turkish politics has been involved in a discussion about whether it is possible to restart the production of vaccines (DHA, 2020; İHA, 2018) and if having such local production would affect vaccination preferences (Eskiocak & Marangoz, 2019). These debates focused attention on the Health Transformation Program implemented in 2003. This program brought about significant new

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regulations and was designed to meet European Union (EU) and Organization of Economic Cooperation and Development (OECD) standards (Aykan & Güvenç-Salgırlı, 2015). The discussions emphasized the failure of the neoliberalization of healthcare and explained the withdrawal of the state from healthcare services in general (Yaşar, 2011). The distribution of vaccines remained a state matter. However, within that state-led framework, the Turkish government continued to increase the involvement of supranational actors, market actors, performance criteria, and modern management. These neoliberal changes seemed to have a negative impact on the equal distribution of public health. Critics had earlier argued that a reorganization of primary care would bring about unequal access and dissatisfaction of the healthcare providers and receivers (Öcek & Soyer, 2007). Policy debates regarding vaccine production and immunization policies have continued because of the apparent rise in the import rates of vaccines and the decreasing trend in vaccine coverage in Turkey (Akar & Akar, 2020).

This study employs the "neoliberal" process as a set of governmental techniques to understand vaccination policies in Turkey. Neoliberal governmentality of immunization is a perspective to explain the knowledge about life that is mobilized by power strategies (Lemke, 2011). Imposing an operational skill over the concept of neoliberal governmentality, the study seeks to understand the changing practices of knowledge in immunization and vaccine production by asking the following questions: "What are the knowledge practices regarding immunization in the main public policy documents in Turkey?" and "How is the placement of the state made?" Drawing on relevant policy documents published by the Turkish government between 1963 and 2019, the study examines the changing place of the state in vaccine production, vaccine production know-how, and immunization. Within the context of neoliberal governmentality, the chapter argues that vaccine production and immunization policies are embedded in power relations where the central power of the state in vaccine and immunization policies has been relocated. Observing a shift from the production of vaccines and immunization as a state-oriented strategy toward an invitation of multiple actors to the policy realm introduces new knowledge practices.

BACKGROUND

The Ottoman Empire encouraged the first graduates of modern medical schools to pay attention to immunization and vaccine production. This perspective enabled the young Turkish Republic to expand its public health approach and vaccine know-how with the production of domestic vaccines. After the proclamation of the Republic in 1923, public health policies focused on child mortality, workers, and public health to build a "healthy nation." Turkey was able to meet the domestic demand for vaccines and achieve substantial vaccine coverage in a short period. After the 1970s, new biotechnology approaches were used to produce vaccines. Since then, vaccines have become commercial goods along with many other biotechnological and human genetic products (Akar & Özgen, 2011; Caulfield, 1998). Commercialization was also noticeable in public policy. Turkey,

which caught up with contemporary biotechnological advancements in terms of trained staff, failed in its ability to sustain vaccine production and adapted to global transformation by welcoming neoliberal policies in healthcare.

Many economic perspectives draw attention to privatization and the fading out of public investments in vaccine and immunization policies in the context of neoliberalization. These steps are followed by a welcomed decrease in the public investment in immunization. However, this approach ignores the "health for all principle" adopted by the 1978 Alma Ata Declaration and neglects the requirement of a national vaccine policy based on public commons (Yenen, 2012).

Studies have examined the impact of neoliberalism and neoliberal health policies on the healthcare system (Danış, Karataş, & Şahin, 2008; Yaşar, 2012). Akar (2019) utilizes the concepts of biopolitics and consumer citizenship within the scope of medical biotechnological products as a starting point for public policy documents. Some scholars relate body politics to neoliberalism, addressing the changing subjects in the neoliberal age. The analysis of the narratives of neoliberal governmentality in public health by Aykan and Güvenç-Salgırlı (2015) is a serious attempt to question increasing individual responsibility. Aykan and Güvenç-Salgırlı (2015) as well as Briggs and Hallin (2007) trace the self-governing bodies and promote neoliberal governmentality as a technique that encourages individuals to be responsible for their own well-being. Sabuktay (2008) interprets the health reform and general health insurance in Turkey through the lenses of Foucault and Agamben. While doing so, the study seeks to demonstrate the exceptions and vulnerabilities of the healthcare system (Sabuktay, 2008).

Yaşar (2011) discusses the policy background of the Turkish health system reform, mainly focusing on the Health Transformation Program and its outcomes; however, she does not view immunization and knowledge practices through the lens of neoliberal governmentality. While accepting individualization in healthcare as a matter of the neoliberal management of life, this chapter addresses neoliberalism as a sum of processes to implement a rational government mentality through public policy. Public policy is a technology of government and cannot be separated from the strategies of knowledge production and utilization in the management of populations. This "know-how" process is concurrent with the discourses of knowledge practices in immunization and vaccines. Based on Turkish policy documents, these discourses can be traced and subsequently offer insights regarding how and which strategies of knowledge support the policymaking process. Initially, the concepts of governmentality and immunization are bridged and then the relationship between knowledge-power and population health is discussed.

IMMUNIZATION AS A TECHNOLOGY OF GOVERNMENTALITY

Foucault (1991) argues that the state, as the central mechanism to exercise power, governs via instrumental rationality that depends on science and knowledge to manage the population. Identifying the regularities of the "governed" can ease

adaptation to new governmental necessities. The management of "the governed" is indeed the management of populations, meaning it is biopolitical (Foucault, 1991).

Biopolitics needs to access knowledge about populations to determine who is "normal" and calculate ways of steering the population toward equilibrium when necessary (Grayson, 2008). This approach requires what Foucault refers to as governmentability, wich, as a mechanism, not only makes its subjects anticipate sovereignty but also regulates and orients the relationship between the state and its citizens (Sabuktay, 2008). The governing populations rationale, or biological life in general, stays on track by producing knowledge and integrating knowledge in administrative practices. Therefore, it is possible to call governmentality a set of rational governing tools, which include not only legal mechanisms but also political strategies of social control (Lemke, 2016). Governmentality encompasses the policymaking of knowledge strategies that govern lives. However, as modern regimes articulate "specific rationalizations in regulations," the post-war critics of the welfare-state seek new ways to rationalize government (Rose, 2004, p. 24). Changing strategies, which reflect policy discourses, include ways of making the government better. The "know-how" promises to increase manageableness, making government possible and better.

Understanding biopolitics and governmentality concepts are important because this perspective helps us examine the changing governmental strategies on life (Rose, 2004). Biopolitics has been evaluated as "the state biology" in the nineteenth and early twentieth centuries, when the state was strategically superior in power relations (Lemke, 2010). Foucault calls this modern experience "governmentalization of the state" (Foucault, 1991, p. 103). This would lead to the centralization of technological know-how by the government in the context of vaccine production. Keeping in mind that power is productive in governmentality, the state is no longer alone in the neoliberal frame. Multiple actors take over and state power mediates from a distance while governing "life."

Alongside many manipulations of human life through medical implementations such as quarantine or preventive medicine, the immunization of modern societies has been considered one of the main techniques of biopolitics (Engels, 2016). Immunization, which challenges natural selection and the sovereignty of nature, requires human-made governmental and political struggles. It has been a modern tool for maintaining public health while managing the population, especially within the context of modernizing city centers. Concurrent with the emergence of modern nation-states, immunization as a political technology was embedded in preventive public health policies. Furthermore, statistical data regarding immunization was incorporated rationally into policymaking. As a result, power and knowledge were interlocked in Western modernity, thereby integrating individuals in reproducing the relationship between power and knowledge as parts of the administrative process (Foucault, 2008).

Making use of scientific knowledge and statistics as a component of political power paved the way to keeping the population alive, governing it and seeing it as a healthy body via immunization (Foucault, 2008). Lemke (2001) suggests that

the liberal government that Foucault dealt with at "the Birth of Biopolitics" necessitated knowing and understanding many technologies, namely institutions and devices, as well as a series of operating power types. While security is the basis of governmentality, it is established as a discourse and is provided through certain mechanisms. Public health works by integrating the administrative mechanisms of the population in addition to the pressure and education of individuals and their bodies to secure population health. Immunization, as a technique of public health, is interpreted, established, and consented to by a number of measurements, including vaccine production and vaccinations.

FROM THE GOVERNMENTALIZATION OF THE STATE TOWARD THE NEOLIBERAL GOVERNMENTALITY: VACCINES IN TURKEY

The history of vaccines in Turkey dates back to the first modernization initiatives in the Ottoman Empire. Along with the waves of pandemics in the nineteenth century in crowded city centers, migrations to Anatolia, and the Balkan Wars led the Empire to become cautious about the loss of population to infections and early implementation of immunization policies (Özdemir, 2010). Despite these developments, another century passed before institutional steps were taken to modernize Turkey's medical system. Following the first modernization initiatives in the military field, Sultan Mahmut II laid the foundations for modern medical education by opening *Tıbbiye* Medical School in 1827. Under the Military Medical Academy, the first institution to produce vaccines was established in İstanbul: the Bacteriology Center (Unat & Altaş, 1988).

One of the most promiment immunization policy was the Smallpox Regulation (*Çiçek Aşısı Nizamnamesi*) in 1848. This regulation made vaccination compulsory in highly contagious collective institutions like prisons and the military (Eroğlu & Şimşek, 2014). These constraints were practical and measurable providing the foundation for modern immunization politics in terms of compulsory and free public service.

After the proclamation of the Republic, the years of "nationalizing the mass immunization"[1] began along with the acceleration of modernizing the health system. One of the most significant indicators of this vision was the establishment of *Hıfzıssıhha*[2] (the Sanitation Institute) in 1928. *Hıfzıssıha* included the Vaccine-Serum Institute and Medical School. In 1934, the Smallpox Institution in İstanbul was added (General Directory of Public Health, 2018). Similar modernization approaches were also applied within the context of immunization. Accordingly, the production of vaccines was located at one center. The

[1]"Nationalizing Mass Immunization" is a phrase borrowed from Mary Augusta Brazelton's book on the Mass Vaccination: Citizens' Bodies and State Power in Modern China (Brazelton, 2019).

[2]*Hıfz-ı Sıhha* means the protection of health and sanitation in Turkish; a basic translation would have been the Center of Sanitation or Sanitation Institute.

government's support of vaccines and immunization accelerated in the early Republican Era. During this period, the Bacteriology Center maintained its central position in terms of production and supply for a long time. Able to respond to immunization efforts based on battle field data, the logic behind central production continued after the establishment of the *Hıfzıssıhha*. However, the data collection and storage methods in this period were quite inadequate – a shortcoming that continued throughout the Republican Era.

From the early Republican Era till the 1950s, Turkey protected its vision of vaccine production and used vaccines within the context of the country's modernization initiatives of the public health system. Starting with diphtheria, tetanus, Semple type rabies, smallpox, and pneumococcal vaccines in the 1930s, Turkey continued with the production of a wide range of vaccines, including typhoid-typhus, intradermal Bacillus Calmette-Guérin (BCG), mixed plague-cholera and other vaccines throughout the 1940s. In addition, the Domestic-Foreign Drug Control, Biological Control Laboratory, the Directorate of Virology, and the Modern BCG Vaccine Laboratory were founded to reinforce the production of vaccine knowledge before 1950 (General Directory of Public Health, 2018). Starting with the modernization of health practices and policies in the late Ottoman and early Republican eras, the production of vaccines and vaccination policies improved greatly despite the difficult economic consequences of World War II. This improvement coincided with the accreditation of *Hıfzıssıhha* as an international influenza center and reference BCG laboratory as well as its ability to meet the country's vaccine needs. As a result, Turkey did not import any vaccines for its vaccination programs until 1963.[3]

One of the prominent initiatives regarding immunization policies in the early Republican Era was the General Law of Sanitation (1930). In addition to making smallpox vaccination mandatory in 1930, the government assumed full responsibility for vaccinating each citizen at no charge. Drawing on health workers and military staff, the national vaccination program even expanded service delivery to the villages. The 1960s was a period when high targets of vaccine production, vaccination coverage, and immunization services were achieved in Turkey. *Hıfzıssıhha* continued to be an authority on vaccination and production until the 1980s. Even though the polio vaccine was first imported in the 1960s, vaccine production in Turkey remained at a level that could meet the domestic need until the rise of innovative technologies in vaccine production (Buzgan, 2012).

[3]Jonas Salk provided no patent for the polio vaccine to keep it accessible worldwide. As a result, the import of the polio vaccine has been perceived as a global public health matter rather than a commercial product. Despite the fact that the first outsourced vaccine was polio, the responsibility for the production and practices of the central government did not change (Salk Institute, n.d.).

With the January 24 Decisions[4] and the Military Coup in 1980, neoliberal policies came to the fore in Turkey. Guided by neoliberal policies, a new era began in the development and implementation of health policies, going from a national understanding of immunization and preventive health to one where individuals are the protector of their own health. The 1987 Health Services Basic Act and the 1993 National Health Service Policy began to transform health practices. Governments of Turkey have been considering revising the health care system since the Socialization of Health Services Delivery Act (1961). There were some efforts to strengthen primary care, "but no attempts to implement fundamental changes in the system were made until the late 1980s" (Yaşar, 2011, p. 112). In 2003, the Health Transformation Program was announced to meet EU and OECD standards. This program emphasized the spread of universal health insurance, while facilitating access to health services. Under the supervision of the Immunization Advisory Council, the immunization program was kept up-to-date and expanded (Akdağ, 2012). Finally, the scope of vaccine and vaccination policies was expanded to include immunization statistics.

The immunization and vaccine-related policies have been affected inevitably by the transformation started in the 1980s. Within the context of the advances in molecular genetics and biotechnology, vaccines produced with modern biotechnological methods for the market have also transformed intellectual property rights. As a result, molecular genetics is expected to reflect changes in both politics and knowledge practices, including immunization and vaccine production. Globalization and neo-liberalization approaches have been effective in the production and politicization of vaccines and enabled actors beyond the nation-state to have a say in vaccine production and immunization. Moreover, these approaches have become integrated into Turkey's public health policies due to the influence of the World Health Organization (WHO), EU harmonization framework, General Agreements on Tariffs and Trade (GATT), and The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreements.[5]

[4]Following the International Monetary Fund's (IMF) requirement to implement a new policy program to protect Turkey's economic stability, the January 24 Decisions is a policy framework that was issued in 1980 to integrate Turkey into the global economy. This policy framework is considered as the beginning of the neoliberal ideology and subsequent practices in public policy in Turkey (Öztürk, Nas, & İçöz, 2008).

[5]The Uruguay Round, which occurred in 1956, provided a forum for discussions on agricultural and intellectual property. The General Agreement on Tariffs and Trade (GATT) is a multilateral trade agreement aimed at promoting world peace through economic links. GATT was in effect until 1994 when the World Trade Organization (WTO) was established. The WTO's main goals have been to promote sustainable development, environmental protection, and to ensure that countries at varying stages of development, including the least developed economies, have a fair share of global commerce. TRIPS (Trade-Related Aspects of Intellectual Property Rights) is more of a concern in the context of biotechnology, as it clarifies the position of patents during the fight against counterfeit goods. TRIPS protects trademarks, geographical signs, industrial designs and models, patents, and know-how.

OPERATING "GOVERNMENTALITY" IN PUBLIC POLICY ANALYSIS

The applicability of governmentality in the public policy field was given little attention until the 2000s. However, neoliberalism changed policymaking by articulating itself within governmentality and reinforcing the knowledge strategies that were already appropriate (Burchell, 1996). Although neoliberalism can be defined as the actualization of legal and political practices according to the new market order, the duality between the market and state is not adequate to explain the neoliberal mechanism (Ören, 2015).

The neoliberal program aims at expanding market relations, thereby enhancing private sector control and subsequently decentralizing the role of the state (Sabuktay, 2008). Neoliberalism invites public policies to regulate and re-regulate the fields. It supports regulatory systems to ease collective entrepreneurship and cooperation as a part of neoliberal governance. Legal regulations make it easier for collective actors and individuals to enter the policymaking realm. Furthermore, these regulations bring each actors' knowledge structures into politics (Gilbert, 2008).

Within this regulatory context, the policy can be defined as "the general principles which guide the making of laws, administration and executive acts of government in domestic and international affairs" (Scruton, 1981, p. 358). Although conventional public policy studies rely on this general definition and distinguish among policy making and philosophy as well as doctrines, contemporary studies in the public policy field do not exclude the cultural aspect of meanings, codes, and actions associated with the policymaking process. If the policy-centered approach illuminates the public decision-making process about how concrete actions and steps are taken from the political arena (John, 2012), public policy should illuminate the policy process of immunization and vaccine policies through discursive practices.

This study employs Foucault's post-structural conceptualization of governmentality to understand vaccine and immunization policies. Conventional public policy research focuses on the role of government – its legitimacy and dynamic processes as well as the results of its policies, actions, and practices from an institutional point of view (Hewitt, 2009). A poststructural policy analysis is expected to illuminate the roles of actors and structures in the political process. This inquiry relies on the stability of the actors and a dichotomy where the post-structuralist approach overcomes this dichotomy and actors are presumed to be the outcomes of structures (Gottweis, 2003). However, the Foucauldian perspective introduces a critical perspective to examine the ways in which "problems" emerge in government policies and strategies (Lövbrand & Stripple, 2017). This kind of inquiry allows researchers to detect a tension or a mismatch, while examining why the policy is doing things differently from the past (Yanow, 2015).

Foucault's perspective perceives government as a regime of dynamic practices (Gottweis, 2003). Moreover, this perspective acknowledges numerous actors of governance (e.g., state and market), various strategies for governing, and that the

exercise of power is built on the deployment of knowledge (Gottweis, 2003; Rose, 2004). According to Foucault (1991), the central position of the state in public policy is called "governmentalization of the state." The state is the main mechanism and primary actor regarding population management. Within the context of neoliberal policies, however, the leading role of the state in knowledge practices and the exercise of the political power has been replaced by multiple stakeholders, such as market actors, international organizations, and consumers.

This study interprets the story of Turkey's vaccine and immunization policies through the concept of governmentality. To do so, it examines the country's main policy documents, namely the Five-Year Development Plans published by the State Planning Organization, Ministry of Development, and the Strategy and Budget Office between 1963 and 2019 (see Table 1). These Development Plans provide a summary of what was done during the previous plan period and include projections and visions for every five years. Since these plans have shaped Turkey's policymaking process in economic, social, and cultural terms, they play an important role in policymaking and affect the lives of individuals in relation to public health, immunization, and vaccination.

Within the context of document analysis, a dataset was created based on the identification of the following words or phrases: vaccine, immunization, preventive health and vaccine, biotechnology, and research and development. Furthermore, two analytical frames were employed to deepen the reading of the textual data:

(1) Knowledge production: Policies regarding production of the know-how of vaccine technology and production of the vaccines as end products are examined under this frame. This level of analysis deals with the know-how vision, market relations, and international actors.

Table 1. Turkey's Five-Year Development Plans.

Plan Number	Institution	Periods
1st Five Year Development Plan	State Planning Organization	1963–1967
2nd Five Year Development Plan	State Planning Organization	1968–1972
3rd Five Year Development Plan	State Planning Organization	1973–1977
4th Five Year Development Plan	State Planning Organization	1979–1983
5th Five Year Development Plan	State Planning Organization	1985–1989
6th Five Year Development Plan	State Planning Organization	1990–1994
7th Five Year Development Plan	State Planning Organization	1996–2000
8th Five Year Development Plan	State Planning Organization	2001–2005
9th Five Year Development Plan	State Planning Organization	2007–2013
10th Five Year Development Plan	Ministry of Development	2014–2018
11th Five Year Development Plan	Strategy and Budget Office	2019–2023

(2) Immunization: Policies regarding vaccination as an instrument of biopolitics are tackled as a complementary unit. These policies create intersection points between the population and governance.

These two frames interpret the knowledge production and how this knowledge is made part of governance in the context of immunization. The examination of the vaccine/vaccine know-how production process is the first frame, while the interpretation of the immunization policies serves as the second frame. In the context of production of the knowledge inquiry, the reader is supposed to reach conclusion as to how the integration of the knowledge of immunization, physicians' reports, digitalization, mother-child statistics, mortality, and vaccination rates become a part of government strategies. On the other hand, the second frame presents the examination of the national and international bases of policies on vaccine production and the vaccine know-how inscribed in governmentality.

FINDINGS

Governmentalization of the State (1963–1979)

The 1st Five Year Development Plan, published in 1963 during the transition to a planned economy, encompasses the 1963–1967 period. The production of biological information and the supply of products were centralized. The production of knowledge about vaccines and the reflection of this knowledge on practices were intertwined with the goal of centralization during this period. Within this framework, it was envisaged that multiple responsible institutions would be merged for the production of vaccine-related information and its transformation into an end product (State Planning Organization, 1963). Although the production of the vaccines was centralized under the *Hıfzıssıhha* Institute in 1928, the need for central control over the vaccines was incorporated as well. Understood as way to complete public health services, the School of *Hıfzıssıhha* was transformed into an institution responsible for conducting research and providing education on the subject of public health. This vision also promoted the establishment of a laboratory infrastructure for making bacteriological products. In this way, laboratory tools, such as growth mediums and equipment, would also be produced (State Planning Organization, 1963). Furthermore, "Vaccines and serum produced separately by the Ministries of Agriculture, National Defense and Health and Social Assistance would be collected in one place" (State Planning Organization, 1963, p. 413).

Investments and expectations in educational institutions for both the gathering of biological information from the field and the training of personnel as tools to produce the biological information, know-how, and vaccines were part of the 1st Development Plan. Health organizations, schools, and graduates from medical schools were given priority in terms of the need for trained personnel and capacity development to produce relevant information. As the number of graduates from medical schools increased, they were viewed as prominent actors in

the areas of vaccine production and policy implementation (State Planning Organization, 1963, p. 411).

The 1st Development Plan also deems the country's immunization policies as a success. "The war on infectious diseases among the public health services, which covers both immunization and environmental health, is quite successful" (State Planning Organization, 1963, p. 407). This "success" also shapes vaccines and immunization and the achievement of major targets such as the eradication of infectious diseases and implementation of health programs enabling home and outpatient care rather than expensive hospitalization (State Planning Organization, 1963, p. 39). The program for combating infectious diseases includes specific suggestions like "establishing an organization that will regularly vaccinate the tuberculosis-sensitive population, enable early diagnosis and home treatment" (State Planning Organization, 1963, p. 410). This programmatic approach was to be run by health centers, dispensaries, and hospitals under the Ministry of Health (State Planning Organization, 1963, p. 410).

The 1st Development Plan focused on the fight against infectious diseases to create a healthy nation. Mortality statistics were evaluated as an administrative part of the fight against infectious diseases. The government hoped that the share of high mortality rates as a result of childhood diseases could be overcome by first reporting outbreaks and subsequently vaccinating the relevant population. In this context, vaccination rates and stability in vaccine production were seen as important matters (State Planning Organization, 1963, p. 407).

The 2nd Five Year Development Plan (1968–1972) can be interpreted as the continuation of the first plan. The statistical results of centralization in vaccination showed that the program was successful. The equal spread of health services throughout the country became a policy focus and main vision with the Socialization Act (1961). These services paved the way for many targets to be set through vaccination. The discourse of fighting against infectious diseases was considered a "war" and associated with the safety of the population.

In light of its focus on fighting infectious diseases, the 2nd Development Plan emphasized vaccination campaigns. Although vaccination campaigns were carried out successfully, the plan criticized the lack of cooperation between the institutions responsible for the production of vaccines (State Planning Organization, 1968, p. 224). They were the leading actors responsible for organizing the fight against infectious diseases, while addressing major challenges. "The number of tuberculosis cases in our country is around 750,000 and this number constitutes 2.5% of the population. Eighty percent of these patients are of working age. Only 17% is under the control of dispensaries" (State Planning Organization, 1968, p. 335). The main means of overcoming disease within the scope of preventive health is vaccination via dispensaries and health centers.

A major focus was the health of the working population, especially within the context of tuberculosis (State Planning Organization, 1968, p. 220). In addition, the state was responsible for providing public health education; however, the existing educational processes were also criticized (State Planning Organization, 1968, p. 220). The state organized the vaccination campaigns according to the statistics collected from the field. In this respect, the implementation of vaccines

and vaccine-related practices in the fight against infectious diseases and within the scope of preventive health indicated the state power-oriented production of the vaccine.

As we move from the 2nd Development Plan to the 3rd Five-Year Development Plan, the government emphasized a significant transformative shift due to migration from villages to cities (State Planning Organization, 1973, p. 645). Following this transformation, the management of populations was subject to change, affecting immunization implementations. Parallel to harmonizing relevant processes with the European Economic Community (EEC), the universal expansion of health services was slowed down due to employment difficulties of health personnel (State Planning Organization, 1973, p. 91).

The 3rd Development Plan, which envisaged an improvement in general health services, did not clearly emphasize vaccines as products. Rather it continued to criticize the lack of mergence of drug preparations under one roof (State Planning Organization, 1973, p. 112). Thus, it seemed that the goals of previous plans were not achieved. Even so, the plan centralized the "public sector" as the main actor in health improvement, while the central role of the public was supported through measurable targets. Accordingly, "94.4% of the investments to be made in the health and other public services sectors will be made by the public sector and 5.6% by the private sector" (State Planning Organization, 1973, p. 167). Furthermore, the promotion of knowledge production for vaccines and immunization was set as an objective for the year 1982. However, political turmoil during the 4th Development Plan period did not make it possible in practice.[6]

Large-scale planning for immunization was not emphasized by the 3rd Development Plan. Instead, the focus was placed on the need and the comparison of the public health data with the European Communities. "In Turkey, the need to turn to preventive medicine services is more evident than in the [*European*] Common Market due to the young population, diseases resulting from malnutrition, the prevalence of infectious and epidemic diseases, high infant mortality rates and poor environmental health conditions" (State Planning Organization, 1973, p. 820). This comparison illustrates that Turkey had started considering economic and public health approaches used by the European Communities.

The 4th Five Year Development Plan (1979–1983) underscored the need to increase the production of vaccines and serum to meet new requirements within the scope of combating infectious diseases. It called for the development of policies related to epidemic and pandemic predictions. Furthermore, the plan's vision for vaccine production and vaccination is linked to animal health and calls for an increase in vaccine production capacity (State Planning Organization,

[6]Turkish political life was tumultuous in the 1970s. As a result of the Cyprus Peace Operation in 1974, Turkey faced a United States arms embargo. While the effects of the OPEC crisis were also felt in the country, the economy and political life went through a volatile period. Left-right divisions deepened and spilled over into the streets. This period came to an end with the 1980 military coup, which ended democratic government. Neoliberal policies were vitalized with the first elections after the coup.

1979, p. 59). Since the logic of import substitution was employed in the vaccine production processes, knowledge and practices gradually slowed down. The 4th Development Plan stated that the inadequacy in preventive health services and the intensification in treatment services had begun with the slowdown of providing universal public health services. Some of the main reasons for this inadequacy was blamed on the lack of governance, coordination, and cooperation.

While there was no major change in immunization targets, the 4th Development Plan reflected an important change in the perspective of public policy in terms of the need for the production of scientific knowledge. Unlike other plans, the 4th Development Plan emphasized Research and Development (R&D). Attention was given to the changing world order regarding the production of scientific knowledge. The "new order" was pointed out as a challenge in changing global political balances in the production of scientific knowledge. Despite the emphasis on the acquisition of the acquisition of know-how in the global market, Turkey cut a major share of the R&D budget designated for the medical field and universities (State Planning Organization, 1979, p. 48). Nevertheless, the plan signaled a discursive transformative change in the way the "vaccine" was treated in public policy. Vaccine production and vaccine know-how were no longer matters of public health, but rather a matter of research and development.

Neoliberal Governmentality: Relocating the State (1985–2002)

The 5th Five Year Development Plan (1985–1989) was prepared within the context of neoliberal policies and the remaining legacies of state-centralization. This plan diversifies the technology policy according to the country's economic policies, sectors, production branches, and the market to integrate it into the incentive system. The plan also called for the necessary investment in information technologies (State Planning Organization, 1984, p. 201). Although a framework for vaccination and immunization was not drawn up, the plan signified a break from conventional information and knowledge practices toward digitalization.

During the 6th Five Year Development Plan (1990–1994), Turkey implemented neoliberal policies in every policy field, including health. A look at preventive health shows that the objective was to provide accessibility and priority to preventive health services throughout the country (State Planning Organization, 1989, p. 3). Accordingly, the plan emphasized the need to re-setup vaccine and serum production regulations. This emphasis reflected the glitches Turkey had experienced in the efficiency of vaccine production, quality control, and distribution (State Planning Organization, 1989, p. 289). This plan also allowed multiple actors to participate in the vaccine production process. At first, these actors would get involved in the vaccine supply side. Then, the market actors would become the producers of governmental knowledge based on economic decisions. In contrast, the state's position was limited to providing the regulatory framework.

As the implementation of the neoliberal policies unfolded, the role of information as a component of political power underwent a significant change after this point. As the central position of the state changed, the production of biological information began to be evaluated within the market of advanced technologies, especially within the context of biotechnology. However, the transformation did not mean that the collection of statistical data as part of the governmental mechanism was completely abandoned. The state continued producing statistical data that was useful for immunization policies, the maintenance of the vaccine trade market, and the improvement of public health (State Planning Organization, 1989, p. 41). Finally, as the public sector maintained its strong position as a health services provider, it emphasized the significance of preventive health (Akar, 2019).

The 6th Development Plan sets general targets concerning advanced technologies. In this context, the plan was to provide comprehensive support in areas such as flexible production and coordination, advanced materials, biomedical materials and biotechnology. These goals were associated with Turkey's global market competitiveness and integration of related know-how into policymaking (State Planning Organization, 1989, pp. 72–73). Furthermore, intellectual Property Rights became part of the political vision in this period. As many patents were released within the context of the Uruguay Round, GATT, and TRIPS, Turkey saw the early 2000s as an opportunity to catch up with the changes in the global advanced technology market. Moreover, Turkey deemed it necessary to protect the know-how process with a mechanism equivalent to the legislation of the member states of the European Community (State Planning Organization, 1989, p. 243).

Starting with The Act on Socialization of the Health Services (1961), which emphasized preventive health and egalitarian access to health services, Turkey witnessed many debates about the transformation of the healthcare system. These debates stemmed from not achieving the main objectives of the Socialization Act. The 6th Development Plan period (1990–1994) led to inadequacy in preventive health services, causing backlogs in treatment. The goal of spreading preventive health services, including immunization services throughout the country is still on the agenda, but lacks details. This plan set the health indicator regarding the immunization rate at 75% for 1989 and increased it to 90% for 1994 (State Planning Organization, 1989, p. 290). Within the context of establishing communication and information databases, these targets were achieved in the next plan period.[7]

When knowledge is interpreted as becoming a tool of power within the scope of vaccination and immunization, there is no strict discursive categorization for immunization and vaccination. This shows that vaccination and immunization are not separated from other agendas in terms of public health and safety. The

[7]Governance of the population, immunization, vaccine coverage, mother-infant health, life-expectancy statistics appear in the Annuals of Health Statistics of the Ministry of Health.

main focus is the integration of Turkey in the international system in terms of world economies and human resources. This perspective, which is a part of population management, can be considered as another discursive break from a matter of health toward the development of human resources.

The production of vaccine knowledge, its practices and the impact of neoliberal policies and globalization on public health issues initiated a transformation in public policy discourse during the 7th Five Year Development Plan period (1996–2000). The 7th Development Plan emphasized the acceleration of privatization. The reason behind favoring privatization is shown as the state's new role in setting the governance rule to ensure competitive market conditions (State Planning Organization, 1995, p. 20). The plan suggested that Turkey use regulatory tools and privatization to solve long-time problems regarding vaccine and serum production (State Planning Organization, 1995, p. 47). Vaccines were considered biotechnological products affected by globalization, advances in technology, and epidemic risks.[8] In addition, the plan determined that the scope of preventive health and immunization remains exempt from privatization, while other organizations should be directed toward production and supply of biotechnological products (State Planning Organization, 1995, p. 42).

The 7th Development Plan, which emphasized the use of digitalization technologies, also criticized the circulation and processing of information. The infrastructure needed for producing and maintaining relevant health statistics and the technical capacities needed to communicate them could not be established at the desired level. As a result, this plan also emphasized the importance of primary health care services. It argued that preventive health has not been adequately improved with respect to basic health level indicators such as infant and maternal mortality as well as immunization rates (State Planning Organization, 1995, p. 13). These shortcomings are intensified by the lack of coordination, cooperation, and high costs. Rather than focusing on the fight against infectious diseases, neoliberal governmentality associates diseases with nutrition in relation to population management and family planning (State Planning Organization, 1995, p. 35). Therefore, in the fight against infectious diseases, immunization and vaccination have begun to move away from being the primary focus. On the other hand, the 7th Development Plan aims to accelerate the health system in terms of service delivery and efficiency, while setting targets based on immunization indicators (State Planning Organization, 1995, p. 41).

During the 8th Five Year Development Plan period (2001–2005) several health indicators improved, including the number of health personnel and utilization rates of hospital beds as well as infant mortality and vaccination rates. However, the desired levels were not reached (State Planning Organization, 2000, p. 244). This period led to the Health Transformation Program of 2003 – a series of health system reforms that included a change in the role of the Ministry of Health, social insurance, and a new organization of health services distribution

[8]The outbreak of HIV had an effect on policymaking on biosecurity under the term "risk" in the 1980s and 1990s.

approaches (Yaşar, 2011). The Health Transformation Program reimagined "vaccine" and immunization linking both to a new primary care organization. Although immunization was not subject to privatization, the Ministry of Health was now responsible for planning and controlling, rather than production.

Furthermore, the reorganization of health services introduced the family medicine schema and autonomous hospitals aimed at spreading primary care throughout the country (Yaşar, 2011). Drawing on the regulatory framework specified by the 1961 Socialization of Health Services Act, vaccination policies were categorized as part of the preventive health services under primary health services. This act ensures individual access to immunization services at no charge, thereby promoting egalitarian healthcare. In doing so, the state's central role can be described as a mediator. Debates on health system reforms escalated following the implementation of neoliberal policies in the late 1980s. Finally, with support from the World Bank the Health Transformation Program was put into effect in 2002 (Yaşar, 2011). This system is based on individual health follow-ups, thereby freeing the Ministry of Health from serving as the direct financial source (Hamzaoğlu & Yavuz, 2014).

The 8th Five Year Development Plan focused on flexible production modes that align with the potential foreign investments in vaccine production. Although the plan did not directly draw a framework for vaccines, they are managed under biotechnological developments and genetic engineering (Akar, 2019). New management approaches and flexibility are seen as opportunities to facilitate digital knowledge strategies necessary for the information era (State Planning Organization, 2000, p. 2). To minimize the possible biosecurity risks that may arise from biotechnological applications, legal, institutional, and practical arrangements will be devised within the context of a holistic approach. These arrangements were the regulatory duties of the state (State Planning Organization, 2000, p. 188).

The need for a regulatory agency was addressed during the 8th Development Plan period. Accordingly, the establishment of the Turkish Pharmaceuticals Agency was suggested to control and inspect the commercial products in the medical market, including the importation of vaccines (State Planning Organization, 2000, p. 123). Thus, the withdrawal of the state from its central position in the vaccine realm paved the way for related agencies to mediate knowledge with respect to society, market actors, and the state. Furthermore, this plan repeated the call to strengthen the *Refik Saydam Hıfzıssıhha* Center, which is the leading institution responsible for improving vaccine production capacity and transforming production and public health data into policy. It was envisioned as a national reference institution in laboratory and control services related to vaccines (State Planning Organization, 2000, p. 88).

This Plan aimed to develop important mechanisms for the vision of an R&D incentive strategy. Technology transfer and a need for regulatory cooperation between the private sector and civil society (as well as the EU and other

countries) came to the fore. Its vision can affect production activities in the biotechnology field and vaccines. Production is seen as part of the general advanced technology policy (State Planning Organization, 2000, p. 244). In addition, R&D activities aim to transform domestic resources into added values. Health research to improve the quality of life, especially vaccines and anti-serum, would be supported as a priority area (State Planning Organization, 2000, p. 75).

When evaluated within the framework of immunization, the 8th Development Plan emphasized infectious disease and maternal and child health data within the scope of preventive health services and prioritized prevention over treatment. However, unlike previous plans, preventive health services emphasized educational steps to raise awareness about healthy lifestyles (State Planning Organization, 2000, p. 88). This awareness education indicates a "responsibilization of the individuals" (Aykan & Güvenç-Salgırlı, 2015) as empowered subjects of healthcare. The 8th Development Plan also focused on information tracking mechanism with the aim of complying with international standards. Thus, the necessity of establishing a health database in accordance with international criteria was emphasized (State Planning Organization, 2000, p. 88). Within the framework of preventive health and public health, an internationally accredited database was employed, leading to standardization and digitalization regarding the collection, storage, and sharing of data.

NEOLIBERAL GOVERNMENTALITY OF IMMUNIZATION: "HOW?"

The Justice and Development Party (AKP), which came into power in 2002, opened up a new era in health care services. The government continued to implement the reform framework suggested by the 8th Development Plan based on the Health Transformation Program. The 9th Five Year Development Plan (2007–2013) paid attention to advanced technologies and digitalization. Information management and the integration of knowledge in governance were seen as necessities of the digital world (State Planning Organization, 2006, p. 5). Within the context of vaccines, one can observe that the state's role in the production of vaccines and know-how is regulation from a distance. The effectiveness of international regulations is prioritized because new biological knowledge draws on a neoliberal regulatory policy framework within the scope of biotechnological products (State Planning Organization, 2006, p. 5).

In the 10th Five Year Development Plan (2014–2018), the general objective was the implementation of the Long Term Strategy (2001–2023) and emphasis on "a Turkey that grows with stability, shares its income more equitably, has competitive power on a global scale, transforms into an information society, and has completed the harmonization process for EU membership" (Ministry of Development, 2013, p. 35). This represented a change in the general perspective of a planned economy. Turkey was envisaged as a country that had completed EU adaptation, globalized, and applied relevant international standards and regulations thoroughly. The main strategy behind the vaccine and immunization

policies was adopting an effective health system strategy (State Planning Organization, 2006, p. 88).

Positive statistics on child mortality and life expectancy in the 10th Development Plan caused a change in population management and subsequent health policies (Ministry of Development, 2013, p. 11). Within the context of this change, it is important to draw attention to the pressure on the health care system, shifting the main focus from immunization to combat infectious diseases and develop a healthy population to meet the needs of an aging population. New policies prioritized promoting healthy lifestyles and increasing the capacity for early diagnosis. The risk of contagious diseases as an epidemic and crisis was considered, but a general framework for immunization was not drawn up. In line with the 10th Development Plan, which indicated a global shift from infectious diseases to non-infectious diseases, the 11th Five Year Development Plan (2019–2023) did not include a detailed perspective on vaccination and immunization.

The 11th Development Plan mapped out a political route based on "the 2023 strategy" and a reference to the 100th anniversary of the Republic. It emphasized the development of infrastructure investments for vaccine and know-how production (Presidency of Strategy and Budget, 2019, p. 94). A vaccine production center was planned in cooperation with the private sector, encompassing veterinary vaccine production. Furthermore, the requirements for an R&D vaccine ecosystem can be evaluated within the scope of biotechnological products. "The necessary ecosystem will be created in our country in the fields of R&D, production, qualified human resources, and legislation, especially in areas requiring high technology such as biotechnological drugs" (Presidency of Strategy and Budget, 2019, p. 84). In this sense, production will be carried out by multiple actors, while the state provides the necessary resources and R&D support.

Finally, within the framework of immunization, migration was an important topic during the 11th Development Plan period because of the ongoing refugee crisis in the region and forced changes in the use and management of immunization-related information. The 11th Development Plan argued that after the humanitarian and emergency aid support provided to the population under international and temporary protection in Turkey, it is possible to benefit from public services in terms of education and health. Accordingly, a total of 180 migrant health centers were established in 29 provinces, and more than 5 million vaccinations were carried out between 2014 and 2019 (Presidency of Strategy and Budget, 2019, p. 23). These activities not only drew attention to vulnerable populations, but also to the new circumstances that may require new channels of governmentality of immunization in the newar future.

CONCLUSION

Governmentality studies in healthcare, especially with a focus on vaccines, argued for the displacement or withdrawal of the state from production. The

governmentality perspective questions the state's central position related to vaccine knowledge, production of vaccines, and immunization services. Until the 1980s, Foucault's argument regarding modern experiences of power appears to be valid. However, with the implementation of neoliberal policies, governmentality starts changing in the 1970s.

Analysis of the Development Plans illustrates that neoliberal governmentality displaced the state from its central regulatory function of producing know-how and vaccines. At first glance, the immunization policies and the way governance of knowledge is organized might appear to be a continuation. Indeed, the new institutional organizations provided by the 2003 Health Transformation Program allowed these institutions to be like market actors, even though they kept their ties with the state. The state's current role is to indirectly support the production of knowledge with respect to vaccine production and immunization. At this point, it is possible to deduce that privatization via neoliberal policies is reflected in knowledge production and immunization that were once part of "governmentalization of the state."

The neoliberal policies adopted by Turkey led to a division between vaccine policies and immunization policies. Governmentalization of the state had presented a holistic perspective on the management of the population as a preventive health matter before Turkey applied neoliberal policies. Centralizing the state in vaccine production, vaccine knowledge production, and immunization made the management of the whole population easier. However, neoliberal governmentality of immunization treats vaccines as commercial goods, while advanced technological know-how is produced according to global market rules. Therefore, it invites multiple actors (e.g., universities, investors) into the political realm and assigns the state a distant actor role responsible for ensuring well-functioning market conditions within the context of neoliberal governmentality.

Regarding current vaccine policies, we can observe Turkey's increasing interest in producing vaccines and know-how. Recently, Turkey's COVID-19 vaccine was listed on the WHO's Emergency Use Listing, followed by the approval of the adult tetanus-diphtheria vaccine. After years of inactivity in production, these might be serious attempts to recreate the vaccine production ecosystem in the near future. However, since vaccine policies are subject to the general technology policies, integrating the progress in production with immunization (especially after the empowerment of consumers as subjects) may require time. At this point, improvement in the capacity of vaccine production is not going to be a turnaround for the governmentalization of the state, but it is going to require new techniques to manage populations. Future studies may take this study's findings further by focusing on the empowerment of the subjects in neoliberal governmentality and looking at the ways consumers can engage in immunization policies.

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