THE IDOLS OF MODERNITY: THE HUMANITY OF SCIENCE AND THE SCIENCE OF HUMANITY

by

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Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

MASTER OF ARTS IN SOCIOLOGY

THE UNIVERSITY OF TEXAS AT ARLINGTON
May 2015

Acknowledgements

My thesis committee deserves many thanks for guiding me to this point and helping me keep my sanity in the process. I am grateful for the assistance of my thesis advisor, Ben Agger, who aided in the conception and execution of this project while providing sage advice regarding the fascinating and often strange world of academe. It has been an honor. I also appreciate honest and beneficial feedback regarding both this project and a career in sociology from thesis committee member Beth Anne Shelton and Sociology graduate advisor and thesis committee member Heather Jacobson, without whom I am sure I would not be writing these words today.

Over the years I have been at UT Arlington I have shared in the triumphs and struggles of both undergraduate and graduate studies with colleagues and friends too numerous to mention. I am indebted to each and every one of you, but it would have been a far more difficult journey without the assistance and support of Mary Faye Hanson-Evans and Jamaica Kennedy. Sociology faculty members past and present Dana Dunn, Jason Shelton, Linda Rouse, Robert Kunovich, Chunping Han, Bob Young, and my late mentor and professor Denny Bradshaw from philosophy, you have inspired me on the journey toward this moment. Thank you. Thanks also to Mark Graves and Patricia Woodward of the Sociology and Anthropology department staff, who have helped me adjust to academic life as a teaching assistant and helped me stay organized and on track through my graduate studies.

I would (quite literally) not be here without my parents, Cindy and Lou, who were always there for me growing up, through a long and winding labyrinth of tenaciously-sought goals and semi-quixotic dreams alike. I hope my niece and my three nephews

will pursue goals and dreams of their own, guided by loving, supportive families in the years to come. Thanks for being there, all of you.

Most of all, I am grateful to my wife Charline, who has put up with me for the past fifteen years and all the aforementioned goals and dreams. Thank you for your love and support, especially on those days when I spent all my waking hours staring at books and computer screens constructing this and other works. You have believed in me and stood by me through all the triumphs and pitfalls of graduate education, and life. I love you.

April 8, 2015

Abstract

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The Idols of Modernity draws upon the work of early thinkers in the sociology of knowledge such as Karl Mannheim in an effort to delineate the history of--and unmask the ideology behind--many of the formative aspects of scientific knowledge that enjoy both a central and potentially controversial role in the twenty-first century. In touching upon the role of imagination and speculation in the 'hardest' sciences, normative disputes between biological and social sciences, and the intellectual history of modern science, I attempt to reveal the humanity of science. In examining the democratization of the written word, the profound consequences of language as disciplinary gatekeeper, implications for the humanities and sciences of a methodologically pluralistic sociology, threats to human agency issued forth by the trend toward medicalizing deviance, and finally, the role of the intellectual in society and history, I probe the promise, and problems, faced by a science of humanity.

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Chapter 1

From the Sky and From the Ground

> [The sociologist] must not forget that, if, like any other scientist, he tries to contribute to the construction of the point of view without a point of view which is the point of view of the scientist, as a social agent he is caught up in the object that he takes as his object, and that in this capacity he has a point of view which does not coincide either with that of others or with the bird's eye view of the quasi-divine spectator which he can attain if he fulfills the demands of the field. He knows therefore that the particularity of the social sciences requires him to work towards constructing a scientific truth capable of integrating the observer's vision and the truth of the practical vision of the agent as a point of view which is unaware of being a point of view and is experienced in the illusion of absoluteness.
>
> – Pierre Bourdieu, *Science of Science and Reflexivity*

My paternal grandfather was a test pilot in the Air Force during the Cold War. I can think of few more exciting, or dangerous, jobs. As a kid I wondered what the world looked like as viewed from the camera lens of a high-flying reconnaissance aircraft. In a sense, sociology can offer such a perspective of the world; a view from above. Individuals might fade from view, giving way to the crisscrossing latticework of power lines and roads, the patchy green polygons of agriculture and parklands interspersed with the gray and brown of buildings. I do not remember the first time I saw the world from the stratosphere, the day my parents, infant sister, and my beloved cat Sasha got on a plane in my birthplace of Milwaukee, Wisconsin with little more than the clothes on our backs. My father, a mechanic, and my mother, a machinist, had been the victims of what I later learned was called de-industrialization. Their jobs had been effectively moved elsewhere, perhaps overseas, where people might be willing to work longer hours for lower pay under more lax safety regulations. It was the first time I had experienced the social world as a force much bigger and more powerful than my proud blue-collar family.

I never got to ask my father's father what it was like on those high-flying missions—he died long before I was born. My maternal grandfather was a Marine; he was in Western Europe during the Normandy invasion that precipitated the end of the Nazi regime. He was among those who liberated the concentration camps. I did not learn what he had been through until after he was gone, but I realize that his view of the world would have been far different than my test pilot grandfather. He would not have seen the latticework or the polygons but the people that inhabited them, lived in them, died in and for them. There is a sort of enduring order from above that is absent on the ground, and I can only imagine how absent such order must have seemed in Western Europe toward the end of World War II.

Though my grandfathers each saw the same planet earth, they saw it at different times, and in fundamentally different ways. The test pilot, an officer, saw the world from above, as a depersonalized whole, while the Marine, an enlisted infantryman, saw the world from below, as a deeply personal and harrowing struggle. One of the challenges of sociological theory is how to reconcile these two perspectives with one another. This work is, in essence, about such disunities of perspective, which were eloquently conceptualized by the founder of sociology of knowledge Karl Mannheim as Ideology and Utopia in a book by the same name: "The concept "ideology" reflects the one discovery which emerged from political conflict, namely that ruling groups can in their thinking become so intensively interest-bound to a situation that they are simply no longer able to see certain facts which would undermine their sense of domination" (Mannheim 1936:40). From above, one sees the structures, both complex and orderly, but is apt to miss the individual sacrifices that have made them what they are. Such a perspective could lead one to believe in a sort of stability, an impersonal status quo not shared by those below. This view of the world can make macrosociologists seem distant, even cold, whether

writing of world-historical forces or collecting and analyzing large-scale statistical data sets. Yet as societies become larger and more complex, as their structures have greater power to shape lives, such a perspective becomes vital.

On the other hand, "The concept of utopian thinking reflects the opposite discovery of the political struggle, namely that certain oppressed groups are intellectually so strongly interested in the destruction and transformation of a given condition of society that they unwittingly see only those elements in the situation which tend to negate it" (Mannheim 1936:40). The view from the ground reveals the same world seen through different eyes. From here, personal narrative abounds. The world appears not in terms of structures but in terms of human lives. Each of us is a long and complex story, so to speak. For my mother's father, a concentration camp was not just a structure built of brick and stone and barbed wire—it was a chamber of the unspeakable to which he and the Allied troops bore witness as they advanced. They must have wondered how human beings could have built such a structure, or put it to such a nightmarish purpose. Hence the tension between the view from the sky and the view from the ground to which Mannheim drew attention: we see the social world differently depending on our position within it.

Whether or not a person has ever studied sociology, predictable exchanges occur between ideology and utopia, between the view from the sky and the view from the ground. Those who see from above accuse the others of personalizing, of subjectivity, of allowing emotional appeals and anecdotal evidence trump factual analysis. Those who see from the ground accuse the others of being heartlessly objective, willing to reduce suffering to mathematics and speculation in the name of preserving impersonal structures. Ultimately those who took up Mannheim's vision of the sociology of knowledge claimed that Mannheim did not go far enough; for he had insisted that, "his

theory of knowledge is really only a theory about social knowledge and beliefs. He effectively excludes knowledge of the natural world, or at least that ordered and obtained by modern scientific methods. In this way, Mannheim steps back from the radical possibilities of his own thinking" (David 2005:7).

A few thinkers who had seen the atrocities of the Third Reich firsthand began to believe that in the soil of modernity, with its emphasis on efficiency and a mentality that favored calculated means-ends rationality, grow the seeds of events such as the concentration camps. Science had, for them, been poisoned by economic and political interests, and had become a source of a new sort of calculated barbarism. In the Dialectic of Enlightenment, these ideas were eloquently put forth by Max Horkheimer and Theodor Adorno (2002), who, among others of the Frankfurt School, escaped the Nazis and came to the United States. Not all of them made it--their colleague, Walter Benjamin, committed suicide rather than face capture (see Lemert 2002:81-3).

As the sociology of knowledge took shape, it did so in a world that had survived World War II and the development of the atomic bomb only to become locked in a cold war between the United States and the Soviet Union. This bloodless enmity served to raise suspicion among United States citizens of anything affiliated with communism or its alleged founder, Karl Marx. In fact, the notion of ideology can be traced back to the work of Marx, and both Mannheim and the Frankfurt School drew on Marx's work. Later work in the sociology of knowledge evolved in large part as a criticism of their approaches. There emerged an insistence on 'opening the black box' and peering inside—it was not just the way science was used that came to be a subject of sociological study, but the findings of science themselves (Webster 1991).

This might at first seem strange: a science of science? A scientist who studies other scientists? What would such an effort entail, and why should it be undertaken?

And what do my grandfathers, World War II, or the Cold War have to do with the sociology of knowledge? It has been a quarter of a century since the fall of the Berlin Wall and what culminated in the end of the Cold War. I was in elementary school then, a rather ordinary boy with a few good friends and no real enemies who spent the vast majority of my time with my head in a book. My interests changed several times, usually every few years--back then it was dinosaurs that fascinated me, and it was all I wanted to read about and talk about. I remember learning about geologic time, the billions of years from the Precambrian to the Tertiary period; about the fearsome Dimetrodon who lived before the dinosaurs, a bloodthirsty carnivorous reptile with a massive fin on its back; the Protoceratops of the early Cretaceous period, who was the ancestor of Styracosaurus and the well-known Triceratops; the giant carnivorous Allosaurus and Tyrannosaurus Rex; the Ankylosaurus, like a giant armor-plated turtle…the idea of a wall through the center of the German capitol and the significance of its collapse, somewhat ironically, were mere abstractions, far distant from these realizations of how impossibly ancient the Earth is, how the universe began with a massive explosion, how the elements that make up all living things were forged in the fires of dying stars, and how different species evolved over time into new species, one of which, millions of years after the dinosaurs had gone extinct, was human beings.

I was many years older when I began to see how those old natural history books were connected to political, historical, philosophical, social, and economic forces. Ideas that seemed at once fascinating and innocent to that boy took on new and strange lives in the society around me. Some of them came under fire from religiously orthodox people who believed that the scientific account of natural history was not compatible with Scripture—raised in the Roman Catholic Church by parents who encouraged my curiosity and answered my many questions, it did not readily occur to me that I had stumbled upon

the fodder for a centuries-old conflict between scientific unity and religious orthodoxy. Similarly, when I say the origins of the sociology of knowledge bear the stamp of Karl Marx, some might decide they need read no further, for his is a name that invokes widespread infamy in the United States.

Yet I am no radical. Science has been a part of my life since I was very young; I will attack neither its findings nor its methods but will focus instead on the sort of sociological drama that plays out around it. Nor do I wish to join the chorus of scholars who have made careers out of attacking religion. I do not write to foment revolution, against religion, science, or capitalism, though they, like any other human system, are not without their foibles, some of which will become evident in what is to come. I am convinced that Mannheim and to some extent the Frankfurt School were onto something; the sort of polarization Mannheim saw in his time is reflected in my own, and the fears expressed by Adorno, Horkheimer, and other critical theorists regarding this sprawling modern technocracy were not unfounded. A growing rift between science and storytelling, between skepticism and wonder, between the personal and the impersonal, between the view from the sky and the view from the ground, has made itself manifest. Yet each of us need both points of view. Without the view from above, we become dogmatic, small-minded; unable to separate ourselves from ourselves and see the world in terms of more than what we personally expect of it. Without the view from the ground, we become callous, arrogant—oblivious to individual lives and realities.

For the purposes at hand, knowledge will be treated, in effect, as a widget, a commodity. It can be produced and consumed; it is bought, sold, traded, and shared. Knowledge can be cheap or expensive (in more ways than one) and its production and consumption is shaped by the political ideologies, religious traditions, various social forces, and the present or anticipated human needs, which are themselves byproducts of

larger cultural and historical contingencies. Knowledge can be constructed to serve specific purposes, repaired or replaced; even retired from service when rendered obsolete only to later be given new life by those who seek to pull it from the world-historical junkyard and restore it.

It would have been scandalous once to say such things; now it is almost a cliché. Do I mean to suggest that reality is an illusion? No. In this sense I believe the sociology of knowledge has a great deal in common with the sociology of religion. Studying religion sociologically, as textbooks for undergraduates never seem to tire of reminding us, means looking at religion as something human beings do without implying anything one way or the other about the truth of religious traditions or beliefs. Similarly, studying knowledge as something human beings do presupposes no necessary philosophical carry-on baggage. We can effectively sidestep the perennial philosophical quandaries about what really is Knowledge or Truth or Reality in order to examine how human beings do knowledge, and how what we know shapes what we become and how we interact with one another.

To use another analogy: I do not need to know the internal workings of a computer in order to study how they are bought and sold or how they shape our lives—I can examine the sociological drama that unfolds around them without being able to build or even fix one. But why employ sociology rather than epistemology (philosophical theory of knowledge) to understand knowledge? I like Howard Becker's answer: "Like many other philosophical disciplines, epistemology has characteristically concerned itself with "oughts" rather than "is's," and settled its questions by reasoning from first principles rather than by empirical investigation. Empirical disciplines, in contrast, have concerned themselves with how things work rather that what they ought to be, and settled their questions empirically" (Emerson 2001:318). This examination is generally about what

knowledge is rather than what knowledge ought to be; how knowledge is treated rather than how knowledge should be treated. As will be seen, it is not always so simple to separate is and ought; fact and value, itself another enduring sticking-point within sociological theory. I offer up this caveat in the hope of generally if somewhat imperfectly keeping me from stepping on the toes of philosophers.

Yet this work is in a sense a conceptual analysis, and one of the first things many philosophers do when conducting a conceptual analysis is to begin with working, commonsense definitions. Having trained in philosophy before sociology, old habits die hard, I suppose. An idol is defined in several ways, including "any object of ardent or excessive devotion or admiration" (Webster's College Dictionary 2002:709). The title serves as a tribute to Sir Francis Bacon and his four Idols, social and ideological biases, which might lead to false knowledge: Idols of the tribe, idols of the cave, idols of the marketplace, and idols of the theater (discussed in Gould 2003:109-12). Bacon, one of the founding fathers of modern science, recognized that we could be easily misled in our endeavors, particularly what have come to be known as scientific endeavors, by the definitively non-scientific forces we confront within ourselves and our society. I also pay homage to Max Weber in this choice of title, who in "Science as a Vocation" refers to different types of idols, noting that "whether we have scientific inspiration depends upon destinies that are hidden from us, and besides upon 'gifts.' Last but not least, because of this indubitable truth, a very understandable attitude has become popular, especially among youth, and has put them in the service of idols whose cult today occupies a broad place on all street corners and in all periodicals. These idols are 'personality' and 'personal experience'" (Weber 1946:139). Weber saw it coming too. The view from the sky and the view from the ground.

If one can study non-scientific forces bound up in the production of (particularly scientific) knowledge, such forces should be equally evident in the sociology of knowledge. I have already touched upon some of Mannheim's views regarding the political and economic realities that necessitate the development of sociology of knowledge. Historical and social forces loom large as well. "Only in a world in upheaval, in which fundamental new values are being created and old ones destroyed, can intellectual conflict go so far that antagonists will seek to annihilate not merely the specific beliefs and attitudes of one another, but also the intellectual foundations upon which these beliefs and attitudes rest" (Mannheim 1936:64). If I had to offer a single reason for pursuing this project, it is that I hope to elucidate the growing polarization as we succumb to the lures of ideology and utopia, to Bacon's or Weber's idols. We view the world from the sky or from the ground. We become stuck. We allow personal anecdotes to trump expert knowledge, or we permit hypothesis testing to devalue human experience, when often the circumstances are significantly more complex.

This is not a work of science so much as a work about science. I hope instead to forge meaningful connections between the broadly-conceived and still-nascent discipline of sociology and the rest of human knowledge-seeking endeavors through fruitful interaction and mutual respect. In the first half of this work, I will explore the humanity of science, shining a light on the human side of the 'harder' sciences in order to belie some of the stereotypes that have become public fixations, revealing the imagination, creativity, passion, conflict, and sometimes luck in what has come to be called science. In the second half I will examine the science of humanity, illustrating how knowledge is transmitted, why it is difficult for the sciences and the humanities to talk to each other, and what is at stake in the debates over medicalizing human behavior. In the process,

contingencies are unearthed whose full manifestations, however glorious or horrifying, lie in wait at some unknown future time.

Sociological theory is, in at least two senses, a sort of science fiction. One first gets the sense that such a project involves envisaging a future that has not yet come to pass, drawing upon past information and insights by others to envision potentialities meaningfully different from the present. There is also something at once self-transformative about such a project: “The aim of this approach to writing sociology—or doing science, in a different language—is self-understanding, self-insight. The assembled self, in understanding its domination by external social forces, can rewrite the story of its life. Its sociology is a self-account, but an account that leads beyond anxiety to agency through the vehicle of authorship” (Agger 2002:10).

There is something deeply liberating about coming to see oneself both from the sky and from the ground. Each perspective complements the other. We are an amalgam of both; we must come to see both the personal and the impersonal as elements of a continuity only imperfectly perceived.

Chapter 2

Space, Time, and the (In)finite

> As the area of our knowledge increases, so does the perimeter of our ignorance.
>
> - Neil deGrasse Tyson, *Space Chronicles*

If it's powered by burning fuel or it transmits information, physics ultimately had something to do with it. If it takes to the air or catapults machines and spacesuited human adventurers into space, physics ultimately had something to do with it. It would be hard to overstate what physics has accomplished since Copernicus and Galileo theorized that the Earth orbits the sun. It is equally easy to see why many of the other disciplines in academe might seem to be suffering from a kind of "physics envy," emulating both the methods and the staggering successes of this broad and diverse field of study. In the academy, physics is the teacher's pet, the student who seems to ace all the exams, and one can almost imagine the sanctimonious instructor gushing, "Look at what physics can do. Look at what physics has done. Physics shows such promise, such potential. Why can't you all be more like physics?"

The discoveries of physics have large-scale implications for science, knowledge, and humanity as a whole. There are four ‘widgets’ that are at once uniquely potent and potentially controversial, hallmarks of modernity: mathematics, reductionism, determinism, and the advent of the computer. When I use the word ‘widget’ I do so in the same sense that businessperson might, as a sort of generic product or device that is to be bought or sold. Knowledge has, for better or worse, become a commodity, and every day it seems like less of a stretch to refer to ‘knowledge-widgets’; mental sound bites or abstract consumer goods. Yet there is also a cosmological story to be told by the

conclusions of physics, a narrative that stretches from the beginning to the end of space and time, with far-reaching implications for how human beings see themselves in relation to the universe. Given the above observations, what is the source of tension between physics as a whole and the rest of human endeavor?

There are many reasons to object to this, or any, broad conceptions of 'physics'. There are, after all, many, many sub-fields of physics from which these data emerge, each of which employs different tools to study the universe. I do not pretend to hold the requisite expert knowledge to compare these various sub-fields with one another, and even if I did, this is an enterprise that would constitute at least a volume to itself. Nor do I seek to make an argument for or against any specific interpretation of the data at hand—I seek instead only to tease out the socio-historical sources of a broad and growing sense of tension in the modern world.

2.1 The Widgets of Physics

Your credit card has a 15.9% annual percentage rate. The meeting starts in 15 minutes. Your car gets 40 miles per gallon of gasoline. Mathematics almost enjoys a sort of ubiquitous privilege, to which sociologist Max Weber referred when discussing science and the modern world. He called it rationality (Weber 1964 [1922]). In fact, the word 'rational' has crept into our language, taken to mean someone who values facts over opinions and thought over emotion. Originally the word 'rational' referred to something that can be expressed as a ratio between two numbers (Sagan 2013:195). In mathematics, the phrase 'irrational' is still assigned to numbers like the square root of two or the infamous pi which contain an unending, non-repeating sequence of decimals. The society in which we live, and many of the things in it which we take for granted, simply would not exist without mathematics. And physics, as a field, occupies a close proximity

to mathematics, an intimate relationship with this revered symbol-system that has succeeded in bringing order to the ever-greater complexity of the world. We tend to view mathematics as a bastion of certainty, while those who deal in higher-order mathematical functions or statistical analysis know better. In a world in which more and more phenomena are counted, enjoying a proximity to mathematics, and the abilities that arise from it, conveys a certain prestige to physics. Conversely, in the social sciences, the quantitatively-inclined are often viewed as more employable both within and outside the university than their less numerically-oriented peers. The order mathematics imposes upon the world is real; but the certainty is to some extent, illusory, an outgrowth of life in a world dominated by numbers.

Consider: how might you communicate your intelligence to a sentient being from another planet (Sagan 1994:286-301)? Would you use the first six prime numbers—2, 3, 5, 7, 11, 13? A Shakespearean sonnet? A recipe for chocolate cake? All three demonstrate a pattern that could be recognized and possibly discerned. But only numbers are assumed to have been freed from certain particulars that would make love poetry, however moving, or desserts, however tasty, less translatable to those who do not share our sensibilities regarding romance or cuisine. In spite of the common refrain that math is complicated, numbers actually serve to simplify the mind-boggling complexity of the universe (even if they might not be as appealing as chocolate cake).

Discussing the conclusions of physics requires the repeated use of the word ‘billions’—thousands of millions—of years, of stars, of galaxies, of atoms. We live in a world in which some people are said to be ‘worth’ billions of dollars. But it is difficult to conceive of how vast ‘billions’ are on an everyday scale. We are superficially familiar with big numbers, and perhaps they begin to take them for granted without pausing to ponder the scale involved. I recall, when I was about eight years old, getting up late at

night to complain to my parents that I could not fall asleep, a common problem for me then and now. My father suggested that I go back to bed and 'count to one thousand.' A little over ten minutes later, I returned: "I counted to one thousand, dad. Now what?" He laughed and shook his head, apparently hoping this trick would help me fall asleep. Consider that if it takes about ten minutes to count to a thousand, it would take a thousand times ten minutes to count to one million. Ten thousand minutes is about 167 hours, just shy of one week. One billion is one thousand millions. If you counted as a full-time job, 40 hours a week, it would take over 80 years to count to one billion (I am by no means the first, or only, person to attempt this experiment in my youth. See Graffin and Olson 2010). Physics offers a humbling new sense both of the vastness of the universe and our place within it.

Physics is also well-known for its unabashed adherence to a doctrine of reductionism (Weinberg 1992:51-64). Reductionism has of late become a dirty word among many circles, though it is at first glance unclear why (Davies 1983:58-71). There is something deeply intuitive about the notion that a good way to figure out how something works is by taking it apart and examining its workings. Consider a single human being. You are made up of organs and tissues, which are in turn made up of cells, which are composed of genetic material, which is composed of organic molecules made of atoms made of subatomic particles made of quarks. We can view each stage of reduction as a level of analysis, and meaningful things can be learned at each step of the way.

While in practice taking a live human being apart to see how he works would only serve to get you a long prison sentence, the principles of reductionism can be thusly illustrated. But taking things apart and putting them back together is only one way of figuring things out. We might also be inclined to look at a bigger picture, to view how, in

turn, the human being is part of a family who inhabit a community in a city in a nation on a planet in a galaxy. We can derive meaningful insights from traveling in either direction, but sociology, and in particular social theory, in studying large-scale interactions between human beings tends toward an antireductionist bent. This does not mean that I wish to join the shouting chorus of those who use the word 'reductionism' as if it is a black magic curse, but I do intend to underscore its impact.

The third widget given to us by physicists is a notion which I will refer to as determinism, another concept that has earned an at least partly undeserved bad reputation. Gravity applies across space and time, as does the speed of light. We can count on things that are sufficiently massive attracting other smaller objects to them, and we can count on light traveling about 300,000 kilometers per second. It was ten billion years ago as it is now, and will be ten billion years into the future. Determinism makes the predictions of physics possible, and therefore much of its success. We use the word cosmos to indicate the universe itself, a word that arose as the ancient Greek opposite of chaos (Sagan 2013:80-1). What has been achieved by the forces of mathematics, reductionism, and determinism, is a grand understanding of the universe, an orderly 'view from the sky'. The trade-off is that we increasingly find ourselves living in a universe ruled by impersonal laws, and this, as we shall see, has the power to irrevocably change the way we see it from the ground. Can mathematical formulae and observations of distant astronomical phenomena provide personal hope, inspiration, and meaning? Will a universe, filled with everything from quarks to superclusters, understood beginning to end in terms of impersonal laws still be in some way humanly significant?

A fourth consideration, to be discussed at length in Chapter Four, is the advent of the computer, and with it, the power to conduct calculations with unprecedented speed and accuracy. Social scientists readily appreciate the value of computer modeling,

particularly quantitative social scientists. Who wants to calculate the average for a sample of 2,000 by hand? Similarly, much of what modern physics can determine about the universe is aided substantially by computer modeling. At the end of a star's life cycle, for example, it stops fusing hydrogen and begins to fuse helium. At this point, the star swells to many times its original size. The equations work, when plugged into a computer—the star swells up as expected--but the math is so complicated astrophysicists are unable to isolate every effect that goes into making a star swell like this (Comins and Kaufmann 2000:288). The development of ever more expansive technologies to expand the scope of the sciences, as well as determinism, reductionism, and mathematics, will find their way into this and other chapters.

Physics is gradually closing the circle, connecting the very large and the very small with stunning success, leaving us to stand somewhere in the middle as members of a civilization that has had to begin to find ways to retell its own story. Who are we? We cannot answer this question readily or wholeheartedly simply by appealing to our constituent parts. We must inevitably also travel in the other direction. We have these tools, these widgets. When applying them to the world, to the universe, around us, what do we see? Looking beyond the mathematical, reductionist, determinist approach to understanding the universe and our place within it, what is the story that physics tells?

2.2 The Demotion of Humanity

A new brand of mythos has been brought to life by the findings of the physicists, a cosmogony deeper, darker, and in many ways, stranger than those it stands to supplant. Science has taught us that we are puny creatures on the scale of the universe. But this revelation, on the very cosmic scale that in significant part contributes to this perception, is quite new. "The first hominids resembling modern man appeared on this

planet around forty thousand years ago, about four-millionths of the current age of the universe. To calibrate the extent of human existence, imagine that the alpine monument of Everest represents the entire span of time that our universe has lived. Humanity's share of that time span is marked by one inch of powdery snow dusting the summit. Just as we might hesitate to conclude that Everest exists to support that thin frozen layer, we should be similarly cautious in assessing humanity's role in the cosmos" (Adams 2002:192). But it was not always this way. In the year 1650, Archbishop James Ussher diligently calculated that the earth was formed, according to a literal chronological reading of the Bible, on October 24, 4004 B.C. The starting point for what became known as the Ussher chronology was the beginning of the book of Genesis, which chronicled a six-day creation followed by God's rest on the seventh. Ussher interpreted this as a succession of seven twenty-four hour days, using the genealogies contained elsewhere in the Bible as well as a host of additional historical literature to determine the age of the cosmos (Numbers 2007).

The Hindu Upanishads offer a cyclical universe some two billion years old (Kurien 2007:27-30). Current scientific estimates place the age of the universe at just under 14 billion years of age, while the earth is approximately four and a half billion years old. It should be noted, too, that like the Ussher chronology, the Upanishads have recently led to the rise of a Hindu creationist movement that stands in opposition to both the Christian creation science movement and the scientific findings regarding the age of the earth and universe (Nanda 2003:119-22). Thousands or billions? What is the difference in the ongoing daily struggles of our lives in the twenty-first century? In order to answer this question we might turn to a classical definition of religion proffered by Emile Durkheim which describes religion as an inherently social phenomenon, conceiving sacred objects and ideas as set apart from the everyday, profane world, as existing

outside of space and time (Emerson, Mirola, and Monahan 2011; Durkheim 2010). For some Christians, the entire truth of Biblical Christianity stands or falls on the basis of the literal historical interpretation of a young earth and a divine creation in six literal days no matter what contradictory evidence is found (Morris 1963). These stories are sacred—they must at least be reinterpreted in light of new evidence. Time is not simply a unit of measure, hands ticking steadily around a watch face. It relates us to our past, to our ancestors, to our gods. We occupy such a small role in the new cosmic drama, like an actor who steps onto the stage in the final act, issues a single poignant line of dialogue, and then disappears as the curtain falls.

When staring into space, the distances are so vast that a new unit had to be formulated: the light-year, the distance light travels in a year. We inhabit a universe that is billions of light-years across. What does this mean? If light travels approximately 300,000 kilometers (or 186,000 miles) in a second, and there are about 31 million seconds in a year, then a light year is about 9,467,280,000,000 kilometers (or about 5,869,713,600,000 miles)! Remember how large one billion is, and consider that these numbers represent trillions--thousands of billions—of kilometers/miles. The universe, at least the parts of it we can see, is billions of light years across. Consider: how far is the farthest you have ever traveled from your home? Such distances can perhaps be measured in thousands of kilometers or miles.

Our ancestors, not so long ago, imagined a universe in which the earth was the center. In some traditions, the earth was a flat surface surrounded by the planets and stars. In others, the earth was a sphere surrounded by the stars and planets. The vast scale of the cosmos is beyond the reckoning of even our recent ancestors. Perhaps, all things considered, it is beyond ours as well. We can say “nearly six trillion miles,” but

such a scale is difficult to comprehend. One is tempted to hazard a provocative question: could all this really exist for the sake of us?

It is a tragic oversimplification to view the cosmogonies of the world as inaccuracies to be remedied by the advancement of science. We must view the age of the earth and universe as set out by holy books not in terms of simple numerical inaccuracy—these are part of a sacred cosmogony, a creation epic that sets human beings apart from the rest of the universe. Even though our view from the sky is increasingly defined in the terms set out by physics, what of the view from the ground? We might, for the purposes of what is to come, adopt the Lutheran theologian Peter Berger's definition of religion as "the audacious attempt to conceive of the universe as humanly significant" (Emerson, Mirola, and Monahan 2011:9). These sacred cosmogonies offer humanity the part of the lead actor, not the one-liner; a universe 'made for us' that has come to be increasingly at odds with scientific knowledge (Sagan 1994:20-55). In the orthodox Judeo-Christian view, for instance, the universe has been created specifically for us, by a God who loves us, who guides us, who answers our prayers, and who is immanent in our everyday struggles. In the vastness of space and time, God cares about us. This is not a question of evidence so much as it is a question of meaning. But it is a story that is often framed as an epic historical struggle between two great ways of seeing the world and our place within it.

This story usually originates with Galileo, Copernicus, and their determination that the Earth was not the center of the universe. In fact, it is difficult to find a popular physics or astronomy book that does not reference Galileo. "When Copernicus first suggested that the earth was in motion around the sun, he was publicly mocked. But when Galileo with the aid of his telescope tried to show that Copernicus was right, the attitude of the opposition passed from scorn to hostility. From the time of Galileo's

discoveries in 1610 until the decision of the theologians in 1616, only six years had intervened. To ask the abandonment of philosophical, exegetical and human tradition in such a short time was, in the circumstances, asking too much" (Langford 1966:160). Galileo has been built up as a prophet of science, a harbinger of the Enlightenment and modern astronomy, and a hero of freethought valiantly resisting the dogmatism of the Catholic Church.

Unsurprisingly, there are varying accounts of what Galileo actually did, and how the historical events occurred, that might be unrelated to the mythos that have been built up around him. For Paul Feyerabend (1987), the trial of Galileo was “a minor event in the historical context of the time. Galileo had given a promise, had broken his promise, and tried to hide behind lies. A compromise was sought, and a compromise was found. Galileo continued writing and continued smuggling contraband out of Italy…but modern scientists, needing a hero and regarding scientific knowledge as inviolate as the Church once viewed the Host, turned the tribulations of an anxious crook into a clash of giants” (Feyerabend 1987:108-9). Stillman Drake (2001) offers a reading of the Galileo narrative that suggests he remained a Catholic and faithful man until his death, under Inquisition-ordered house arrest, in 1642. Drake makes a compelling case that Galileo was, in fact, sincere in his zeal for the faith, and that Galileo was seeking to envision a God that would lie utterly beyond the bounds of scientific inquiry (Drake 2001). Such a perspective suggests not a deliberate attempt at heresy or blasphemy in demonstrating via the scientific method conclusions that come into conflict with a certain reading of Scripture. Instead, this perspective affirms the possibility of a God both immanent and transcendent, infinite, beyond the scope of science.

If there was a battle, that battle is over. In 1992 the Catholic Church, in the words of Pope John Paul II, addressed Galileo's role in modernity: "From the beginning of

the Age of Enlightenment down to our own day, the Galileo case has been a sort of "myth" in which the image fabricated out of the events is quite far removed from reality. In this perspective, the Galileo case was a symbol of the Catholic Church's supposed rejection of scientific progress, or of "dogmatic obscurantism opposed to the free search for truth" (Sagan 1994:44). Later in the same speech, and quite significantly, the Pope continues with: "The error of the theologians of the time, when they maintained the centrality of the earth, was to think that our understanding of the physical world's structure was in some way imposed by the literal sense of Sacred Scriptures" (ibid.). A bold declaration--both an admission that the Catholic theologians of the early seventeenth century had erred and a sweeping rejection of Biblical inerrantism. Here is an instance in which the most ancient and potentially powerful church of Christendom took a rather unprecedented stand, and the data available shows they were by no means alone. The grand narrative of physics was not being rejected for conflicting with faith; faith was instead evolving to accommodate the findings of science. There are many such examples of reconciliation between the cosmic narratives of new and old, of which the positions of mainline Christian religious traditions constitute but one (Roof and McKinney 1987). The ‘battle’ between physics and Christianity seems to have ended largely in a truce.

But it is a rather uneasy truce. Whatever Galileo’s true identity and purposes, this was a turning point, the beginning of a new secular mythos. Since the earth was dislodged from its position of celestial privilege, ‘The Great Demotions’, as astronomer Carl Sagan once put it, have been ongoing and seem inexorable (Sagan 1994:20-1). In fact, at present, the work of physics can offer a grand cosmic narrative that traces itself from the first fractions of a second after the universe exploded to life with the Big Bang to the probable ultimate fate of the universe. After the Big Bang, a matter-antimatter

explosion that sent the cosmos hurtling in many different directions to cool, coalesce, and form stars, galaxies, planets, and eventually us, the universe was set on a runaway expansion, everything in it rushing away from virtually everything else at fantastical speeds. Our solar system came about as a whirling cloud of gas and dust that condensed around the nascent sun into planets and planetoids and kept in motion by gravity and inertia, an idea first stumbled upon in 1796 by Pierre Laplace, a French mathematical astronomer. Laplace was allegedly asked where God fit into his theory, to which he confidently replied "I have no need of that hypothesis" (Numbers 2007:24-5).

Some four or five billion years from now, our sun will die, cooking the earth to a cinder in the process. Yet the universe will keep on going as if nothing happened. Ultimately, trillions upon trillions of years from now, the cycle of new star formation and destruction will wind down, and the universe will, it appears, give itself over to entropy until it is a massive, frigid waste. No stars, galaxies, planets, or life—and certainly no humans (see Krauss 2001). This view from above, the cosmogony of physics, might give us pause. We might, in fact, decide that such a worldview is unsatisfying, if not downright depressing. Physicists qua physicists ultimately do not have to concern themselves with this—they are in the business of understanding how the universe works, not making it emotionally satisfying for fellow human beings. Those who reject Credo quid consolans arguments regarding the advancement of science might be prone to declare, 'to hell with what makes you feel better; I am concerned with what is true.' It is not my intention to muddy the scientific waters by examining physics as a creation story, but to show that it can, and does, tell a story.

Besides, this story need not be so glum or colorless as it appears. We came from the stars. When massive stars, burning up their fuel, exploded, they released new, heavier elements into the universe that eventually found their way into our corner of the

universe (Krauss 2002). The air we breathe; the sky above; the fuel that burns when you step on your car's accelerator—all of it was once stardust. Yet humanity has, according to this tale, been in the grips of a series of Great Demotions ever since Galileo and Copernicus, which amount to a multipronged assault on the human presumption that the Universe was created for our sake. It has been learned since then that the sun is not the center of the universe but only one rather average example of billions upon billions of stars, and that the Milky Way galaxy is also rather ordinary but for the fact that it is our home, occupying no privileged position among the hundreds of billions of galaxies. And yet more Great Demotions await us. We might well find life elsewhere in the universe; in fact, it is not too late to find it here in our own Solar system. As of today some 1876 other planetary systems have been discovered orbiting some 1181 other nearby stars (the count was 1047/794 when I began writing this work in the fall of 2013) (Zolotukhin 2014). The stage is already set: our own planet and solar system appear increasingly ordinary from a cosmological perspective. In a universe so vast and old that it has seemingly rendered the earth a lump of rock orbiting a mediocre star and humanity a species of puny upstarts, why should extraterrestrial life not exist?

There is even the postulate, suggested by some modern theoretical physics models, that we inhabit but one of a potentially vast (or even infinite) array of universes. "The possible existence of other universes affects how we view our place in space and time. In the sixteenth century Copernicus showed that Earth is not at the center of the solar system. In the twentieth century our status was degraded further when we learned that our solar system does not live at the center of the galaxy and that our Milky Way enjoys no special location within the universe. In the twenty-first century we are likely to find that our universe has no special place in the vast mélange of universes that constitute the multiverse" (Adams 2002:66). As impossibly large as the cosmos now

seems, all these billions of years and billions of light years might ultimately amount to only tiny fraction of it.

The conclusions of science have been narrativized, but there are still a few holes in the plot. How this story reshapes the relationship between human beings and the cosmos is difficult to underestimate, and requires a closer examination of some of the attempts to reconcile the narratives of science with the narratives of faith is warranted. To ignore the various means by which these epics can be interwoven is to overlook a fundamental piece of a larger puzzle: the story we tell, and the characters it features, are a product of our own worldviews, cultures, traditions, and histories. Early social theorists, such as Max Weber, predicted that the rise of scientific knowledge would give rise to a disenchantment of the world, with people choosing to stand their ground to preserve their views of the world even if it means rejecting the scientific narrative: Credo non quod, sed quia absurdum (Gane 2002). Though insightful, this secularization thesis fails to capture the nuanced perspectives that have arisen over time. There are many perspectives, of which I will offer only a sampling. Is it possible to recapture meaning in the face of the demotion of humanity?

2.3 Physics and Philosophy: Odium Scholasticum

Sociologist John Ciazza (2007) writes that "Although much of popular writing about contemporary science continues to reinforce its traditional link to materialism and naturalism (especially in the writings about evolution), writing about contemporary physics and cosmology seem to have taken the opposite thrust. They are opening up vistas, long closed by science, of a universe manifesting inherent purpose, a cosmos designed to provide a home for the human race, and even pointing to the reality of a God. What the evolutionary biologists are taking away from religion, the physicists seem to be

putting back" (Ciazza 2007:15). Consider, for example, physicist Gerald Schroeder, who argues that the universe can be both thousands and billions of years old, that both Genesis and science can be accurate, invoking a variant of Einstein's time dilation equation from special relativity: (T2 – T1) = (t2 – t1)[1 – (v2/c2)]0.5, where T and t are elapsed time relative to one another, v is the velocity at which one travels, and c is the constant for the speed of light. Plugging in, the universe could in fact be approximately 6,000 years old from the point of view of God while also over ten billion years old from the point of view of human beings, provided one travels at very nearly the speed of light in relation to the other (Schroeder 1990:27).

Consider, too, Paul Davies and his work in seeking to show how modern physics might suppose the existence of a creator God similar to the one found in Abrahamic theology (Davies 1983; Davies 1992; Horgan 1996:261-3). He is hardly the first to make such an effort. Robert Jastrow speculated on the theological implications of the Big Bang: "For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance, he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries" (Jastrow 1981:50). To this assertion, prolific science (and science fiction) author and humanist Isaac Asimov replied caustically: "Perhaps Jastrow, abandoning his "faith in the power of reason" (assuming he ever had it) will now abandon his science and pore over the Bible until he finds out what a quasar is, and whether the Universe is open or closed, and where black holes might exist—questions astronomers are working with now" (Asimov 1981:52). Consider, too, the work of the eminent physicist Stephen Hawking, who was invited by Pope Pius XII to speak at the Pontifical Academy of Sciences at the Vatican in 1981, where he presented the first indicators of a theory of the origin of the universe that did not require divine

creation. He later went on to argue for his 'no-boundary proposal,' developed in collaboration with colleague Jim Hartle, comparing the philosophical/theological question "what came before the Big Bang?" to the terrestrial question "what is north of the North Pole?" (Giberson and Artigas 2007:87-109). And at the other end of the universe lies the position of once-fundamentalist Baptist Frank Tipler, who borrows the notion of an Omega Point from Jesuit priest and scientist Teilhard de Chardin to make the case for eternal life as a vast universal computer that comes into existence before the end of the universe, bringing back all that has ever been, a new form of immortality (Tipler 1994; see also Horgan 1996:256-60 and Shermer 2002:257-72).

Is Tipler's project 'religious' or not? Schroeder's? It depends, of course, on what one means by 'religious', a question that could span volumes unto itself. But there are other approaches to dealing with some of the strange and fascinating implications of physics, including the previous discussion of another potential Great Demotion, the recognition that we might inhabit but one of many universes. David Deutsch postulates the 'multiverse theory' as a potential solution to the paradoxes of quantum theory (Deutsch 1998), while Paul Davies wonders why it makes more sense to suggest multiple universes to account for the seemingly impossibly narrow constraints that gave birth to our universe or if there is a divine hand at the controls (Davies 2001:393-8). Or consider John Wheeler, who was one of the first physicists to propose that reality might not be wholly physical; in some sense, our cosmos might be a participatory phenomenon, requiring the act of observation—and thus consciousness itself, or David Bohm, who drew parallels between physics and Eastern mysticism (Horgan 1996:81-5).

Some physicists recognize this trend and are embittered, like Richard Feynman, who declared that "The philosophers who are always on the outside making stupid remarks will be able to close in, because we cannot push away…There will be a

degeneration of ideas, just like the degeneration that great explorers feel is occurring when tourists begin moving in on a new territory" (Horgan 1996:90-1). Stephen Weinberg admits that, "the techniques by which we decide on the acceptance of physical theories are extremely subjective" (Horgan 1996:74). Weinberg seems at once a wistful prophet and a committed materialist, embracing, even inviting, the profound meaninglessness of our grand cosmic narrative: "I certainly would not disagree with people who say that physics in my style or in the Newtonian style has produced a certain disenchantment. But if that's the way the world is, it's better we find out. I see it as part of the growing up of our species, just like the child finding out there is no tooth fairy. It's better to find out there is no tooth fairy, even though a world with tooth fairies in it is somehow more delightful" (Horgan 1996:76).

Ciazza's suggestion apparently has some truth but is not broad enough. It would seem that physics has failed to kill the need for, or appeal of, philosophical speculation, and is not likely to do so. Not every physicist might wish to engage in such philosophical speculation, and some explicitly denigrate it on principle (Pigliucci 2014). Some embrace their views for the solace they provide or the beauty with which they are imbued. What the persistence of metaphysics in part seems to suggest is that we have a deep-seated desire as human beings to find not only patterns but purpose. The view from the ground is alive and well even among eminent physicists. Deeply human qualities such as hope, imagination, or creativity, often thought to be obscured by suspicion of mathematics, reductionism, and determinism, abound.

To conclude, it seems that much of the trepidation that surrounds concepts like 'determinism' or 'reductionism' is misplaced. What speculation offers is the potential to view the world as being other than it is today. If we tend Weinberg or Sagan to be tragedians about the cosmos, who like Max Weber see the disenchantment that rides the

coattails of the advancement of science, we can still conclude that we are free in an existentialist sense, perhaps *absolutely free* (Gane 2002). If the cosmos does not come with meaning built in, we must gather our nerves and find the wherewithal to make our own. Perhaps that sense of meaning can be found in the journey toward greater scientific understanding itself (Weinberg 1992; Sagan 1994).

On the other hand, these speculations based on science, whether or not they bear fruit in the near or far future, suggest another powerful human tendency, expressed poetically by Horkheimer: "What is religion in the good sense? The not-yet-strangled impulse that insists that reality should be otherwise, that the spell will be broken and turn toward the right direction. Where life points this way in every gesture, there is religion" (quoted in Neiman 2002:306). This is not to assign religion to those who are irreligious, or orthodoxy to the heterodox, but to underscore the humanity behind theory at the frontiers of knowledge, among even the most 'hard', mathematical sciences, where one detects the voices of individuals with hopes and fears, seeking to understand this vast and wondrously complex cosmos.

Chapter 3

Living Things

> Evolution, then, is the creation myth for our age. By telling us our origins it shapes our views of what we are. It influences not just our thought, but our feelings and actions too, in a way which goes far beyond its official function as a biological theory. To call it a myth does not of course mean that it is a false story. It means that it has great symbolic power, which is independent of its truth.
>
> - Mary Midgley, *Evolution as a Religion*

Evolution: the grand unified theory of biology. Evolution: one of the most emotionally charged words in the American ideological landscape. Why is evolution controversial? Why does it remain controversial a century and a half after Charles Darwin's Origin of the Species? Evolution's status as a grand unified theory and its ideologically contentious status are intimately connected, as I will illustrate in the coming pages. But before diving in, a few preliminary considerations: a Pew Research poll at the end of 2013 shows that 33% of Americans believe 'humans existed in present form since the beginning of time', while 60% believe that 'humans and other living things have evolved over time.' (Pew Research Center 2014). A Gallup poll in 2014 found that 42% of Americans believe that 'God created human beings pretty much in their present form at one time within the last 10,000 years or so. The same survey found that 31% believe that 'human beings have developed over millions of years from less advanced forms of life, but God guided this process', while 19% (an all-time high) believe that 'human beings have developed over millions of years from less advanced forms of life, but God had no part in this process.' (Newport 2014).

At this juncture I hazard a glance at this unique sort of widget--a 'grand unified theory'. There is more than a little speculation that physicists will be able to uncover a grand unified theory in physics. Thus far such a theory has not been forthcoming, but it's possible this will change. Perhaps such a finding will occur between the time these words were written and when you read them! A grand unified theory is what it implies--an explanatory and predictive framework for an entire discipline or set of disciplines. I begin by examining this concept in further depth, namely, how people interact with this curious new 'grand unified theory' widget. In doing so, perhaps it will become apparent why evolution has enjoyed a long and distinguished history of controversy. First, evolution will be introduced briefly as a new sort of widget, an unprecedented scientific tool that has the power to dramatically reshape the way humanity sees itself, not just in relation to the cosmos but to the rest of the living things with which we share this planet. Then, the narrative will trace the controversy back to Darwin himself, and how and where his adversaries gradually arose, in order to locate the common conceptual ground on which the objections to evolution have been constructed: morality. Finally, the tensions can be unmasked, revealing the humanity, in all its 'lowly origins', teeming beneath them.

3.1 Just What is a Grand Unified Theory?

If 'grand' and 'unified' are straightforward enough, perhaps it is the word 'theory' that has become problematic: "In science, a theory is a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and test hypotheses" (Kennedy 1998:5), states a guide for the teaching of evolution produced by the National Academy of Sciences. "Science has many other powerful theories besides evolution. Cell theory says that all living things are composed of cells. The heliocentric theory says that the earth revolves around the sun rather than vice versa. Such concepts

are supported by such abundant observational and experimental evidence that they are no longer questioned in science" (Kennedy 1998:5). You, and other living things, are made up of cells. The earth orbits the sun. You and I are distant cousins to the apes but also, albeit more distantly, to squirrels, slugs, and slime. Out of such kinship, the sharing of common and now-extinct ancestors, one gets a profound sense of being a part of a biosphere we share with every other species on the planet, living or not. Despite our revered intellect and technological sophistication we are subject to the same possibility for decline, decimation, and eventual extinction that has befallen the vast majority of species that have ever existed on the planet, enjoying a brief moment in the sun only to vanish, sometimes leaving other progeny-species distinct from their evolutionary ancestors in their wake.

There is something at once poignant and unsettling about this view of life on earth, including human life, as transient and fleeting, a further and perhaps more damaging blow to our anthropocentric pride. Perhaps Charles Darwin himself, in a moving passage, best described this phenomenon: “As buds give rise by growth to fresh buds, and these, if vigorous branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications” (Darwin 1859:130). We are no longer the triumph of the universe; its *raison d’etre*. Daniel Dennett even called evolution a “universal acid” that “eats through just about every traditional concept, and leaves in its wake a revolutionized world-view, with most of the old landmarks still recognizable, but transformed in fundamental ways" (Dennett 1996:63). Dennett examined Darwin’s theory from a philosophical perspective, looking primarily at the science and the scientists who

deal with the theory itself in their work. I endeavor instead to examine the public controversy itself and the public institutions and ideas that have shaped it.

Accordingly I wish to underscore the first citation in this section: the National Academy of Sciences produced a work outlining the teaching of evolution. Understanding biological evolution is important enough that members of the most prestigious science foundation in the United States expended time and effort to aid in its teaching (Kennedy et. al. 1998). This alone might give us pause. “If I were to give an award for the single best idea anyone has ever had, I’d give it to Darwin, ahead of Newton and Einstein and everyone else. In a single stroke, the idea of evolution by natural selection unifies the realm of life, meaning, and purpose with the realm of space and time, cause and effect, mechanism and physical law” (Dennett 1996:21). One might further point to the fact that there are prestigious scholars who have spent their lifetime specializing in teaching evolution; that is, there are entire scholarly subfields and lifetimes worth of books set aside to deal with the numerous pitfalls related to the process of introducing Darwin’s theory in the classroom (See, for example, Alters 2005).

Additionally, many major religious denominations active in the United States have issued statements on evolution. The Catholic Church, for example, accepts evolution as God-directed with the stipulation that the human soul is divinely created. The Episcopal Church passed a 1982 resolution to "affirm its belief in the glorious ability of God to create in any manner, and in this affirmation reject the rigid dogmatism of the 'Creationist movement'," and has also taken a skeptical view of Intelligent Design. The United Methodist church expresses similar views, and leaders from denominations as diverse as The Church of Jesus Christ of Latter-Day Saints, United Church of Christ, Presbyterian Church, and Evangelical Lutheran Church have expressed opposition neither to evolution nor the findings of science, and many of their leaders believe

evolution to be compatible with faith. Buddhists and Hindus, and many Muslim leaders in the United States, have also spelled out generally accommodating attitudes toward evolution. There are other religious groups that view evolution more unfavorably, or even reject it outright (Pew Research Religion and Public Life Project 2009). Religions have specific, explicitly spelled out views on Darwin's theory. Examined together, if this does not at least suggest a 'grand unified theory' is at work, it is unclear to me what could.

Evolution offers a final, singularly significant piece to the Grand Cosmic Narrative that began in Chapter One. One might be tempted to speculate that evolution has been more or less consistently under fire since the nineteenth century because it hits far closer to home than the strange and often seemingly distant, abstract implications of cosmology and other branches of physics. Darwin's theory affects both the view from the sky and the view from the ground in significant ways. There is the fact that objections to evolution take theological, and specifically ethical undertones, at least in the United States, where evolution has met with some of the most visible controversy in the Western world. Each of these and other related possibilities will be examined in our narrative, a narrative that will describe not the origin and fate of the universe, nor specifically the diversification of life via natural selection, but the evolution of the debate over evolution, its proponents and its critics.

3.2 Marxists and Other Devils: Evolution in Social Discourse

Charles Darwin was a quiet man, originally trained for the clergy, who through a combination of personal empathy, family ties, and unique life experiences came to champion abolitionism and abhor the cruelty of slavery. Darwin sought an alternative means of explaining life that would forever shatter the racism embedded in both conservative religious traditions and scientific 'findings' of his day which suggested that

Europeans were higher on the chain of being, and that native peoples, or 'savages,' belonged to lower rungs of the hierarchy of being. In Darwin's time, many Anglo scholars were convinced that darker-skinned human beings were seen as somewhere between white people and beasts, and slavery was in part 'for their protection'. The American Anthropological Society emerged, declaring unequivocally that through the use of phrenology, which measures the size and shape of human skulls, it could be determined scientifically that whites were intellectually superior to non-whites—whites had larger brain-pans, and therefore bigger, more developed brains. In the face of the prevailing scientific views of his day, Darwin became motivated to seek an explanation for the diversity of human beings that would succeed where the abolitionist fervor, motivated largely by Christian evangelicals, had failed (Desmond and Moore 2009).

In the nineteenth century, around the time Darwin first published his magnum opus, geological evidence had begun to mount that the earth was much older than Ussher's Biblical chronology could account for; that millions, and in fact billions, of years rather than thousands had passed since the earth's beginnings. It was around the turn of the century that thinkers of devout Christian faith, unwilling to accept this new evidence, began to look for alternate explanations. An early founding father of what came to be known as Young Earth Creationism, a belief system that maintained a literal creation of the heavens and earth by God in six twenty-four hour days less than 10,000 years ago, was Seventh-day Adventist George McCready Price. He presented an account of geology and the fossil record that traced the shifting sands and massive piles of stony remains to Noah's flood, in effect founding what came to be called the new catastrophism (Numbers 2007).

Price set the stage for later creationists, and the controversy began to unfold, coming into full view in 1925 with the Scopes Monkey Trial, which pitted freethinker and

biology teacher John T. Scopes against populist politician and presidential candidate William Jennings Bryan in order to challenge a Tennessee statute which made it illegal to teach Darwin's theory (Robbins 2009:99-116). It was the first of such cases, but by no means the last. Beginning with the Epperson v. Arkansas 1968 Supreme Court invalidation of an Arkansas law that criminalized the teaching of evolution, creationists gradually lost ground. Rulings have consistently declared that creationism cannot be taught in science classrooms because appeal to the supernatural is beyond the reach of scientific methodology and therefore is not properly labeled science. Many more such cases appear throughout the latter decades of the twentieth century, first legalizing the teaching of evolution and rejecting as unconstitutional arguments for 'equal time' for Creationism and later Intelligent Design (Long 2011). An excerpt from "Religion in the Public Schools: A Joint Statement of Current Law" clarifies: "Schools may teach about explanations of life on earth, including religious ones (such as "creationism") in comparative religion or social studies classes. In science class, however, they may present only genuinely scientific critiques of, or evidence for, any explanation of life on earth, but not religious critiques (beliefs unverifiable by scientific methodology). Schools may not refuse to teach evolutionary theory in order to avoid giving offense to religion nor may they circumvent these rules by labeling as science an article of religious faith. Public schools must not teach as scientific fact or theory any religious doctrine, including "creationism," although any genuinely scientific evidence for or against any explanation of life may be taught. Just as they may neither advance nor inhibit any religious doctrine, teachers should not ridicule, for example, a student's religious explanation for life on earth" (Kennedy et al 1998:123).

Returning to Price, his ideas were picked up later by a hydraulic engineer named Henry Morris. After studying Price's work, Morris became convinced of the need for

creationist perspectives to be developed, beginning the Creation Research Society in 1963. Morris devoted his life to the critique of evolution, and he pulled no punches: "But behind both groups of evolutionists [those intellectuals who prefer evolution because they are in moral rebellion against God, and those who seek God but accept evolution because "all educated people must accept evolution"] one can discern the malignant influence of "that old serpent, called the Devil, and Satan, which deceiveth the whole world" (Revelation 12:9). As we have seen, it must have been essentially the deception of evolution which prompted Satan himself to rebel against God, and it was essentially the same great lie with which he deceived Eve and with which he has continued to "deceive the whole world." Consequently, until Satan himself is destroyed, we have no hope of defeating the theory of evolution, except intermittently and locally and temporarily" (Morris 1963:93). Morris also aligns evolutionary thought with the fascism of Mussolini and Hitler as well as Stalinism in another work, *The Long War on God* (Morris 1989).

Creationism really came of age in the 1960s amid a period of cultural turmoil in the United States. The 60s bore witness to a presidential assassination, the Civil Rights movement, Vietnam, and the rise of what sociologists of religion Roof and McKinney call “The New Morality,” defined by an increased acceptance of homosexuality, divorce, abortion, marijuana use, and sexual permissiveness (Roof and McKinney 1987:186-228). I am convinced one of the primary reasons these attacks on evolution have continued despite unequivocal losses in the courts is tied intricately to this new morality and the dramatic upheaval it brought to the United States cultural landscape. Evolution seems to be viewed by its critics as a root cause of the rise of this new morality, a sinister force that infiltrated both the education system and the mainline religious denominations, bringing new views of human nature and humanity that are incompatible with traditional religious

values. In short, the primary reason the evolution controversy has gone on so long, and continues today, is because evolution is perceived as having dramatic moral implications.

An everyday phenomenon may best exemplify the potentially competing worldviews mapped out by the controversy. The nearly-ubiquitous fish symbol, dating back to ancient Rome as a mark that identified one as a Christian, appears on the backs of automobiles all over the United States, often inscribed with the word JESUS. Not long after its debut, another symbol, a fish with two legs inscribed with the word DARWIN appeared. Phenomenologically speaking, "The Jesus fishes do have a discernible cause, however, namely the sense that many traditional minded Christians and believers of virtually all other religions in the United States have that the ambient culture has become so materialistic and degraded as to bear comparison with no other time in American history than the debauched times of the end of the Roman Empire" (Ciazza 2007:2). Ciazza characterizes the Darwin legged fishes as "...also a fear based phenomenon, namely, the fear that a potent combination of right-wing political organization and evangelical religious sentiment now constitutes a danger to the separation of church and state" (Ciazza, 2007:2). In these simple automobile adornments, one can bear witness to an ongoing cultural conflict between 'cultural modernism' and 'cultural fundamentalism', (Eve and Harrold 1990:56-61), a potent indicator of the sort of polarization Mannheim described.

For example, Longview, Texas-based couple Mel and Norma Gabler (1986) created a stir in the public education system with *What Are They Teaching Our Children? What You Can Do About Humanism and Textbooks in Today's Public Schools*. "The basic issue is simple," they contended. "Which principles will shape the minds of our children? Those which uphold family, morality, freedom, individuality, and free enterprise; or those who advocate atheism, evolution, secularism, and a collectivism in

which an elite governs and regulates religion, parenthood, education, property, and the lifestyle of all members of society" (Gabler and Gabler, 1986:31-2)? Returning to Eve and Harrold's rather prophetic work, The Creationist Movement in Modern America, a fundamental component of social movements theory sheds light on the issue at hand, that it is, "as if anyone who accepts evolution must necessarily reject the idea that the universe as a whole was created. The unwary reader easily gets the impression that in this dispute he or she must choose between fundamentalism and atheism" (Eve and Harrold 1990:80). Moral values evoke emotional responses, creating the appearance of dichotomy: 'creationist/Christian/good' versus 'evolution/atheist/evil.' You are either with *us* or with *them.*

In the wake of failures in the courtroom and in the classroom, at the turn of the century creationism evolved into Intelligent Design. Intriguingly, beneath this rebranding the original moral impetus remains. In an Intelligent Design introductory volume, one of the authors explains, "This is the same tactic I use to teach my students how to defend the lives of unborn children threatened by abortion. Rather than assuming the Bible is true, it is much more fruitful to reason from science, philosophy, and common sense to a view of the unborn. For those willing to honestly consider the evidence, a compelling scientific case can be made that certain features of the world are best explained by an intelligent agent. Are you open to the evidence?" (Dembski and McDowell 2008:46). It is a more subtle view, but some of the same critical elements are in place, exapted from the creationist movement.

The governing goals of the Discovery Institute, a prominent Intelligent Design think tank, include, "To defeat scientific materialism and its destructive moral, cultural, and political legacies" and "To replace materialistic explanations with the theistic understanding that nature and human beings are created by God" (Discovery Institute

1999). Why is the Discovery Institute governed by these goals? Because, "Debunking the traditional conceptions of both God and man, thinkers such as Charles Darwin, Karl Marx, and Sigmund Freud portrayed humans not as moral and spiritual beings, but as animals or machines who inhabited a universe ruled by purely impersonal forces and whose behavior and very thoughts were dictated by the unbending forces of biology, chemistry, and environment" (Discovery Institute 1999:6). "Discovery Institute's Center...wants to reverse the stifling dominance of the materialist worldview, and to replace it with a science consonant with Christian and theistic convictions" (Discovery Institute 1999:8) and "that the ultimate goal of "cultural renewal" was to ensure that design theory penetrated the social sciences, humanities, and culture in general, namely the disciplines of "psychology, ethics, politics, theology, and philosophy in the humanities." This included plans to alter contemporary views of "abortion, sexuality, and belief in God" (Foster, Clark, and York 2008:183).

Political scientist John G. West blames materialism (which he associates with evolution) for the dehumanization of social welfare, public education, sexuality, criminal justice, and even life and death (West 2007:6-8). Benjamin Wiker associates evolution with "hedonism" and a "culture of death," tying it to "Social Darwinism and eugenics…libertinism, abortion, infanticide, euthanasia, and cloning" (quoted in Foster, Clark, and York: 2008:190-1). Those who criticize Darwin's theory, of which Intelligent Design proponents are but the latest species, seem ubiquitously unable to resist reminding the reader that the reason for the attack on evolution is largely ethical rather than empirical. It is not enough that the grand unified theory be called into question; it must be condemned, pilloried, demonized. For its detractors, evolution is a threat to the sanctity of humanity, synonymous with a cold and impersonal—as well as morally bankrupt--universe. Many works on Darwin's theory have avoided, or even ignored,

these concerns. But since critics of evolution often resort to such tactics, an effort to carefully examine the moral history of evolution using a sociology of knowledge lens should be fruitful.

3.3 Divided We Stand: The Social Implications of the Struggle for Existence

In 1985, a theologian from the University of Chicago Divinity School related telling incident. Having recently testified at an Arkansas creationism trial, his young son's teachers invited him to speak about the evolution-creation controversy. To the surprise of the teachers, Langdon Gilkey explained to the students that evolutionary theory is compatible with religious belief. After his speech, the faculty informed him that they had invited him to speak against evolution! Unbeknownst to the apparently bewildered teachers, Gilkey had testified at the creationism trial that creationism is religious doctrine, not science, and does not belong in a science classroom (Eve and Harrold 1990:80; Gilkey 1985). Similarly, Darrel R. Falk, an Evangelical Christian evolutionary biologist, wrote a book-length work reconciling his faith with the evidence for an old earth and descent with modification. He sets the tone in the preface: "Fundamental to the thesis of this book is my belief that the chasm [between science and faith] has been created in part, by the particular metaphor that has been chosen for the activity of the Creator. We have been forcing the Creator of the universe into a box limited by human experience" (Falk 2004:14). Falk continues: "Perhaps, however, the best analogy for the designer is not that of an engineer but an artist, or better yet, the composer and conductor of a symphony. Can one decipher through scientific study the "rules" of great art or the "statutes" of a masterfully composed and conducted symphony? Perhaps, like the work of an artist or a symphony conductor, the action of the Creator has been so subtle and all-encompassing that it will never be possible to describe it by using the tools of science"

(Falk 2004:15). For Falk, and others like him, science and religion are not only compatible but complementary.

Where is the tension inherent in the passages above, the righteous indignation, the outrage? Where is the 'battle' between science and religion? What has come to be called theistic evolution, or, in an odd turn of phrase, evolutionary creationism, would seem to go far in reconciling faith and Darwin's theory. In one fell swoop, a theologian who argues for evolution and a biologist with orthodox religious convictions would seem to render false the dichotomies presented above. It indeed seems possible for a single individual who can see the cosmos as alternately personal and impersonal. Lest they be perceived as outliers, note, too, in the first section of this chapter that nearly a third of Americans in 2014 (31%) embrace theistic evolution, and many large religious denominations have made clear that they see no doctrinal problems with being a member of their congregations and embracing evolution.

These are more than a view from the sky and a view from the ground—there are elements of both in both science and religion. "Non-Overlapping Magisteria" (NOMA), a view expounded upon by paleontologist Stephen Jay Gould (1999), holds that "science studies how the heavens go, religion how to go to heaven" (Gould, 1999:127). Thus, "If the issue must be dichotomized at all, the two sides might be characterized as supporters versus opponents of NOMA; as defenders of the First Amendment for separation of church and state versus theocrats who would incorporate their certainties as official state policy; or, most generally, as defenders of free inquiry and the right of teachers to present their best understanding of subjects in the light of their professional training versus the setting of curricula by local sensibilities or beliefs (or just by those who make the most noise or gain transitory power), whatever the state of natural knowledge, or the expertise of teachers" (Gould 1999:128).

One would imagine that the problem had been all but solved, the truce upheld, and scientists and religious leaders could carry on with their endeavors without the need for further conflict. To science belongs the question of how the natural world operates, and to religion, questions of ultimate meaning and purpose as well as morality. In a work published posthumously, Gould expounds upon his position on morality by dealing with the singularly divisive issue of abortion in the context of United States politics: "Science, by its very nature as a quest for factual understanding and explanation, cannot prescribe a moral resolution to any question…One cannot, as an obvious example, advocate the moment of conception as the ethical definition of life's beginning (there can be no unambiguous factual "beginning" of life in such an unbreakable continuum of biological events) until one understands, and can identify, the biology of conception. In fact, and in the absence of this knowledge, legal and moral authorities, during most of Christian history accepted the quickening (or movement) of the foetus in the womb as the defining point (and first clear indication) of life's beginning—and abortion before this advanced moment in pregnancy did not then count as illegal or immoral by theological standards. But no study of the biology of conception and pregnancy can specify the ethical, theological, or merely political "moment" of life's legal or moral inception" (Gould 2003:140-1).

Gould's solution opens up the possibility of a host of new problems related specifically to the notion of life and the origins and practice of morality. To deal with the ethical implications of evolution by simply stating that there are no ethical implications would be to ignore the long and checkered history of biology after Darwin, a new narrative replete with heroes and villains as seen through twenty-first century eyes. Though it is often unclear which is which at the time, there emerges a lucid picture of the implications of evolution that reach far beyond science and deep into the domains

demarcated by Gould for religion: those of ultimate meaning, purpose, and morality. To address these concerns, and their implications both for the social sciences and for humanity, another story needs to be told.

The association of evolution with certain anti-egalitarian ideologies such as social Darwinism, eugenics, fascism, and even genocide has fueled challenges to Darwin's theory on moral grounds. This debate isn't really about evidence, but about values, epitomizing the sort of dilemma posited by Mannheim: in a world of upheaval, polarization emerges. It is no longer enough to debate ideas: one must, in this environment, destroy the very foundations of one's opponent's ideas. There is also a sort of tension between the rather brutal, pessimistic worldview offered by some as an extension of Darwinian thought, and utopian assertions tied to evolution and a belief in progress. Neither of these implications stands alone; perhaps one cannot exist without the other.

There is a strong undercurrent of thought in evolutionary theory and its proponents that can in large part be traced back before Darwin to one of his own guiding lights: in particular, the Reverend Thomas Malthus and his 1798 essay on population (Dugatkin 2006:19). The ideas developed by Malthus in his essays both influenced Darwin and had a profound impact on the era in which he lived. For Malthus, the desire among human beings to multiply would periodically and inevitably outstrip the supply of food and lead to starvation and death on a massive scale (Malthus 1798 [1985]). The notion that an evolutionary view of the natural world holds for us an unending chamber of horrors, a vision of cut-throat competition and dominance, where every person is both potentially predator and prey as much as the animals that live in the wild reaches beyond the human metropolis haunts Darwin's theory to this day. Consider one of the following modern analogues in the unapologetic declaration of sociobiologist Michael Ghiselin:

"The evolution of society fits the Darwinian paradigm in its most individualistic form. The economy of nature is competitive from beginning to end. Understand that economy, and how it works, and the underlying reasons for social phenomena are manifest. They are the means by which one organism gains some advantage to the detriment of another. No hint of genuine charity ameliorates our vision of society, once sentimentalism has been laid aside. What passes for co-operation turns out to be a mixture of opportunism and exploitation. The impulses that lead one animal to sacrifice himself for another turn out to have their ultimate rationale in gaining advantage over a third, and acts for the good of one's 'society' turn out to be performed for the detriment of the rest. Where it is in his own interest, every organism may reasonably be expected to aid his fellows. Where he has no alternative, he submits to a yoke of servitude. Yet, given a full change to act in his own interest, nothing but expediency will restrain him from brutalizing, from maiming, from murdering—his brother, his mate, his parent, or his child. Scratch an 'altruist' and watch a 'hypocrite' bleed" (Ghiselin 1974:247). Note the profound difficulties in reconciling such a statement with any—let alone traditional religious—conception of morality.

Perhaps, then, we should not be surprised at all to find a movement to cast doubt upon and even actively suppress Darwinian evolution in light of this declaration. But in order to root out the source of this line of thinking, and to examine why it is by no means an inevitable worldview associated with the grand unified theory of modern biology, I return to the nineteenth century and a man who was at once Charles Darwin's friend and one of his staunchest defenders: Thomas Henry Huxley. Huxley grew up in an England beset by the problems of a deep economic depression. Widespread poverty brought the young Huxley face-to-face with the horrors of systematic privation during one of his first jobs as a doctor of medicine in a slum clinic. From an early age, for Huxley, it was family

ties that enabled him to escape living through such horrors himself, and he came to believe that nature was indeed “a bloodbath, devoid of altruism and cooperation, with no retreat but the family unit” (Dugatkin 2006:15-6).

While such discussions raged in Darwin’s homeland, in the cold, dark reaches of the Siberian tundra, another set of ideas was coming to life. These ideas were as far removed from the nature-as-bloodbath image of Huxley and Malthus as seemed possible. Yet at the same time, these ideas were distinctly Darwinian in origin. Here a Russian aristocrat turned naturalist and anarchist Petr Kropotkin found a very different view of nature, in that “wherever I saw animal life in abundance, as for instance on the lakes…; in the colonies of rodents ; in the migrations of birds…and especially in a migration of fallow-deer which I witnessed on the Amur, and during which scores of thousands of animals came together from an immense territory…in all these scenes of animal life which passed by my eyes, I saw mutual aid and mutual support carried on to an extent which made me suspect in it a feature of the greatest importance for the maintenance of life, the preservation of each species, and its further evolution.” (Quoted in Dugatkin 2006:27-8). Kropotkin, too, saw in evolution his own sociopolitical views. After witnessing the misery and privation of the serfs in Russia, he came to believe that the best form of government was no government at all, and that in discerning the prevalence of mutual aid among animals Kropotkin believed he had found the secret to human utopia. People ought to live in small groups and benefit from the application of mutual aid in the absence of hierarchical governing structure. Such a vision has distinctively communist overtones—not the perverted communism of Stalin but the view expressed by Marx that human beings in the absence of exploitation could live in a stateless and classless society (Kropotkin 1902 [1972]).

So who was right? Such ideas were later tested empirically by a Quaker and devoted pacifist Indiana farmer turned scientist named Warder Clyde Allee, demonstrated that even simple forms of life benefited from mutual aid. Allee lived through the First World War, witnessing Axis rhetoric that co-opted evolution the destruction of enemy nations (Schmidt 1957). In a larger sense, Allee's work gave rise to the still-salient notion in biology that cooperation and altruism as well as competition and dominance existed in nature, and that neither could account for behavior well in the absence of the other. For his work Allee was elected into the prestigious National Academy of Sciences, but died three days later. An unnamed sociologist said of Allee that "Dr. Allee has brought us the greatest word from science since Darwin. His scientific research which shows the evidence for cooperation gives us new hope" (quoted in Dugatkin 2006:60).

To 'be true to our nature', so to speak, are we then to make of ourselves unabashed egoists or communitarian anarchists? Is dominance and militarism to be our lot, or cooperation and peace? Profound questions about human nature begin to surface. What seems to be taking shape with increasing clarity is that the truce posed by Gould in which religion is said to deal explicitly with morality seems to have been violated—biology since Darwin seems to have a great deal to say about morality. In this light, accusations made by critics of Darwin's theory appear at once myopic and ill-founded, exaggerating the pessimistic implications of natural selection while ignoring the optimistic ones. When viewing modern biology from the ground, it seems there is as much room for fear as for hope. Yet from here the story takes a few even more surprising turns.

Stephen Jay Gould made clear elsewhere that he did not object to descriptive evolutionary accounts of morality—"anthropology of morals"—falling under the rubric of science, but that the normative question of what we ought to do—"the morality of morals"—was not comprised of questions that could be answered by science (Foster,

Clark, and York 2008:24-6; Gould 1999; Gould 2003; see also Lewis 1943 [2002]). It should be noted too, for clarification, that Huxley alluded to something similar to this, underscoring the need to distinguish our "wild zoological nature from our ethical existence" (Dugatkin 2006:153).

Amid this tension between conflicting world-views arising out of Darwinian thought we come face-to-face with a profound iteration of the nagging problem of the social sciences: that of separating (or attempting to separate) "is" from "ought"; "facts" from "values". Is it possible? Should we try to do so? What are the benefits, and costs, of each approach? As scientific research becomes increasingly proximate to the human species, such concerns become at once more complicated and imperative. Insofar as such implications exist, can the future study of the social sciences afford to ignore them?

I turn now to another development that arose in the study of altruism: the now-famous Hamilton's rule, which is stated mathematically as $r * b > c$, where 'r' is the coefficient of genetic relatedness. A brother, sister, mother, or father would have an r of 0.5, while a grandparent or aunt or uncle would have an r of 0.25, and so on. 'b' is the benefit of an altruistic or self-sacrificing act, and 'c' is the cost. According to Hamilton's rule, an animal will engage in altruistic behavior provided that the product of genetic relatedness and benefit of the self-sacrificing act are greater than the perceived cost of the act. Here's the hitch: the benefit conferred is not directly to the individual or the group but to the gene (Dugatkin 2006:86-106; see also Dawkins 1989 and Wilson 2000).

The altruism that Huxley saw among family members as a flicker of light in a dark and brutal world, an ongoing fight for survival, has been mathematically formulated and empirically verified by multiple experiments in the animal kingdom. An often-touted example, a general problem for Darwin when he first began to develop his theory, was the behavior of colony insects like bees. Called eusocial creatures, these are species in

which a large number of individuals do not reproduce, and will often defend the hive, giving their own lives without compunction to do so (Dennett 1996:483-5). Such behavior can be seen for its apparent social order and division of labor, and also as a stunning example of Hamilton's rule in action, as such behaviors are accounted for accurately by the fact that these drones share more than half their genes with one another (Dugatkin 2006). Even the ancient Greek thinkers were exceedingly curious about, and impressed by, the cooperative behavior of such creatures—in one of his dialogues, Plato imagined philosophers would be reincarnated as orderly creatures like ants or bees (Warmington and Rouse 1999:486-7).

When this quantitative relationship between relatedness and self-sacrificing behavior is teamed up with game theory experiments like The Prisoner's Dilemma which suggest that altruistic behavior beyond one's kin comes in the form of 'tit-for-tat' reciprocation, and then modern social psychological work is also added into the mix, an imposing edifice is erected that seems to have a great deal to do with morality (Cialdini 2001; Dugatkin 2006:142-6; Dennett 1996:253-5). Can a naturalistic account of morality succeed? If so, where does that leave human beings? And if we accept Gould's peace offering, where does that leave religion? Out of the fact that altruism as well as many other behaviors can be explained in part by appealing to genetics came a daring new science: sociobiology. Its founding father was Harvard biologist E.O. Wilson, whose book, bearing the discipline's namesake, caused a commentator to suggest that "sociobiology carries with it the revolutionary implication that much of man's behavior toward his fellows…may be as much a product of evolution as is the structure of the hand or the size of the brain" (quoted in Dugatkin 2006:117; see also Wilson 2000).

Sociobiology raises a number of pointed questions with implications that are difficult to overstate. Philosopher Mary Midgley, perceiving an attack on human agency,

suggests that it "is by no means a necessary consequence of admitting that there are genetic causes at all. There certainly are, and their presence is harmless to freedom, indeed it is a precondition of it, since a mere piece of blank paper conditioned by its society would not be free. The enslaving element in sociobiology does not come from this, but from the refusal to admit other kinds of causes…genetic forces appear as inescapable fates, and the rhetorical tone varies between reverence for their power and contempt for humans who suppose that any other element in life need concern them…It is, in fact, a self-justifying projection of human selfishness…It has done, and is still doing, enormous harm" (Midgley 1985:129).

Social scientists and humanities scholars dismiss this imposing edifice at their potential peril, for here the grand unified theory of biology has continued to reach out, seeking ever greater swaths of knowledge to subsume beneath its growing influence. It is both intriguing and mystifying that Darwin himself seemed to perceive and anticipate the growth of such a science in *The Descent of Man* (Darwin 2010[1871]:50-63) and yet there is among the social scientists and humanists of various stripes only a delayed and sparse reaction. A paradox arises for sociologists: should we decide to ignore the influence of genes on human interactions, shrug, and simply state that 'it is not our area'? This seems at best a blinkered view. We might benefit instead from addressing what Dennett rather wryly called the "only slightly nonstandard social science model" in which it is acknowledged that, "while we have biological propensities, we are also equipped with the means, through culture, learning, and other sources of human variation, to resist and overcome these biological determinants" (Dennett 1996:491). Consider, for instance, an anecdote featuring Hamilton himself, who found that he had committed a howler when he wrote a job reference for a female student in which he called her "exceptionally strong on the theoretical and statistical side and with an ability that was especially remarkable in

view of her sex and non-mathematical background." Hamilton was writing from the position that it was statistically well-established that women score lower on mathematical and spatial problems than men. He had intended to suggest that she was good at math for anyone, not good at math for a woman (Dugatkin 2006:147).

Research does indeed show that women score lower on tests of math and spatial reasoning skills. The problem wasn't just some sort of rampant political correctness, but the unexamined assumption that women tend to score lower *because they are women* and not because there are cultural pressures at work. We see in this anecdote the playing-out of Midgley's critique of sociobiology as a whole and the fundamental problems that have yet to be addressed in the undoubtedly complex and variegated interplay of genes and culture. What is daring about sociobiology is also problematic: perhaps in its proponents' zeal to establish a niche for their work they failed to take seriously the complexities already unearthed by sociologists which demonstrated the marked impact of cultural and environmental factors.

On the future horizon looms a clash between Darwin and both the social sciences and the humanities. This is evident in the infiltration of evolutionary thought into fields presumably far removed from biology such as literary criticism (Goodheart 2007). The fact that philosophers like Mary Midgley and Daniel Dennett, as well as other humanists, take seriously the implications of Darwin's idea should serve as precursors that we, too, as social scientists, have a long-term interest in doing the same.

I will close this chapter by briefly examining the outgrowth of some of the work done by a cousin of Charles Darwin, Francis Galton. "Galton believed, basing his belief on natural selection, that by studying the family trees of eminent persons he could see how their great abilities were hereditary (Coming from a wealthy family, Galton was apparently blind to environmental influences. He could not admit that perhaps poor

people rarely produced great statesmen because they spent most of their time trying to survive). From the Greek word for “endowed with noble qualities” he coined a neologism: eugenics. Slowly such ideas took root in the United States, culminating with a Supreme Court decision that permitted the sterilization of “undesirables”. Between 1927 and 1941, with nearly half the states in the union supporting such sterilization efforts, nearly 36,000 people with criminal histories, epilepsy, mental illness, or the developmentally challenged were sterilized. Unsurprisingly, when the Nazi Third Reich adopted eugenics as official policy and used such ideas to justify the mass slaughter of millions of “undesirables”, public support for such policies in the United States began to wane” (Kaku 1997:256-6). How neatly, how elegantly evolution unifies biology in a view from the sky that traces life back to its first stirring on earth. And how comparatively ugly have some, however well-intentioned, made the view from the ground. In the next chapter, I turn to the bold and harrowing elements that come into play as science becomes institutionalized and technology takes center stage at the twilight of the age of exploration.

Chapter 4

From Democritus to Hiroshima

> Mr. Haldane's Daedalus has set forth an attractive picture of the future as it may become through the use of scientific discoveries to promote human happiness. Much as I should like to agree with his forecast, a long experience of statesmen and governments has made me somewhat skeptical. I am compelled to fear that science will be used to promote the power of dominant groups, rather than to make men happy. Icarus, having been taught to fly by his father Daedalus, was destroyed by his rashness. I fear that the same fate may overtake the populations whom modern men of science have taught to fly.
>
> -Bertrand Russell, *Icarus or the Future of Science*

There is a curious tension settling over the sciences which is characterized by two books: The End of Science by John Horgan (1996) and Visions: How Science Will Revolutionize the 21st Century by Michio Kaku (1997). For Horgan, the age of exploration is coming to an end; many of the great questions have been answered. For Kaku, this is only the beginning; science is moving from an age of discovery into an age of mastery (Kaku 1997:9-10). Both men, the former a science journalist and the latter, a physicist, demonstrated their respective theses by interviewing eminent scientists. The differing conclusions emerge because Horgan interviewed those at the frontiers of scientific knowledge, while Kaku interviewed those at the edge of technological prowess.

Could they both be right? Evolution, the Big Bang, DNA, atoms—these, and so many other 'big ideas' have already been discovered; barring some cataclysmic series of events that sends the human race back into the Stone Age, they need not be discovered again. We have peered far back in time and out to the cosmic horizon, the edge of the visible universe. Exploration is beginning to give way to a new era.

Part of the reason for this is pragmatic. Exploration is expensive. Explorers, once accountable to despots, are now at the mercy of an increasingly challenging funding climate following the Cold War (Babich 1996). To rewind some five centuries, consider the oft-contested reputation of the "discoverer" of America, Christopher Columbus. His motives, whatever they might or might not have been, for setting sail, required a great deal of funding, bought perhaps with a promise of riches and likely other more unwholesome treasures. Ultimately Columbus did not deliver the goods, so far as his investors were concerned, and was brought back to Europe to stand trial (Granzotto 1988). Much as Galileo's trial has become a symbol of the twilight of the Medieval human-centered universe, the tale of Columbus brings to light a new set of contorted mythos warning of the manifold prices extracted by those who fund exploration and discovery. When the first self-sustaining nuclear chain reaction was detonated beneath an abandoned Chicago football stadium as part of the Manhattan Project on December 2, 1942, a triumphant scientist allegedly reported that "The Italian navigator has landed in the New World. The natives were friendly" (Bowden 2003:29). Indeed, on July 20, 1989, George H.W. Bush celebrated the twentieth anniversary of the Apollo 11 lunar landing with a push for a permanent base on the moon and a crewed mission to Mars, comparing his plan to the spirit of discovery embodied in the voyage of Columbus (Tyson 2012:7-8).

The widgets of the twenty-first century are tangible pieces of technology, once and future fruits of science, created to improve the lives of human beings, enrich industry, and empower the military. In this transition from discovery to mastery, science finds itself colonized by its own sub-field, technology, raising a new and wholly unprecedented set of social, ethical, and political conundrums (David 2005:25-50). In this post-atomic age, science is a part of society, an establishment, an institution, a bureaucracy, a source of

authority, and it is alongside this development, and with this in mind, that a need for the sociology of knowledge has arisen (see Bijker, Bal, and Hendriks 2009; David 2005).

A sort of optimism emerges, a hope that the problems faced by humanity, even the problems that are themselves caused by technology, will be solved by appeals to the same kind of technology. Yet various doubts loom large as well. Both are today manufactured and sold alongside the rest of the technological fruits of our Faustian transition toward scientific mastery. In this mastery the sociopolitical origins of knowledge stand forth ever more glaringly, as do some of the formidable consequences of the rise of technocracy. The stakes are high, the repercussions global, on our flight, with Daedalus and Icarus, into the sun. We have come to find ourselves in possession of the means to precipitate our own extinction. I turn first to a tale that leads from the ancient speculations of Greek philosophers to the atomic age, and beyond.

4.1 An Ocean of Time

Perhaps there is a sense of wonder, of curiosity, that burns within all of us, back to the earliest nomadic human beings who found themselves staring at the stars. Sophisticated tales that resemble the creation stories of the religions of the world abound, and can be found among some of the last few remaining hunter/gatherer societies on the planet, such as the !Kung bushmen, who look up at the hazy band of light that is the edge-on view of the Milky Way galaxy and see the spine of a great beast. We reside in the belly of the beast, and without the Milky Way galaxy, the spine of the beast, the darkness would fall all around us. Such stories help us to feel at home in the universe (Sagan 2013:178-9; Campbell and Moyers 1988).

Yet there is another way of viewing the world, one that arose some two and a half millennia ago among the Ionian peoples clustered amid an archipelago in the

Aegean Sea. There was Thales of Miletus, who allegedly predicted a solar eclipse, was able to measure the height of structures by examining the length of their shadows and the angle of the sun, and proved some of the geometric theorems three centuries before Euclid, such as the angles at the base of an isosceles triangle are equal. Thales had a friend and colleague, Anaximander of Miletus, who used the moving shadow cast by a stick to accurately predict the length of a solar year and the changing of the seasons. He speculated that humans arose from earlier species of animals, and that life itself originated in mud when spiny fishes began their trek onto dry land. Theodorus invented the ruler, the carpenter's square, and the level, among other technologies, around the same time that Hippocrates, from whom the modern Hippocratic oath in medicine originates, began accumulating medical knowledge through trial and error. Empedocles was the first to discover the existence of air, something all but young children take for granted today, by demonstrating how a vacuum permitted water to enter a vessel called a clepsydra (Sagan 2013:182-8).

It was in this climate that the first leading protagonist of our tale, Democritus of Abdera, developed his thoughts. Democritus declared over two thousand years ago that "bitter and sweet are opinions, colour is an opinion—in truth there are atoms and the void." (Quoted in Feyerabend 1987:49). The word atom in his language meant 'unable to be cut', and in his words one can hear the stirrings of what would today be called philosophy. Democritus brought to life many concepts recognizable today as forbearers of physics, cosmology, and astronomy. He is credited with speculations that led to the limit theorems of calculus, and the discovery that galaxies, like our own, the Milky Way, are composed of unresolved stars (Sagan 2013:188-9).

Not all modern thinkers view Democritus in a favorable light. Philosopher Paul Feyerabend argued that "Democritus' atomism did not add to knowledge; it was parasitic

on what others had found in a non-theoretical way, as Democritus himself concedes" (Feyerabend 1987:70). Physicist Stephen Weinberg notes that "As an undergraduate studying philosophy I felt some pain at hearing Hellenic philosophers like Thales and Democritus being called physicists; but, when it came to the great Hellenistics, to Archimedes in Syracuse discovering the laws of buoyancy or Eratosthenes in Alexandria measuring the circumference of the earth, I felt at home among my fellow scientists" (Weinberg 1992:10). A distaste toward speculative theorizing, a hesitation to call scientific that which has not, or cannot yet be, subjected to experimentation, reappears. The parasitism of which Feyerabend accuses Democritus might also be called connectedness, and it is a fundamental aspect of the scientific conversation.

This tension is more profound than it first appears, reaching far beyond the fact that the atom of Democritus was not the atom of modern particle physics. A tension that has defined the intellectual life of the Western world manifested itself between the Ionians, who, though they are today referred to as pre-Socratics, and the schools of thought that emerged later with Plato and Pythagoras; with the Stoics and the Epicureans (Hadot 2002). The Ionians were merchants and artisans; they worked with their hands, and this in part led to their interest in observation and experiment. The Athenians engaged primarily in contemplation, and much of the later philosophical work begins to look more like spirituality or self-help than science, placing an emphasis on how adherents could find inner peace and live the good life rather than learn how the natural world works. Weinberg sums this up nicely when he discusses Aristotelian physics: "Aristotle describes the motion of a projectile as being partly natural and partly unnatural; its natural motion, as for all heavy bodies, is downward, toward the center of things, and its unnatural motion is imparted by the air, whose motion can be traced to whatever started the projectile in motion. But just how fast does the projectile travel along its path,

and how far does it get before it hits the ground? Aristotle does not say that the calculation or measurements are too difficult or that not enough is yet known about the laws of motion to give a detailed description of the projectile's motion. Rather, Aristotle does not offer an answer, right or wrong, because he does not realize that these are questions worth asking" (Weinberg 1992:8).

In such times, it was these proto-scientists who saw the world from the ground and the grand theorizers in Plato and Socrates who saw it from the sky. This tension remains with us today. Weinberg later devotes a later chapter in the same volume called "against philosophy" to expounding upon his own views of this tension, while astronomer Carl Sagan details the rise, with Pythagoras and Plato, of appeals to authority coming to supplant and repress these fledgling Ionian empiricists. I see a social class component in the turning of the tide away from experimentation as a form of labor and toward contemplation as the exalted way of life. Aristotle believed that "The slave shares in his master's life; the artisan is less closely connected with him, and only attains excellence in proportion as he becomes a slave. The meaner sort of mechanic has a special and separate slavery" (Sagan 2013:196).

One can only wonder what Aristotle would have said about today's scientific endeavors, particularly those discussed by Michio Kaku as indicators of the dawn of a new era of scientific mastery. Engineers and technicians populate the pages of his work, taking shape around a tripartite set of revolutions: that of the quantum revolution, the biomolecular revolution, and the computer revolution (Kaku 1997:7-9). The scientific knowledge that has revolutionized our world contains within it a great deal of manual labor—in fact, we are only able to benefit from the technological fruits of the scientific revolution because of manual labor. Someone had to build it, and someone had to install it. Consider that the invention of electric light or indoor plumbing or air conditioning or

automobiles and how each invention has profoundly changed the way we live our lives. But these inventions would be largely irrelevant to us, however clever or useful, were it not for the armies of electricians and plumbers and mechanics and technicians who keep the modern world in motion. It would seem that we collectively need Aristotle's "meaner sort of mechanic" more now than ever in history.

It has been argued that appeals to authority and revelation over experiment espoused by the philosophers in the Platonic tradition laid the foundation for both Christianity and Western Civilization, and that this tension between differing types of philosophy in antiquity is reflected in the tension between science and religion in the present (Foster, Clark, and York 2008). Others have viewed Plato as a sort of reactionary, opposing the fledgling Athenian democracy in favor of dictatorship (Popper 1962; Stone 1989). The difficulties are deeper still, and can be characterized by examining the relationship between Socrates and Plato in the terms set out by Karl Popper, who reserved great admiration for Socrates while heaping equally great condemnation upon Plato. In particular, what is most relevant to the task at hand is the relationship between education and politics espoused by each.

In Popper's reading, Socrates espouses a sort of anti-authoritarianism which coincides with the rise of democracy and experimental science, linking education to politics in a specific manner: "The true teacher can prove himself only by exhibiting that self-criticism which the uneducated lacks. 'Whatever authority I may have rests solely upon my knowing how little I know'…This educational mission he believed to be also a political mission. He felt that the way to improve the political life of the city was to educate the citizens to self-criticism" (Popper 1962:130). Socrates saw himself as a philosopher, a lover of truth and a seeker of truth but not a possessor of it. For one does not seek what one already has. In this way he differentiated himself from other 'wise

men', particularly the Sophists, who were paid professional purveyors of rhetorical skills (see Warmington and Rouse 1999).

To link education and politics in this sense is to endeavor toward a society which values sober, nonpartisan examination of evidence, precisely the type of society that would be expected to hold science in high esteem. Contrast this to Plato's view of education and of the philosopher a la Popper: "His lover [of truth] is no longer a modest seeker, he is the proud possessor of truth. A trained dialectician, he is capable of intellectual intuition, i.e. of seeing and of communicating with the eternal, the heavenly Forms or Ideas…It is hard, I think, to conceive a greater contrast than that between the Socratic and Platonic ideal of a philosopher. It is the contrast between two worlds—the world of a modest, rational individualist and that of a totalitarian demi-god" (Popper 1962:132). Plato's philosopher seems to already have what Socrates still seeks. And while Socrates' philosopher is a teacher, a freewheeling questioner of every sort of authority, Plato's philosopher *is an authority*. How easily the shift is made, from the seeker of wisdom to the possessor of wisdom and what profound consequences result in the arenas of both education and politics! In the wake of this realization, a myriad of hard questions arise out of the modern transition from scientific *discovery* to scientific *mastery*, from ideas to institutions, and from curiosity to commodity, inaugurated by the construction and deployment of the atomic bomb.

4.2 Dividing the Indivisible, or "There's No Such Thing As Scientific Neutrality"

Democritus was wrong about the atom in at least one sense: the atom was further divided in the 1940s at the height of World War II, when German physicists had determined that the uranium atom could be split into two smaller atoms of beryllium, releasing neutrons which could then split other uranium atoms in a process called fission,

producing a chain reaction that led to the potential for the most devastating explosion in the history of humanity (Caiazza 2007:111). When in August of 1945, at the close of the Second World War, the United States dropped the atomic bomb on the Japanese city of Hiroshima, a new era began which sociologist of science Matthew David (2005) viewed as the Third World War; the Cold War between the Soviet Union and the United States. It was in this third war that the sociology of science came to be, as the ancient Socratic-Platonic connection between education and politics took complex new forms. On one hand, widespread critiques of science stemming from the nuclear debate and environmental degradation resulted in a renewed attempt to re-separate fact from value, assigning to scientists the arena of producing fact, and to society, the responsibility to decide how to use said facts. "Whether knowledge was used for good or ill, so the argument of scientific neutrality ran, was not the ethical responsibility of the scientist, or the scientific community. While physicists might have developed the theory and split the atom, it was for 'society' to choose whether this knowledge be applied to the making and using of nuclear bombs, for the production of electricity in nuclear power stations, or not used for either purpose…In exchange for expanded budgets and social status, science had, in large measure, withdrawn from questioning the established order" (David 2005:18-9; see also Rose and Rose 1976).

Positivism gradually gave way to naturalism, which basically just formalized the epistemology of the natural sciences. The results are almost self-evident: "Scientific method does not interpret; only those who use it do. Yet socially speaking the interpretation is as important as the method itself" (Riepe 1969:84). The conception of scientific neutrality represents a shift away from the Socratic method of rigorous skepticism and toward a Platonic conception of expert authority, but it is a shift that has largely failed to occur, for in the days that have followed since the United States dropped

an atomic bomb on Hiroshima, it is abundantly clear that scientists and academics have become more involved in ethical and political decision-making, not less. For example, a recent work by nuclear scientist Frank Barnaby (2004), entitled How to Build a Nuclear Bomb, details the disturbing scenarios arising in a post-Third War smorgasbord of weapons of mass destruction (Barnaby 2004). It is a work written not for his fellow nuclear scientists but a sober warning to the general public that serves to raise awareness of the dangers we face, more so today than ever before, from such weapons.

An apparent lack of scientific neutrality does, however, call into question elements within the classical Mertonian sociology of science paradigm, specifically Merton's views on disinterestedness, the view that scientists by training successfully avoid vested interests in particular points of view, and organized skepticism, the view that the institutions of science would serve truth apart from the potential distortions of political and economic influence (Merton 1993; see also David 2005:10-3). This is not a critique of the scientific method per se, but the culmination of the ongoing analysis that has dominated the first half of this work: that of revealing the humanity of science through the sociology of knowledge.

Renowned physicist Albert Einstein was an avowed pacifist whose views shifted with the rise of Nazi Germany. Upon the first successful construction and testing of the atomic bomb, Einstein wrote a letter to President Franklin D. Roosevelt warning of the bomb's devastating effects, but the president died before he had a chance to read it. Einstein was convinced Roosevelt would not have allowed the bombing of Hiroshima had he remained alive (Calaprice 1996:77,113-7). It is likely that the first draft of this letter was written by Hungarian Jewish theorist Leo Szilard, who narrowly escaped Germany in 1933. While Hitler invaded Poland and rounded up the Jews, the pioneers of nuclear physics were already warning about the destructive potential of a new class of weapon

(Herken 2002:24-5). Decades later, chemist Linus Pauling became the only person in history to be awarded two unshared Nobel prizes when he received the Nobel Peace Prize for his tireless crusades to halt the aboveground detonations of thermonuclear weaponry, culminating in the Limited Test Ban Treaty of 1963 (Sagan 1995:417-8).

The story that led to the creation of the atomic bomb is a high drama unto itself, a story filled with surprising twists and moral ambiguity to rival a Shakespearean play. This story begins in 1929, when a twenty-eight-year-old associate professor of physics arrived at the University of California, Berkeley and rather promptly stumbled upon the notion that magnets could be used to accelerate particles around a circular track. The man's name was Ernest Lawrence, and the circular track came to be called the cyclotron, the ancestor of the 'atom smasher' for which the young physics professor won the Nobel Prize some ten years later (Herken 2002:3-27).

After hitting a series of stumbling-blocks, Lawrence began to realize that he lacked the theoretical foundations to continue his pursuits, and he found the answer in a twenty-five-year-old chain-smoking theorist with a bohemian tendencies who had been hired by Berkeley shortly before he had, but had wound up delayed in Europe finishing postdoctoral studies (Herken 2002:11-3). This young man was Robert Oppenheimer, affectionately called "Oppie" and would later come to be known as "father of the A-bomb" (Caiazza 2007:116). A third member of this modern-day great triumvirate entered into the 'brotherhood', a Hungarian-born physicist Edward Teller, who walked with a limp after losing part of his right foot in a streetcar accident and bore the psychic scars of the Bela Kuhn communist revolution that saw his middle-class family's property seized (Sagan 1995:284). Teller was also the means of communication between Szilard and Einstein, ferrying the former to the latter in his old Plymouth. His dour intensity and fragile ego were the stuff of rumor among his colleagues (Herken 2002:24-5).

Of the three men, only Oppenheimer was initially drawn to politics. The first falling-out between Oppenheimer and Lawrence occurred when Oppenheimer, a long-time left-wing political activist, used a laboratory chalkboard to announce an upcoming benefit for the Spanish Loyalists who fought overseas against a fascist regime. For Lawrence, this was deeply offensive—Oppenheimer was urged to never again bring politics into the laboratory. In fact, for Lawrence, Oppenheimer's "leftwandering"—which Oppenheimer likened to a moral duty to help the less fortunate—was a hindrance to the project at hand, and might lead to Oppenheimer being denied requisite security clearances.

Meanwhile, Teller, who had been present when Einstein signed the letter to FDR urging against the use of the atomic bomb, was moved to aid in the war effort by Roosevelt's appeal that scientists "act together to protect and defend, by every means at our command, our science, our culture, our American freedom, and our civilization" (Herken 2002:32-55). Three physicists, brilliant by any standard—one, Lawrence, who found himself heroically clinging to the doctrine of scientific neutrality, while another, Teller, championed science for military use, and a third, Oppenheimer, advanced leftist causes. In fact, in his younger years, Oppenheimer associated with active members of the Communist Party, and this served to later arouse suspicions that haunted him for the rest of his life, particularly decades later, when he found himself under fire from a political opponent who was then the head of the Atomic Energy Commission (Herken 2002; Sagan 1995:285; Caiazza 2007:116-7). Teller, on the other hand, went on to become 'the father of the hydrogen bomb,' a weapon with exponentially more destructive potential than the fission bombs dropped on Hiroshima and Nagasaki, actively promoting the device for both military and non-military uses (such as leveling mountains, dredging, and other activities involving changing the Earth's landscape) while leading the criticism of the

doomsday ‘nuclear winter’ scenario that models predicted would occur in the aftermath of a full-scale thermonuclear exchange (Oreskes and Conway 2010:47-59; Herken 2002:66-7; Sagan 1995:286-9).

Oppenheimer became another pioneer placed on trial, marking a third great leap toward an ever more scientific modernity. First, the realization that the earth is not the center of the universe shook the views of the cosmos as tailored to human needs to its foundations, and second, the discovery that humans are biologically related to every other living thing on the planet fundamentally changed, and is changing, the way we conceive of humanity. The aftershocks of Darwin and Galileo were still very much alive and well when Lawrence, Oppenheimer, and Teller began the journey toward the most destructive weapon in history. But the collateral damage was related to the political and ethical fallout, for how, a bystander could reasonably ask, could three men who began their journeys in such similar places find themselves in such disparate positions?

The first issue is one of scale. Lawrence built his first model cyclotron for $25, and he attached it to a kitchen chair with a clothes hanger, while by the time the Manhattan Project got underway, millions of dollars had been invested to employ teams of scientists in massive spaces that housed state-of-the-art equipment (Herken 2002). In this example, a momentous transition can be witnessed, the journey that made science itself an object of study in the social sciences. Andrew Webster (1991) suggests that “The very nature of scientific inquiry within the laboratory is changing precisely because experiments tend to be the work of teams of scientists rather than isolated individuals beavering away at a laboratory bench. These teams rely on increasingly costly and complex instruments and apparatus and, most importantly, require collaboration across a range of disciplines” (Webster 1991:3). In other words, the Manhattan Project marks a decisive transition from ‘Little Science’ to ‘Big Science’ (Price 1984). Scientific authority

in effect becomes a double entendre—scientific authority in the pre-Socratic sense may have been exhausted by a set of crude tools, an inquisitive mind, and the sketch of a methodology, a starting point of 'questioning everything.' But in this age of 'Big Science,' such a toolkit is no longer sufficient, for we as individuals possess neither the increasingly expensive equipment nor the increasingly specialized expertise to conduct the research for ourselves. In this era, scientific authority has taken on a new, more Platonic meaning: *trust the experts, and obey them, for they know better than you do*. In response to this transition, political institutions have arisen to cope with the increasingly complex interplay of a science that has been drawn irrevocably into the realm of social discourse, institutions which are themselves entities worthy of sociological study. Consider, for example, a revealing ethnography of the internal workings of the Geshondheidsraad, a Dutch science foundation that performs tasks in many ways similar to those engaged in by the National Academy of Sciences in the United States (Bijker, Bal, and Hendriks 2009). Policy decisions are made by scientist-politicians under conditions partially removed from the ideals of scientific neutrality by public, political, and economic pressures and constraints.

Having discussed the issue of scale, I turn now to a related issue of conflict and contingency. Lawrence's $25 cyclotron was not constructed with the intention of building a nuclear weapon. In fact, Lawrence and his colleagues envisioned several non-military uses for his invention. The cyclotron represented a new source of scientific research and discovery, though fraught from the beginning with dangers, and a potentially unlimited source of energy. For one of his graduate students, David Sloan, it became a means to use radiation to shrink tumors, with ever broader implications as a tool for detecting and combatting disease (Herken 2002:3-23). Yet what the cyclotron set in motion was

something far different. Part of the reason for this change lies in the events that occurred between the end of the 1920s and the 1940s: World War II.

In order to understand how the progression from Little Science to "Big Science" unfolded, I return to the speech by George H.W. Bush, cited earlier in this chapter, calling for a return to the moon with his Space Exploration Initiative in 1989. A quarter of a century later, it still has not happened. Why? The cost of Bush's plan was "a coffer-constricting, Congress-choking price tag of $500 billion over twenty to thirty years. Was it any more than Kennedy got [for the Apollo program]? No. It was less…The opposite outcomes of these two speeches [Kennedy and Bush] had nothing to do with political will, public sentiment, persuasiveness of arguments, or even cost. President Kennedy was at war with the Soviet Union, whereas President Bush wasn't at war with anybody. When you're at war, money flows like a tapped keg, rendering irrelevant the existence or absence of other variables, charisma included" (Tyson 2012:8). The cyclotron itself benefitted immensely from World War II, but exploration and discovery took a back seat to military demands and applications. Under different geopolitical circumstances, the cyclotron might have remained a scientist's pet gadget.

In short, priorities shift when a nation is at war. This is hardly new or counterintuitive. The advancement of science, based as it is on so many decidedly non-scientific factors, leads inevitably to new roles for scientists themselves. In this era of Big Science, scientists find themselves battling for funding to continue projects with great promise to their respective fields, somewhat akin to captains of industry battling it out in the marketplace. As a modern example, consider the ill-fated Superconducting Supercollider to be constructed in Texas, which was approved in the 1980s and subsequently abandoned in favor of the International Space Station, a means to 'bury the hatchet' with Russia following the end of the Cold War. "Once again," Tyson notes wryly,

"politics and war trumped the urge to discover" (Tyson 2012:6-7). It should not be surprising that physicist and Nobel laureate Steven Weinberg, who frequently testified before Congress in favor of the Supercollider, heaped scorn on the International Space Station, calling it an "orbital turkey" that "has produced nothing of scientific value," viewing the increased funding to NASA as a reflection of "an infantile fixation on putting people into space, which has little or no scientific value" (Weinberg 1992:241-75; Tyson 2012:10).

What lesson can be learned from the long journey from Democritus to Hiroshima? Science is complex and expensive, and is likely to get more so. The continuation of science is dependent upon funding, and the sources of that funding conform to norms and forces that may not align with, and may indeed be irreconcilably at odds with, scientific discovery. Knowledge has become a tool, a widget, wielded with authority by experts, bought and sold by entrepreneurs and politicians. In the next section, Big Science will take center stage in another series of looming crises that have manifested themselves in the second half of the twentieth century, serving to illustrate the polarization and fragmentation of knowledge predicted by Mannheim around the same time that Lawrence built his little model cyclotron.

4.3 The Dawn of Doubt and the 'Third Way'

Futurists who hold out the hope for a brave new world promised by science, reaching upward toward the stars to which that future promises to take us, have developed a typology for this future. Physicist Freeman Dyson and astronomer Nikolai Kardashev labeled civilizations according to their energy usage as Type I, II, and III civilizations (Kaku 1997:17-9). Where are we today? We are at present a Type 0 civilization—we do not yet even register on this scale. "A Type I civilization has mastered

all forms of terrestrial energy. Such a civilization can modify the weather, mine the oceans, or extract energy from the center of their planet. Their energy needs are so large that they must harness the potential resources of the entire planet. Harnessing and managing resources on this gigantic scale requires a sophisticated degree of cooperation among their individuals with elaborate planetary communication. This necessarily means that they have attained a truly planetary civilization, one that has put to rest most of the factional, religious, sectarian, and nationalistic struggles that typify their origin" (Kaku 1997:18). This is a story about the sort of doubt that emerges in relation to this future.

The first element of this doubt is related to the mastery of the planet. Already the disturbing ecological repercussions of viewing the Earth merely as a source of raw material have manifested themselves. Rather than conceiving of the planet as a giant battery cell waiting to power the widgets of the future, some have come to view the Earth as "a gigantic banquet. Hundreds of millions of people come to eat. They eat and drink to their hearts' content—eating food that is better and more abundant than at the finest tables in ancient Athens or Rome, or even in the palaces of medieval Europe. Then, one day, a man arrives, wearing a white dinner jacket. He says he is holding the bill. Not surprisingly, the diners are in shock. Some begin to deny that they partook of the meal. One diner suggests that the man is not really a waiter, but is only trying to get attention for himself or to raise money for his own projects. Finally, the group concludes that if they simply ignore the waiter, he will go away" (Oreskes and Conway 2010:266). The waiter has arrived, and many have concluded that they are better off simply ignoring him. This is a story that begins in the most unlikely of places, and has taken center stage in the public arena.

This tale begins with a man named Ben Santer, a distinguished scientist who has been studying the earth's climate since the 1980s. He and his colleagues are the source

of compelling evidence that the earth's climate is warming, and that human activity, not natural occurrences, are to blame (Oreskes and Conway 2010:1-2). For this, Santer became the target of an ongoing political assault: "Santer had impeccable scientific credentials, and he had never before been involved in even the suggestion of impropriety of any kind, but now a group of physicists tired to a think tank in Washington, D. C. accused him of doctoring the report to make the science seem firmer than it really was…They wrote reports with titles like "Greenhouse Debate Continued" and "Doctoring the Documents," published in places like Energy Daily and Investor's Business Daily. They wrote letters to congressmen, to officials in the Department of Energy, and to the editors of scientific journals, spreading the accusations high and wide. They pressured contacts in the Energy Department to get Santer fired from his job. Most public—and most publicized—was an op-ed piece published in the Wall Street Journal, accusing Santer of making the alleged changes to "deceive policy makers and the public" (Oreskes 2010:3)."

Ben Santer later learned of distinguished Cold War physicist Fred Seitz, who had distributed nearly fifty million dollars under the auspice of the R.J. Reynolds tobacco company to generate biomedical research that could be used to defend the tobacco industry in court. Santer learned, too, that Fred Singer had later written a report attacking the surgeon general's finding that secondhand tobacco smoke was harmful using a grant from the Tobacco Institute channeled through a think tank. These men had played an eerily similar role in attacking Santer's climate change research, and they and many other scientists used similar strategies and resources when challenging scientific research on everything from asbestos to acid rain (Oreskes and Conway 2010:5-6).

Other looming questions elicited a similar sense of polarization, such as the TTAPS paper of 1983, in which five leading scientists outlined the doomsday scenario

that would follow in the wake of an all-out nuclear exchange. The original title for the paper was “Nuclear Winter: Global Consequences of Multiple Nuclear Explosions,” and it was immediately controversial. Later data showed that the original estimate—that the result of nuclear war could be a full 35o C drop in global temperatures, was reduced to a 10-20o drop by later models generated by the same group, in what one scientist sardonically called “nuclear autumn” (Oreskes and Conway 2010:50-4). In his final work Carl Sagan (the ‘S’ in TTAPS, an acronym for the authors’ names) acknowledged the controversy in which he had become embroiled, pointing out that the original paper suggested 15-20 degrees, and that later figures were actually closer to 10-15 degrees, but that “Both temperature declines are much greater than the difference between current global temperatures and those of the last Ice Age” (Sagan 1995:286).

Throughout the Cold War era, tempers heated up among US scientists over the development of a ballistic missile system as a defense against nuclear warfare, which came to be called the Strategic Defense Initiative. One of its notable proponents was none other than Edward Teller, the ‘father of the hydrogen bomb’ himself, as well as Fred Seitz, who, with Robert Jastrow, began an anti-communist science-and-policy think tank called the George C. Marshall institute, which they used to demand equal time to debate the merits of such a system (Oreskes and Conway 2010:54-9). It was under the Reagan administration that the Strategic Defense Initiative became a ‘hot-button’ issue, as some argued that it would escalate rather than curtail the risk of nuclear war with the USSR. According to Sagan (1995), “Ten thousand American scientists and engineers publicly pledged they would not work on Star Wars or accept money from the SDI organization. This provides an example of widespread and courageous non-cooperation by scientists (at some conceivable personal cost) with a democratic government that had, temporarily at least, lost its way” (Sagan 1995:288).

In the end, it would seem the scientific fallout of the atomic bomb is still very much with us. Edward Teller was still active into his nineties as a scientist and advocate of both the hydrogen bomb and associated new technologies like SDI. And where Oppenheimer had reportedly declared after the use of the atomic bomb against the Japanese, that "physicists had known sin", Teller reportedly added: "I would say that physicists have known power" (Herken 2002:334). But Edward Teller did not merely promote the hydrogen bomb as a tool of power in an ominous militaristic sense—he was a promoter of world government, believing that the hydrogen bomb was a weapon large and terrible enough to necessitate the move away from nationalism (Dyson 1984:236). Teller imagined that hydrogen bombs could be used for many purposes, including the creation of harbors, canals, and other means of transforming the Earth's surface as well as scientific research. He tirelessly supported nuclear energy, and advocated experimenting with using nuclear weapons to destroy or deflect asteroids that might pose a threat to the existence of the human species (Sagan 1995:284-9). If Teller could be accused of anything, it would be an unabashed faith in technology as a wellspring of human progress.

Some would call such faith "technofideism" and argue that it is misplaced. They also point to the source of resistance to climate change evidence and the denial or downplaying of ecological repercussions of human activity as linked to a Cold War view of politics that would place environmentalism, and its apparent challenge to free market economics, in the spectrum of communist ideology (Oreskes and Conway 2010:246-65). There is still controversy, still political polarization when it comes, in particular, to the issue of global warming. Specifically, are humans causing it? What should be done? Who should do it? And how much priority should it be assigned? (Jones 2014; Saad 2014; Motel 2014). This polarization is evident, as was noted in Chapter Two, regarding

evolution. In a world in which science is institutionalized, dissenting scientists can form their own think-tanks and generate their own data, particularly, as we have seen, when a great deal of money stands to be made, or lost.

Yet there is more at stake: nuclear weaponry and environmental threats represent questions of survival, the survival of a way of life, the survival of civilization as we know it, and even the survival of the human race. The stakes have never been higher—one may even be tempted, with Freeman Dyson, to divide the debate into those who believe in survival and those who do not (Dyson 1984:16-27). Would a full-scale thermonuclear exchange end civilization? Can science and technology coupled with free enterprise solutions prevent environmental collapse? These high-stakes questions have much in common. In 1984 Dyson wrote: "Since the believers in survival and in nonsurvival have failed for thirty-five years to convince each other, I propose to break the deadlock by adopting dogmatically a third position. My dogma is that the question of survival is undecidable. There is no way, short of actually fighting a nuclear war, to find out whether anything worth preserving would survive it…The dogma of undecidability is not just an abstract proposition. It has immediate practical consequences" (Dyson 1984:23-4).

Dyson speaks elsewhere in the same volume about the problem of communication between 'the world of the warriors' and 'the world of the victims'. The warriors "share a common language and a common style. Their style is deliberately cool, attempting to exclude overt emotion and rhetoric from their discussions, emphasizing technical accuracy and objectivity, concentrating attention on questions of detail which can be reduced to quantitative calculation. The style of the warriors is congenial to professional scientists and historians, who base their work on factual analysis rather than on moralistic judgment. The philosophical standpoint of the warriors is basically

conservative, even when they consider themselves liberal or revolutionary" (Dyson 1984:4). On the other hand, "The world of the victims is the world I see when I listen to my wife's tales of childhood in wartime Germany, when we take our children to visit the concentration camp at Dachau, when we go to the theater…when we read (other) books which truthfully record the human realities of war, when we sit with a crowd of strangers in church and hear them pray for peace, or when I dream my private dreams of Armageddon. The world of the victims is not male-dominated. It is, on the contrary, women-and-children-dominated" (Dyson 1984:5).

This Third Way, this dogma of undecidability, is vaguely reminiscent of Mannheim's attempt to find a third way to escape the trap of ideology, to attempt once more to peer past the polarization as wealth, power, and politics have found their way into institutionalized science (Mannheim 1936; see also David 2005:6-7). It is also a heartfelt effort to engage two disparate worlds with one another in an effort to address potentially world-ending problems. It demands, in a deep sense, new roles for scientists that are reminiscent of the Socratic teacher who seeks wisdom by questioning everything while also engaging in a deeply moral and empathetic journey, blurring the line between fact and value without obfuscating their separation. This third way represents yet another historical attempt to transcend opposites compellingly laid out by C.P. Snow in his essay Two Cultures and the Scientific Revolution, where Snow, an experienced scientist and successful novelist, describes the great disconnect between the worlds of science and the humanities. He postulated a third culture, bridge-builders, who could find a way to communicate with the world outside academe, neither scientists nor humanists but in a sense both, and neither (Giberson and Artigas 2007:5-7; Wilson 1998:125-6; Gould 2003:89-97).

But I am getting ahead of myself. In this first section, I have delineated the humanity of science by analyzing the discoveries and repercussions of physics, discussing the polarizing effects of evolution, and noting the rise of institutionalized, technological, geopolitically-aware science. Out of these three chapters emerges three discoveries that are of particular interest from a sociology of knowledge perspective: first, the loss of the human conceit that we are the center of the universe beginning with Copernicus and Galileo; second, the potential social and ethical ramifications of Darwinian evolution via natural selection, the 'grand unified theory of biology'; and third, the Manhattan Project, climate change, and the rise of 'Big Science'. In the next section, a fourth discovery will be examined in light of historical and cultural phenomena that from this point of view rivals these three. In the next chapter, I will discuss the Internet as it relates to the sociology of knowledge.

Chapter 5

Enlightenment for All

> Science is wonderful at destroying metaphysical answers, but incapable of providing substitute ones. Science takes away foundations without providing a replacement. Whether we want to be there or not, science has put us in a position of having to live without foundations. It was shocking when Nietzsche said this, but today it is commonplace; our historical position--and no end to it is in sight--is that of having to philosophize without foundations.
>
> -Hilary Putnam, *The Faces of Reality*

Emile Durkheim is regarded by many as a founding father of academic sociology. His theoretical and empirical work is to this day widely read and regarded. Durkheim writes, tellingly, that "For a long time it has been known that the first systems of representations with which men have pictured to themselves the world and themselves were of religious origin. There is no religion that is not a cosmology at the same time that it is a speculation upon divine things. If philosophy and the sciences were born of religion, it is because religion began by taking the place of the sciences and philosophy…It is quite another matter with magic. To be sure, the belief in magic is always more or less general; it is very frequently diffused in large masses of the population, and there are even peoples where it has as many adherents as the real religion. But it does not result in binding together those who adhere to it, nor in uniting them into a group leading a common life" (Quoted in Emerson, Mirola, and Monahan 2011:9-13). This is a story about the threads that weave together religion, science, magic, and the successive revolutions of the written word.

There are several elements that bear further examination in this context. The first is the history of the written word and the advent of writing. The second is the

democratization of knowledge, and how various technological, economic, and historical developments have served to make the written word available to an ever-increasing number of people. The third is the rise of a new and unprecedented technology, the Internet, and how it has changed the way we think, interact, and acquire and process knowledge. This is a story of where and how science, religion, and magic meet, how each has evolved in relation to the others, and what each stands to gain—or lose—in the anxious, high-stakes modern quest toward enlightenment for all.

5.1 The History of History and the Written Word

Writing had been around for thousands of years before Socrates and Plato traded ideas in ancient Greece. Sumerian pictographic writing predated their debates by millennia, and later took the form of etched signs known as cuneiform (Spielvogel 2000:14-5). Why then are we not still reading and discussing ancient Sumerian philosophy? What was different? Could it be, at least in part, linked to the fact that the Greeks were the first to develop a phonetic alphabet, thereby making it possible for the many rather than the few to participate in writing? With less characters, fewer cognitive resources needed to be employed in writing, making the process more efficient, requiring the author to use less memory (Wolf 2007).

It is rather odd that in the Republic, Plato had his interlocutor, Socrates, deliver a sustained attack on poetry, especially since it was Plato who captured the dialogues of Socrates, as Socrates never wrote anything down, and it is assumed as a matter of convention that some dialogues are actually the words of Socrates, while others are the words of Plato (Warmington and Rouse 1999:246-311; Stangroom and Garvey 2007:8-15; Griswold 2014). I bring up the origins of writing and Athenian philosophers to draw attention to two facets of the written word that were irrevocably changed back in ancient

Greece. The first is memory, which will become significant later. The second anticipates the end of memorizing and recitation, the twilight of an age of oral storytelling. For as Plato attacked poetry he also seemed to realize, in part by doing what his master did not, the benefits of recording spoken dialogue as the written word. Something was gained, but something else was potentially lost: "The oral world of our distant ancestors may well have had emotional and intuitive depths that we can no longer appreciate" (Carr 2011:56, 51-7). Who today can recite an epic poem from memory?

Writing took off rather rapidly, culminating in the Egyptian Library of Alexandria, which at its height boasted perhaps over half a million scrolls. Here also there was a museum, a word that originally meant 'a place devoted to the Nine Muses,' and what might have been the world's first true scientific research institute (Sagan 2013:16). The library was destroyed shortly after its final caretaker, Hypatia, a woman who headed the Neoplatonic school of philosophy and was skilled in mathematics, physics, and astronomy, met a grisly death at the hands of a mob (Sagan 2013:355-7). The destruction of the library did not mean the end of books, nor of the changes to their readers that came with them.

For a long time, slow, laborious copying of books by hand was the order of the day, and it was carried out by a relatively small intellectual elite, until the twelfth century, when carved wooden blocks came to make printing easier and more efficient. From there it was the ingenuity of German goldsmith named Johannes Gutenberg, and the funds of an affluent neighbor, Johann Fust, that led to the first movable type press. By the sixteenth century, printing became one of the largest industries in Europe, and likely helped to spur the Protestant Reformation, for one of Gutenberg's highest hopes was to use his printing press to print the Bible (Spielvogel 2000:344; Carr 2011:68-9). For the first time, people had access to the written word on a massive scale. The Bible could be

read, and in principle interpreted, by anyone who could read. Books could be mass-produced for profit, and inevitably new forms of literature arose. “Along with the high-minded came the low-minded. Tawdry novels, quack theories, gutter journalism, propaganda, and, of course, reams of pornography poured into the marketplace and found eager buyers at every station of society” (Carr 2011:71). Exemplifying this new literary explosion is an Italian miller of the late sixteenth century, known today only as Menoccio, who generated his own creation myth: “I have said that, in my opinion, all was chaos, that is, earth, air, water, and fire were mixed together, and out of that bulk a mass formed—just as cheese is made out of milk—and worms appeared in it, and these were the angels. The most holy majesty decreed that these should be God and the angels, and among that number of angels, there was also God, he too having been created out of that mass at the same time” (Quoted in Numbers 2007:13-4; see also Ginsberg 1980:52-3). The Inquisition, unsurprisingly, was not impressed, and convicted him of heresy. Menoccio’s story is another indicator of the diffusion of knowledge from religious and educational establishments into the hands of the public. Whatever we may think of Menoccio’s homey cosmogony, it represents an independent effort to make sense of the world apart from and, in conflict with, orthodox channels.

Concordant with, but in part prior to, this rise in the availability of literature came the Intellectual Renaissance of Italy, and with it, the first stirrings of what would later be called humanism. Fourteenth century humanism stressed the study of what are often today called the humanities: subjects such as poetry, philosophy, and history. In this era, many of the classic thinkers were being rediscovered, which gradually led to a sort of ‘civic humanism’ in the fifteenth century which reflected a new interest in politics and public life. Later, humanism took a more philosophical-historical turn, focusing on human rather than divine intervention through history as well as developing secular schools

aimed at developing well-rounded, complete human beings rather than just scholars. It is from this conception that the phrase “Renaissance man” emerges, and it was precisely some of these early secular intellectuals who first objected to the mass printing of books, seeing in it ‘vulgarization’ (Spielvogel 2000:338-44).

These proto-intellectuals were increasingly being confronted with a new kind of society: a literate society. Many who lived a life of toil and drudgery lacked the free time to educate themselves, and thus would not be able to take part, but the stage was set for a series of earth-shaking transformations. Literature and the humanities were aggressively taking shape, and the sciences would follow suit—in 1620 Sir Francis Bacon published the Novum Organum and became “avatar of the Scientific Revolution,” whereby, “In promoting the cause of new knowledge, won by observation and experiment under a basically mechanical view of natural causation, and in denying the Renaissance’s chief premise that scholarship would best advance by recovering the superior understanding achieved in Greece and Rome, the leaders of the Scientific Revolution popularized two metaphors with long pedigrees in Western literature. But these old saying developed sharp edges in a quite conscious (and often virulently contentious) argument that swept through the intellectual world of seventeenth- and early-eighteenth-century France and England, and entered the record of history as the debate between Ancients and Moderns” (Gould 2003:69). These ‘founders of modern science’ were unabashedly elitist in their temperament: Kepler, Newton, and others often reserved a degree of contempt for the common people (Numbers 2007:10). It is to be suspected that they, too, would have stood in opposition to the ‘vulgarization’ decried by the Renaissance humanists.

A brief ‘history of history’ leads from the invention of the written word and its august critic Socrates through the renaissance criticism of mass-printing as vulgarization

of knowledge and finally, to the Enlightenment ascent of science. Many significant characters have not been featured in this series of developments, but there are several threads spanning the millennia that begin to interweave in the nineteenth century. The first involves the widespread distribution of the written word. The second involves a broad and amorphous sort of 'humanism', the development of the humanities as increasingly secular pursuits alongside the rise of the sciences with their new type of knowledge 'won by observation and experiment under a basically mechanical view of natural causation'. The third involves knowledge gradually finding its way into the hands of the common people. This potent chemical interaction in the nineteenth century created an explosion, and the dust still has yet to clear. I refer here to what historian of science and religion Ronald Numbers calls the Vulgar Enlightenment.'

5.2 "Vulgar Enlightenment": Fragmentation or Democratization?

There is a tacit sense of elitism in much of human intellectual endeavor. It is with a sociological curiosity that I leave the lofty Ivory Tower of the intelligentsia to see what was happening among the people. Historian of science and religion Ronald L. Numbers (2007) discusses the 'Vulgar Enlightenment', an examination of what occurred as the scientific truths dating to Copernicus and Galileo filtered down to the public in the context of a European Christian society. At first such filtration was virtually nonexistent: the common folk were for the most part illiterate and too burdened by the struggle to survive to concern themselves with how old the earth was, or whether it orbited the sun rather than the other way around (12-3).

Visible astronomical phenomena such as comets, planets, or eclipses and their potential significance as signs of doom or divine favor piqued public interest in astrology and related inquiries, which, though widely condemned by the clergy, maintained great

popularity (14-5). To this day, there is evidence of both widespread interest in, and condemnation of, astrology among modern Christians in the United States. Jason E. Shelton and Michael O. Emerson (2012) found that reading horoscopes and finding a degree of 'scientific merit' in astrology is surprisingly common among modern Protestants: over half of White Protestants and 63% of Black Protestants have read their horoscopes, and just over a quarter of White Protestants and just over half of Black Protestants consider astrology either 'very scientific' or 'sort of scientific' (230). At the same time,"church leaders believe that Christians should not pay attention to astrology: they associate it with the occult. Contemporary church leaders more or less view astrology the same way that they do other realms of paranormal divination such as fortune telling, tarot card readings, magic, witchcraft, sorcery, séances, and psychics: as non-divinely-ordained bodies of meritless disinformation. These realms of the supernatural (as well as the individuals and groups associated with them here on Earth) are viewed as esoteric or secretive since they seemingly undermine the commonsense "good news" of Christianity that they believe is open to anyone" (Shelton and Emerson 2012:145). It is not difficult to envision nineteenth century clergy voicing similar arguments, while Durkheim looked on and found in these debates a contrast between communal, established 'religion' and fragmented, heretical 'magic'.

Alchemy, too, captured the public attention with the promise to heal the sick or injured, a task once reserved for faith and supernatural appeals. On the one hand, alchemy was roundly condemned by church leaders, but nevertheless thrived (Numbers 2007:15-6). One of its more well-known proponents, Paracelsus, was led through the practice to introduce metals and minerals into the practice of medicine, which in its talk of fermenting and distilling reverberated on a practical and an intuitive level with craftsmen, midwives, and farmers (Numbers 2007:16; Bauer 2001:203). On the other hand,

practical medicine was being developed and used by religious leaders. John Wesley, the founder of Methodism, wrote extensively on science and history as well as religion and morality, and he spent considerable time and energy developing medical knowledge alongside his religious views. Puritan leader Jonathan Edwards died in an attempt to immunize his family to smallpox (Numbers 2007:20-1).

A mixed bag of religion, science, and magic (at least in the Durkheimian sense) had descended upon the people of the nineteenth century, an aftershock of Gutenberg's invention felt some four centuries later. Books unsurprisingly declined in price and increased exponentially in availability, placing both religious leaders and scientific experts in a sort of unlikely coalition as they struggled to steer the public toward knowledge of nature and faith in God. This effort, too, took interesting new turns, as astronomers peering toward the night sky began to speculate on the possibility of multiple worlds, some inhabited by extraterrestrial life, which raised novel questions for theologians and the public alike (Numbers 2007:22-6).

A new field called *astrotheology,* neither entirely science nor entirely religion, a systematic effort to develop the means to deal theologically with the appearance of extraterrestrial life, was born out of such questions, and scholarly literature on this topic is still being produced today (Peters 2014). A cursory Internet search reveals a host of speculation and debate surrounding this word and its use. Some refer to such speculations as 'junk science' while others connect them to various occult and New Age belief systems and phenomena. Last May, however, Pope Francis asserted that the Catholic church would be willing to baptize extraterrestrial life—"Who are we to close doors?" (Withnall 2014). But the question—are we alone?--has inspired scientists, theologians, and the public. The question inspired the Search for Extra-Terrestrial Intelligence (SETI), championed by eminent astronomer Carl Sagan and garnering an

eight-figure annual federal budget (Sagan 1994:286-98). When Congress pulled the plug on SETI, Sagan lamented in response, "how, before we have found extraterrestrial intelligence, can we guarantee that we will find it? How, on the other hand, can we know that the chances of success are remote? And if we find extraterrestrial intelligence, are the benefits really likely to be so limited? As in all great exploratory ventures we, do not know what we will find and we don't know the probability of finding it. If we did, we would not have to look" (Sagan 1994:299).

Consider parallels to the Extrasensory Perception (ESP) studies, which search for the presence of psi, a sort of 'sixth sense.' Such studies have been conducted for a century and a half now, and no reliable positive findings have surfaced in spite of ongoing research among professional behavioral scientists as well as the U.S. Government "Stargate" Program, which ran from 1972 to 1995 and boasted an eight-figure price tag (Lilienfeld et. al. 2010:29-33). Should we then be satisfactorily convinced there are only five senses, and turn our attention to other matters? And speaking of justification, what is it about ESP that made it worthy of such investigation? Like the possibility of contacting extraterrestrial life, the odds of discovery are unknown, but in both cases the benefits would be world-changing.

This raises another question that, as will be seen, is even more pressing today than it was in the nineteenth century. In fact, many of the issues that are being dealt with today regarding knowledge had their beginnings centuries ago. The question has usually been formulated as an epistemic one: what constitutes knowledge? A sociological formulation of this ancient philosophical question might take the form of: who decides what avenues are to be explored? And how are such findings to be disseminated, discussed, and interpreted? In cases like SETI or ESP, where the chances of success are unknown yet the payoff might be extraordinary, how should we proceed? There is no

compelling or reliable means-ends analysis that exists in such situations—there are too many unknowns.

This ultimately touches upon another development with regard to the Vulgar Enlightenment, for as information spreads throughout society, beyond the confines of the churches and the universities, a mixed bag of scientific and religious ideas impact the public, giving rise to new species of ideas. This democratization of knowledge inevitably leads to new avenues of exploration, some of which exist at least partially 'beyond the pale' of mainstream religious and scientific views. For Durkheim, these loosely systematized, individualistic forays into the sacred were 'magic'. Within the sciences, these adventures often come to be called 'pseudoscience'. But these categories are difficult to manage in practice—who distinguishes science from pseudoscience? Consider an ambiguous case: in the late eighteenth century, Viennese physician Franz Mesmer believed he had discovered in magnetism a property that flowed through all things, almost like a fluid that he came to call "animal magnetism" (Sagan 1995:68,387). Mesmer developed a technique that came to be called "mesmerism" which seemed to have the ability to put people in trance-like states, a technique that was rejected by his peers in Vienna and later roundly condemned by Victorian sensibilities, which offered sinister innuendo at the prospect of an older man being able to place a younger girl in a trance (Webster 1991:17). Mesmer was wrong about magnetism, animal or otherwise, but his technique had filtered into popular culture and eventually being re-branded 'hypnotism' and becoming a part of mainstream psychology (Bauer 2001:78). It didn't hurt that the neologism 'mesmerized' has since filtered into the English language as well.

The case of Franz Mesmer is instructive in attempting to determine what is meant by 'pseudoscience'. His theory of magnetism turned out to be fatally flawed; but surely 'pseudoscience' means more than 'wrong'. Scientists are often wrong, and indeed

must be in an ongoing quest for new knowledge. And though "animal magnetism" proved to be something of a non-starter, the idea was exapted for use in psychology, and it turns out that there is still ongoing work on what is called 'bioelectromagnetics', a field dedicated to exploring the electromagnetic properties and effects of electromagnetism on chemical and cellular levels. Such studies continue to probe many open questions at the frontiers of science (Bauer 2001:119-36).

There are two descriptions offered by physicists of how the question of distinguishing science from pseudoscience may be answered which prove instructive. On one hand, "The fact that one can distinguish (in most cases quite readily) between genuine science and pseudoscience does not mean, of course, that it is possible to draw a sharp line between them…one would do better to envisage a continuum with well-established science (e.g. the idea that matter is composed of atoms) at one end, passing via cutting-edge science (e.g. neutrino oscillations) and mainstream but speculative science (e.g. string theory)—and then, much further along the way, through shoddy science (N rays, cold fusion)—and ending, after a long further journey, at pseudoscience" (Sokal 2008:267-8). Sokal readily admits that using this definition places the tenets of the major religions—Judaism, Christianity, Islam, Hinduism--within the realm of pseudoscience (267). Similarly, Stephen Weinberg (1992) discusses this issue at length, though he does not use the word pseudoscience: "Our discovery of the connected convergent pattern of scientific exploration has profound implications, and not just for scientists. Alongside the main stream of scientific knowledge there are isolated little pools of what (choose a neutral term) I might call would-be sciences: astrology, precognition, "channeling," clairvoyance, telekinesis, creationism, and their kin" (48). He goes on to explain, regarding testing the validity of these claims, that "the conventional answer would be that this evidence must be tested with an open mind and without

theoretical pre-conceptions. I do not think this is useful answer, but this view seems to be widespread" (48). What is missing from these hypotheses is "the sense of the connectedness of scientific knowledge. We do not understand everything, but we understand enough to know that there is no room in our world for telekinesis or astrology" (49).

Weinberg offers the metaphor of sixteenth-century Spanish settlers investigating the rumors of cities of gold in the new land that would come to be called Texas. He points out that as Texas was at the time unknown, it seemed prudent to investigate such claims. But testing some of the would-be sciences could be likened to mounting a modern expedition in Texas to seek out these cities of gold (50). What is instructive about Weinberg's metaphor as well as Sokal's is the appeal to the connectedness of mainstream science. The further away from mainstream science such investigations are the more probable it becomes that they will earn the label 'pseudoscience.' What Mesmer did not have in his mesmerism, that Sagan did in his search for extraterrestrial intelligence, was this sort of connectedness to mainstream science. Nevertheless, hypnosis became a mainstay of psychology, and the search was terminated prematurely.

One of the profound difficulties in understanding the Vulgar Enlightenment, and the various responses among scientific and religious communities lies in this very connectedness. There is clearly an historical and a social connection in the case of mesmerism, astrology, and other purported pseudosciences, for, as mesmerism left in its wake the ancestor of hypnosis, so astrology left in its wake an indelible image of human beings attempting to link themselves through non-standard channels to the broader cosmos. Dr. Henry H. Bauer (2001), electrochemist, sociologist of science, and amateur 'Nessie' hunter, suggests the word 'anomalistics' rather than pseudoscience for certain somewhat ambiguous phenomena. Astrology "is about how the cosmos influences our

lives. Astrology doesn't argue against the laws of gravity or electromagnetism; it doesn't claim to be able to calculate orbits better than astronomy can" (4). Or consider, likewise, the conception of lunacy, of peculiar behavior around the full moon, or the word lunatic, synonymous with a person who is insane. "Assume that statistical evidence of such an effect is offered. It might be because the moon exerts a physical influence as it does on the tides; or, perhaps human behavior is influenced by the phases of the moon just because folklore has convinced some number of people that it is true, and they behave accordingly" (5). Bauer seems to take seriously the possibilities raised by parapsychology, the search for psychic phenomena, cryptozoology (the search for animals rumored to exist such as Bigfoot or the Loch Ness monster), and ufology, the study of unidentified flying objects, and he advises humility and an open mind regarding these and other subjects which he, too, views as at best only tenuously connected to mainstream science. Bauer resists the temptation to lump together disparate areas of study that happen to fall outside the mainstream, and instead calls these fields of inquiry 'scientific heresies' (147-75).

I hope to have, through the course of this exegesis, set the stage for a set of tensions, not between science and religion, but between mainstream science and anomalistics, and between religious orthodoxy and heresy. Science has grown exponentially since Franz Mesmer and the nineteenth century democratization of knowledge. It is interesting the number of parallels that can be drawn between the religious and scientific experiences regarding knowledge originating outside the fold. Further, it is intriguing that the spread of books and the rise of literacy resulted not in a population that was more religiously or scientifically literate, but in a mixed bag of fragmented and often inconsistent information. Viewed in using the sociology of

knowledge, popular practices arouse ire among intellectual authorities. The power of the written word is difficult to underestimate.

Democratization or fragmentation? Both, it would seem, for the spread of ideas leads inevitably to new permutations of speculation and study, some daring and prescient, others phony and pernicious. New knowledge often occupies a complicated state of limbo somewhere between the two extremes, and it becomes apparently impossible to establish any sort of *a priori* wall of separation between fact and fiction. We do not know in advance where new ideas will lead whatever their source. This becomes at once illuminating and deeply problematic in the next section, where I will turn to the latest information explosion, bringing its own veritable avalanche of data, interwoven, conflicted, and polarized in new and unprecedented ways. I turn now to what in my view earns the title of the *Second Vulgar Enlightenment*, the age of the Internet.

5.3 Where Science, Religion, and Magic Meet

Extrasensory perception, haunted houses, ghosts, telepathy, clairvoyance, astrology, witches, reincarnation, communication with the dead, channeling—how many of these do you believe in? Odds are, you believe in at least one. Nearly three in four Americans do (Moore 2005). British psychologist Bruce M Hood (2009) offers a 'prediction': "These numbers will be much the same five years from now, and five years after that. I would happily place a large bet on that. I am not a psychic. People are just remarkably consistent and predictable" (Hood 2009:35). Psychologist Michael Shermer (2002) also recounts how academics, scientists, and members of the high IQ society Mensa are not without a stake in these anomalistic beliefs, and that such people are often more easily fooled by visual illusions, for watching a magic trick more closely seems to lead to a greater likelihood of 'falling for it' (285-7). What does this mean?

The human brain is the place where religion, science, and magic meet. Yet it would seem, that between 1990 and 2001, beliefs in paranormal phenomena were not steady at all—they *increased* (Shermer 2003:246). What could be behind an increase in beliefs in paranormal phenomena at the cusp of the twenty-first century? In order to understand this, I pick up in 1954 with the death of pioneering computer scientist Alan Turing, who took his own life after being convicted of homosexuality under British indecency laws. He envisaged what would today appear, for all practical purposes, to be a simple digital calculator with a single add-on: it could be programmed, and he believed that with such programming it could potentially become a "universal machine" (Carr 2011:81-2).

Programmable computers of course became a reality, and by the end of the twentieth century were increasingly powerful, cheap, plentiful, and ubiquitous. The development of the Internet has changed the world in unprecedented ways, many of which are still being discussed nearly a quarter of a century later. The universal machines dreamed up by Turing have been linked across the globe. We carry them in our pockets. We surf the net and social network sitting in airports and at coffeehouses. We have the ability to potentially connect to anyone, anywhere, anytime. The phrase 'Information Age' began to float around at the turn of the century. Centuries passed between the deployment of Gutenberg's movable type printing press technology and the flood of information that characterized the nineteenth century. It has been mere decades since the World Wide Web came to life, but there are already clear indicators of continued fragmentation and democratization of knowledge orders of magnitude larger and more revolutionary than anything in the history of, well, history.

What happened between 1990 and 2001 can only be described as a tidal wave of information, and, like the Vulgar Enlightenment, it was a mixed bag. And like the

Vulgar Enlightenment, it has taken on a life of its own. “Everything from Beethoven’s Ninth to a porn flick can be reduced to a string of ones and zeros and processed, translated, and displayed or played by a computer. Today, with the Internet, we’re seeing firsthand the extraordinary implications of Turing’s discovery. Constructed of millions of interconnected computers and data banks, the Net is a Turing machine of immeasurable power and it is, true to form, subsuming most of our other intellectual technologies. It’s becoming our typewriter and our printing press, our map and our clock, our calculator and our telephone, our post office and our library, our radio and our TV” (Carr 2011:82-4).

Consider the power of the Internet in relation to the institutions of church and university. When Gutenberg printed his first Bibles using his press, what followed over the next several centuries was a fragmentation of the Church: Catholicism begat Lutheranism, and the Protestant Reformation had begun. By 1800, some 500 Christian denominations existed, and as of mid-2014, there were a staggering 45,000 Christian denominations (International Bulletin of Missionary Research 2014)! If the analogy holds true, the future is likely to bring not only a continued increase in the number of denominations, but a simultaneous uptick in belief in other supernatural claims that stand outside of, and sometimes at odds with, religious orthodoxy. A world teeming with Menoccios, creating their own creation tales and splicing together multiple beliefs from various places and times, more practitioners of magic by Durkheim’s standard than religion. What of religion in an organized sense? Churches are changing too—some have made their rituals, services, and ceremonies available on the Internet, some of which have an interactive component (Emerson, Mirola, and Monahan 2011:36-45). Many, particularly the young, are leaving organized religion altogether, forming a diverse, self-styled, and growing contingent of ‘Nones’ as well as a growing number of people who

identify themselves as 'spiritual not religious' (Chaves 2011:16-9,40-1; Pew Religion & Public Life Project 2014).

On the other hand, the relationship between science and the Internet is less clear. Open-source encyclopedias such as Wikipedia seem to aid immensely in the dissemination of knowledge, and are democratic and egalitarian in an unprecedented manner with regard to adding and editing entries, flying in the face of 'The Iron Law of Oligarchy' (Konieczny 2009). The difficulties that arise out of this page, and others like it, regard verification of the information presented. There are, in a profound sense, no authorities on the Internet. A page called Conservapedia arose in response to perceived liberal bias among the editors of Wikipedia that does "not attempt to be neutral to all points of view" and does "not allow liberal censorship of conservative facts" (http://conservapedia.com/Conservapedia:How_Conservapedia_Differs_from_Wikipedia). What are 'conservative facts', one is forced to wonder, and what would constitute 'liberal censorship' of them? In an environment without authorities, in which anyone can offer expertise without credentials or relevant background, people seem choose their own facts based upon their own ideological points of view. It is a veritable information buffet, and perhaps no one would have been less surprised than Karl Mannheim.

"The Internet has not only placed before us a dizzying array of information, but it has also created a legion of "instant experts," whose qualifications may be a strong opinion and followers willing to believe what they have to say. These "experts" are often imbued with heroism for their very lack of credentials and drape themselves in the mantle of the little guy standing up to the establishment. In other cases, Internet experts might be those with legitimate expertise and training, but who are using these credentials cynically and opportunistically" (Goldberg 2010:110). What Dr. Robert Goldberg (2010) has in mind in particular is an examination of the controversy over vaccines that has

played out over the Internet, beginning with British researcher Dr. Andrew Wakefield, who announced that he had evidence linking the MMR vaccine to autism. Vaccination rates fell in the United Kingdom, and measles began to re-emerge despite Wakefield's problematic research which could neither be duplicated nor squared methodologically with his scientific peers (111-3). In the United States, concerns over mercury poisoning via a vaccine preservative called thimerosal hit a nerve despite ambiguity and political meddling, while outraged parents of autistic children began to emerge as 'instant experts' (115-9). After multiple scientific studies in several countries failed to detect any linkage between vaccination and autism, the movement in fact strengthened, and in 2005 found a champion in celebrity Jenny McCarthy, who proudly claimed that she had bestowed a 'Google PhD' upon herself (128-31).

It seems the reason science has been largely powerless to contain this new movement is because a social movement narrative has been developed that frames a heroic group of suffering parents against a greedy, profiteering medical industry (Stewart, Smith, and Denton 2007). This story takes on new life on the Internet, where connectivity is possible between people at any distance, and where a story so provocative and harrowing has the potential to touch people far and wide in an age of 'networked individualism' (Rainie and Wellman 2012). The narrative seems to have had a profound effect: a poll of 2012 voters found that one in five believe there is a link between childhood autism, while only 51% are convinced there is not (Jensen 2013).

The movement to implicate childhood vaccinations in autism has taken on the mantle of a full-fledged conspiracy theory. In light of the statistic offered above, the Tom Jensen survey (2013) offers a host of other 'conspiracy theory' data gathered from voters at the same time: 37% believe global warming is a hoax, 13% believe Barack Obama is the anti-Christ, 28% believe "that a secretive power elite with a globalist agenda is

conspiring to eventually rule the world through an authoritarian world government, or New World Order," and 21% believe a UFO crashed at Roswell, New Mexico and the government covered it up (2). Some 15% believe that the pharmaceutical industry is in league with the medical industry to invent new diseases, 15% believe there is secret mind-controlling technology in television broadcast signals, 11% believe the United States government knowingly allowed the September 11 attacks to happen, and over half (51%) believe that 'there was some larger conspiracy at work' in the assassination of President John F. Kennedy (3).

What do these conspiracy theories have in common? Not much, on the face of it. Some would seem to suggest a partisan political point of view, while others betray a general suspicion of authority. Four percent of those polled believe that "Shape-shifting reptilian people control our world by taking on human form and gaining political power to manipulate our societies," while seven percent are not sure about this (Jensen 2013:3). Conspiracy theories, like 'pseudoscience' and magic, are disparate and sometimes incompatible beliefs that are simply lumped together.

For clarity and comparison, I turn now to a pre-Internet event that has varyingly been called "The Satanic Panic", one that has wide-ranging implications in the context of both pseudoscience and conspiracy theories. A number of factors bear some commonality, but first, a brief history. In the 1980s, there emerged the belief that a widespread, shadowy conspiracy had taken positions of power within the United States which linked Satanism to the murder and sexual abuse of children. This belief was fostered by the recovered memory movement in which therapists put troubled individuals into a hypnotic trance. Such techniques increasingly began to recover lurid and horrific accounts of ritual incest which garnered increasing publicity (Richardson, Best, and Bromley 1991). At the height of the recovered memory movement, it was asserted that

one-third to one-half of all women were sexually abused as children, leading to the impossible statistical figure that a significant minority of United States citizens are sexual abusers (Shermer 2002:108-13).

Consider the parallels with the anti-vaccine movement. The victims are children, the most powerless members of society, and the victimizers are framed as part of a systematic effort to callously and deliberately exploit their victims. The victimizers are also in positions of authority, whether parents, politicians, or pharmaceutical industry representatives and scientists. As for the anti-vaccination movement, there is the apparent spike in the number of autistic-spectrum children and their increased visibility that scientists have been unable to explain, just as the Satanic panic followed a precipitous rise in child abuse accusations that seemed to be similarly inexplicable. The omnipresence of pharmaceuticals in our daily lives, the high cost of health care, the occasional reports of fraud or poor data analysis among scientists, and heavily televised class action suits against new medicines and technologies combine to make 'Big Pharma' a compelling villain. Satan, it almost goes without saying in a nation that is majority Christian, makes an even more compelling one, and since child abuse is a real and tragic phenomenon and it is widely known that people have the ability to repress traumatic experiences, the Satanic Panic made for a compelling narrative.

What many of these instances of anomalous scientific pursuits, heretical religious beliefs, and conspiracy narratives have in common is a powerful victimizer and a powerless victim. Framing these diverse views in this way harkens back to the first movement toward the democratization of knowledge which resulted in a loss of control over what ideas were being disseminated, what books were being read, and who believed what. A narrative that mobilizes the powerless against the powerful seems to hold ubiquitous sway over human beings, and the resulting burning sense of injustice can

drown out the voice of reason. Even that voice of reason itself can come to be seen as just another source of oppression (Feyerabend 1987). Thus, the more perceived authorities condemn certain beliefs, the more powerful such beliefs become.

Yet it would be intellectually irresponsible to end this chapter on that note. One might argue that there is little harm in reading our horoscopes in the morning paper. What if you found out that the President regularly consulted an astrologer in decision making, as Ronald Reagan and First Lady Nancy Reagan did (Sagan 1995:19)? Would you not want more information about astrology, such as that it relies on a discredited Earth-centered model of the solar system? The tides are brought in and out by the moon, it is said, but the planets are millions, even billions, of miles away. Why should we expect them to affect our judgment, or our behavior? Beyond that, what is the connection between high tide and low tide and our decision-making or destiny, and how could such a connection be established?

If we believe the television is sending out mind-control rays, will this lead us to turn it off and go enjoy a sunny day, or attempt to blow up a news broadcast station? If an infant dies from diphtheria because the child's mother elected not to vaccinate, or a contagious child spreads a vaccine-preventable illness to infants who have not yet been vaccinated, or a population suffers many deaths among elderly and immune-compromised persons because people don't trust Big Pharma, what are we to make of this 'Enlightenment for all' and its instant experts? On the other hand, if a person spends their free time studying reports of Bigfoot or UFOs or the Loch Ness monster, what is the risk?

Some have suggested that we need a system that measures risk effectively in our society, assigning a numeric scale value like the Richter scale measures earthquakes. One such proposal is offered by mathematician John Allen Paulos (2001),

who systematically analyzes multiple phenomena in modern society including some of the aforementioned examples of 'pseudoscience'. In his objections to "Tabloid Medicine" Dr. Robert Goldberg (2010) reminds us, as does Paulos, that our modern society includes risk, that there are trade-offs, that nothing is one hundred percent safe, and that that is as true today as it has ever been. A world that relies on science is a world without certainty, for science is always changing.

The Internet is a Vulgar Enlightenment writ large, with one very important difference. The transition toward surfing and away from reading books has had some marked changes on the human psyche. This is a problem that was first addressed by Socrates, when he argued that putting words on paper affects our ability to hold information in our minds. It is often argued in the present that this has developed even further with the rise of the Internet. Our smartphones can hold all our contacts: e-mail, telephone, address, or one of any number of social networking sites. Similarly, the Internet contains information in unprecedented quantity and scale. "Socrates was right. As people grew accustomed to writing down their thoughts and reading the thoughts others had written down, they became less dependent on the contents of their own memory" (Carr 2012:177). This has become even more prominent today: "Why memorize the content of a single book when you could be using your brain to hold a quick guide to the entire library? Rather than memorize information, we not store it digitally and just remember what we stored" or "Memorization is a waste of time" (Quoted in Carr 2012:181).

The problem, confirmed by increasing memory studies, is that the human brain does not store memory the same way a computer does. We do not 'use memory' in the same sense that our electronic counterparts do. When a computer uses memory, it has less to spare. There is theoretically no upper bound to the amount of information that can

be stored in the human brain. Beyond that, it would seem that 'using memory' for humans actually makes our memory stronger, and enables a deeper synthesis of ideas (Carr 2012:182-97). The Internet undermines the very type of thinking that is most essential to sorting through the barrage of information it throws at us. If we do not remember facts, it follows that we do not grapple with them, and their relationship to other facts, when we are not logged on.

I am inclined to go one step further: We do not *theorize* as much, or as effectively, because of these changes wrought through this new medium. Sociology in this sense requires memory; it requires us to make connections between diverse and disparate entities and ideas. It engages imagination and critical faculties of which memory is only a single example.

Without this sense of memory, of synthesis, we may doom ourselves to unimaginatively sifting through information, finding confirmatory evidence that fits our own pre-existing world-view while ignoring the rest. Our ideology is strengthened by a network of others who share the same ideology. Evidence of these developments, from the aforementioned 'liberal censorship of conservative facts' to the tendency to form conspiratorial beliefs around political views (I sincerely doubt any of the voters who believed Barack Obama is the anti-Christ voted Democrat, and it seems plausible that those who believe George W. Bush lied about WMDs in Iraq were generally not voting Republican either). Sociology of knowledge has perhaps never been so needed, nor so complex.

The erosion of the human ability to commit to memory and think deeply about the issues of the day, combined with the Internet information smorgasbord, have the potential to preserve and accentuate anomalistic pursuits, conspiracy theories, and alternative religious views as well as Durkheimian magic in startling new ways. It seems that if the

brain is as apt to ‘believe weird things’, the Internet should bring about a rise in the number, longevity, and popularity of such ideas. While the proponents of science and mathematics argue for their power to shape our lives for the better, it seems, in so many ways, that it is stories that remain compelling for most. The tension between these two aspects of intellectual endeavor, accentuated by what has already been written, culminate in a rift between two academic cultures that can be felt most profoundly in fields like sociology, where writing and data analysis exist side-by-side. I turn now to these issues, to the relationship between storytelling and mathematics in the context of new ideological labels such as the Religious Right and the Academic Left, marking an ancient and harrowing intellectual schism.

Chapter 6

The Dystopian Thread

> The redefinition of thought which helps to coordinate mental operations with those in the social reality aims at a kind of therapy. Thought is on the level with reality when it is cured from transgression beyond a conceptual framework which is either purely axiomatic (logic, mathematics) or coextensive with the established universe of discourse and behavior. Thus, linguistic analysis claims to cure thought and speech from confusing metaphysical notions—from "ghosts" of a less mature and less scientific past which still haunt the mind although they neither designate nor explain. The emphasis is on the therapeutic function of philosophical analysis—correction of abnormal behavior in thought and speech, removal of obscurities, illusions, and oddities, or at least their exposure.
>
> - Herbert Marcuse, *One Dimensional Man*

Imagine you are a surgeon, about to perform heart surgery. There are many tools required for such a surgery as well as specialized skills and knowledge that take years of training. But one such tool that is often invisible is the language itself, for when a surgeon discusses 'the heart', she means that four-chambered organ responsible for pumping blood throughout the complex network of the human circulatory system. In the operating room, she must mean this and only this by 'heart'. When poets, novelists, and mystics use the word 'heart', they do not necessarily mean what surgeons mean.

This is by no means true only for the surgeon, for "even within physics such terms are pre-muddled in the way any flattened usage of a word which refused the wider resonance of a metaphor is inevitably muddled. In physics this works because the metaphor is chosen by simple associative caprice or subjective metonymy. A sense of a word's history or the finesse of the poet has nothing to do with the selection. Thus, a quark's charm has nothing to do with Brillat-Savarin, Orpheus or Lucretius. This only

means that physics is not literary studies" (Babich 1996:52). When the heart surgeon is outside the operating room, she recognizes that 'I gave her my heart' (hopefully) does not mean 'I removed one of my vital organs and handed it to her.' 'Follow your heart' does not mean 'spend your life pumping blood,' and 'let him into your heart' doesn't mean 'open up your chest cavity and let him climb in.' These are all popular metaphors for deep human experiences bearing no resemblance to the usage of 'heart' by the surgeon. We may declare with Babich, that this only means that cardiology is not romantic poetry, intuitionism or evangelicalism.

It is the subject of much philosophical head-scratching that becomes a problem within the sociology of knowledge when it comes to the interactions between academic disciplines. A variant of a popular adage seems to apply: "I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail" (Maslow 1966). Our specialized training in various fields and sub-fields seems to place us in precisely this sort of dilemma. When economist H. E. Daly asserts, "There is something fundamentally silly about biologists teaching on Monday, Wednesday, and Friday that everything, including our sense of value and reason, is a mechanical product only of genetic chance and environmental necessity, with no purpose whatsoever, and then on Tuesday and Thursday trying to convince the public that they should love some accidental piece of this meaningless puzzle enough to fight and sacrifice to save it" (Daly 1996:21), what does he mean by 'meaning'? This is the sort of question that probably does not make philosophers very popular at dinner parties, but it is nonetheless a question with profound implications. *A la* Babich we might decide that this only means biology is not religion or ethics, but as has already been demonstrated, the demarcation between fact and value, between the sciences and the humanities, between the academic and the public sphere are not so neatly or readily separated.

I am attempting to illustrate a sort of academic analogue to the polarization, and fragmentation, of knowledge evident in the preceding chapters. The solution to the apparent quandary "What is meant by 'meaning'?" seems on one level self-refuting, and might be viewed as revealing the limitations of language. Another approach might be to suggest that the phrase is a sort of category mistake, to which Babich alluded. In this view, we must only ask, "Why should the sort of meaning the author of this quotation seeks should come from biology at all?" But we cannot simply relegate a sphere of meaning and a sphere of scientific discovery to separate arenas of human endeavor, declaring by fiat that they must never, ever interact. This approach raises far more questions than it answers, and indeed, can answer, for we must then know which spheres do not overlap, why they contain some concepts and not others, and on what grounds it can be claimed they do not overlap. This problem was raised in relation to Gould's proposal in Chapter Two that conflicts between science and religion could be rendered nonexistent by simply declaring that each deals with separate questions. It became clear that science and religion both not only make factual claims about natural history but also host a number of speculations that are not readily separated from ethical concerns.

There is another approach to answering this timeless and vexing question of meaning, one that has been taken very seriously since the early twentieth century, having arisen in philosophical circles and migrated outward across disciplines. In this view, "Everything is knowable which can be expressed, and this is the total subject matter concerning which meaningful questions can be raised. There are consequently no questions which are in principle unanswerable, no problems which are in principle insoluble. What have been considered such up to now [in philosophy] are not genuine questions, but meaningless sequences of words. To be sure, they look like questions

from the outside, since they consist of empty sounds, because they transgress the profound inner rules of logical syntax discovered by the new analysis" (Schlick 1959:56). In other words, a question regarding the sort of meaning Daly demands cannot even in principle be answered, because it fails this test of logical syntax; it is a meaningless sequence of words. From this perspective, philosophy becomes a means of clarification, a systematic excision of that which does not measure up to the logical standards at hand. If only language could be clarified, these erudite voices seem to cry out in unison, many of the weird and wooly problems of traditional philosophy, including but by no means limited to the aforementioned equivocations of the word 'heart', would simply disappear. This species of views came to be known as logical positivism. Herbert Marcuse (1964) called it One Dimensional Thought. Citing the epigraph at the beginning of this chapter, there is something vaguely Orwellian in Marcuse's tone.

I am well aware that this approach to philosophy has fallen out of favor during the mid-twentieth century (see Rorty 1992). I do not seek to write a treatise refuting positivism all or piecemeal—such a project has already been undertaken by scores of professional philosophers who are far more qualified (and interested) in such an endeavor. I wish to point instead to a rather interesting and potentially fortuitous development arising out of the vestiges of positivism which seems to have broad implications for the sociology of knowledge and all of academia. An essential task to the positivist movement was the development of the sort of 'therapeutic linguistics' decried by Marcuse as part and parcel to the creation of a 'unified science'. Harnessing the power of philosophy, positivism would bring together the natural and social sciences, ushering in a new era of interdisciplinary connectivity and cooperation using common criteria without the need for metaphysical appeals (see Neurath 1959:282-317). I speak of what biologist

E. O. Wilson called Consilience: The Unity of Knowledge in a book that bears this namesake (Wilson 1998).

Tied up in this examination are several related threads. The first deals with the history of the social sciences as a discipline coming of age, their relationship to philosophy, and the diverse and often mutually incompatible methodologies that are a hallmark of sociology. The second, which has already been introduced, is language, its uses, its limitations, and how such matters have affected various controversies between the sciences and the humanities of late, not least the Sokal affair, which will be discussed at length (Sokal 2008). Finally, I will turn to the questions raised by the social sciences in relation to positivism and Wilson's proposal.

6.1 At the Crossroads of Technology, Poetry, and Justice

Turning once more to ancient Athens, it would seem that Plato reserves words, harsh and not few, for the poets. In the previous chapter, Plato's views on poetry were contrasted with earlier views assumed to be those of Socrates in relation to the changes in memory and nuance that occurred with the advent of literary culture. Now the topic at hand is Plato's strict and rigid censorship of the poets, forcibly aligning their narratives with ideals of virtue and piety in his ideal society (Warmington and Rouse 1999:172-91). His concerns bring to light a dimension of statecraft that calls to mind the ongoing concerns regarding freedom of speech that have stalked both the printing and Internet revolutions. Of course, Plato's ideal society would be, by our standards, a totalitarian society which featured a caste system in which a warrior caste protected, philosopher-kings ruled, and everyone else worked for the good of the society (Warmington and Rouse 1999; see also Popper 1962).

A second example of this sort of censorship might strike one as odd, and emerges not far away in time or place from Plato's ideal state. This was made manifest in the words and deeds of Pythagoras, the mathematician and mystic whose theorem bears his name. For the Pythagoreans, mathematics was next to godliness, so to speak. They saw in it order and perfection, and sought to commune with the cosmos through the revelations of their leader and master mathematician. In fact, it may have been Pythagoras who first used the word cosmos, the Greek antonym of chaos (Sagan 2013:193; Cavendish 1967:63-8).

For the Pythagoreans, numbers and the order they represented meant everything. Little remains of their lives, though there are trace elements of their thought, some of which survived through Platonism (Hadot 2002:57-8,149). What is intriguing is that they actively suppressed an important mathematical discovery: when a diagonal is drawn from one corner of a square to the other, the length of that diagonal is expressed as the length of a side times the square root of two. In other words, the square, a symbol of order in their mathematical universe, contained within it an irrational number, a number that could not be expressed as a relationship between two numbers (Sagan 2013:195). One can easily speculate as to what likely happened when they chanced upon the discovery that the circumference, or area, of a perfect circle could only be expressed in terms of the now-infamous irrational number pi. Censorship of such discoveries followed due to a profound inability to reconcile the existence of these irrational numbers with the cornerstone belief among the Pythagoreans that they had discovered perfection, order, and certainty in mathematics.

Thus we have two examples of prominent thinkers who faced down challenges to their sacred aesthetic ideals by employing suppression of dangerous ideas. Poetry and irrational numbers in relation to Plato and Pythagoras represent a kind of conundrum that

has recurred throughout the history of human intellectual endeavor, and of course suppression is the typically authoritarian move when encountering such disharmony. In a sense, it is out of such apparent disharmony that the discipline of sociology was born. Sociology invites us to see ourselves in relation to those censored elements, those things which are ever present but rarely talked about, the glaring contradictions and sources of upheaval that lie in wait behind and beneath the merely apparent world of the everyday.

These censored elements seem possessed of an uncanny ability to make themselves known, each piercing the veil of separation between humanity and science. Many of the great works of sociology succeed in doing this quite profoundly. When W. E. B. DuBois declared that "It is a peculiar sensation, this double-consciousness, this sense of always looking at one's self through the eyes of others, of measuring one's soul by the tape of a world that looks on in amused contempt and pity. One ever feels his twoness,--an American, a Negro; two souls, two thoughts two unreconciled strivings; two warring ideas in one dark body, whose dogged strength alone keeps it from being torn asunder" (DuBois 1999 [1903]:164), did he not express a truth, the kind of truth that defied the sort of ordered interconnectedness demanded by his status within his time and place? And when Charlotte Perkins Gilman chronicled her nervous breakdown in The Yellow Wallpaper or the fact that women had been throughout history economically dependent on men (see Lemert 1999:172-84), how would such realizations impinge upon the notions of the ancient philosophers discussed above, with their number-mysticism and utopian polis-building?

In Plato's totalitarian ideal state, justice is readily and unapologetically defined in terms of each person within the caste system keeping his or her place (Popper 1962:86-119). Through the eyes of philosopher-kings, DuBois and Gilman would be subversive poets *par excellence*. They narrativized coercive and unjust aspects of their own

societies that were initially invisible to others; things that were not made manifest by recourse to interconnectedness or rationality or some carefully delineated methodology. Herein lies what is problematic about the social sciences, which forces them inevitably into a world apart from both the natural sciences and the humanities, causing no shortage of confusion on both sides.

Is such work fiction? Essay? Personal narrative? Is it science? Is it scientific at all, or merely one person's impression? Should it simply be dismissed as anecdotal or subjective? Charles Lemert (2002) spells it out eloquently: "sociologies of all kinds are like nothing so much as they are like poetry…if you doubt this, just hang around a check-cashing joint when a mom with kids counts the meager remains of the monthly allotment and sighs a sorrow song of the hunger that will visit her babies before the moon comes back to full. The beauty of poetry, as of sociology, is in the soul's ability to join the personal and local with the disjointed differences of the social whole. The tears sparkle in the moonlight" (Lemert 2002:viii). This disjointedness is that irrational quantity that Pythagoras needed, and suppressed, to understand his perfect figures. It is the poetry that Plato's ideal society cannot possess lest the people become aware that their lives are being micro-managed by philosopher-kings.

For just a moment, recall in Chapter Three the descriptions of Freeman Dyson, of the warriors and the victims, of those who made the impersonal calculations and those who bore the consequences. Sociology, from this perspective, makes real the collateral damage; personalizes the impersonal. It is something anyone can do, anyone who finds within themselves the will to peer past the structures of their society that compel them, shape them, organize them, uplift or repress them. Sociology is of necessity messy—it needs a plurality of methods, the advanced statistical techniques and sophisticated software packages, the interviews, participant observation, studies of text and culture,

and of course, personal narrative exposition. To the outside observer, this can make professional academic sociology seem like a hodgepodge, a discipline lacking the sense of orderly first principles or axiomatic protocol statements. It is neither entirely literary nor entirely numerate, not fully reductionist nor holist. This might appear to be a weakness, but I have come to see it as sociology's greatest strength. One of the reasons for this strength is the ability to examine multiple facets of what it means to be human. Sociologists can study any structure, in principle, that shapes lives, including the academic sphere, the sciences—sociology can even study itself, and frequently does.

6.2 One-Dimensional Thought and the Language of Subterfuge

There is a sort of de facto tradition of methodological innovation in sociology, and much of this innovation begins with a critical attitude toward *positivism*. I begin with an example from science fiction, produced by writer Isaac Asimov (1991 [1951]) and entitled Foundation. Central to the development of the plot in the first of this series of books is a new science, called psychohistory, which is said to have the ability to predict the movements and future paths of large groups of people using mathematics. The book features a brilliant scientist, Hari Seldon, who is able to, in effect, see the end of an empire that has reigned for twelve thousand years to be followed by dark ages to last thirty thousand years. The book chronicles how the psychohistorian is able to set things in motion that later generations are able to bring to fruition in order to significantly shorten the dark ages, all on the basis of a set of advanced calculations (Asimov 1991 [1951]).

I have undoubtedly not done justice to what is admittedly one of my personal favorite science fiction sagas, but this nevertheless serves to illustrate a point: this sort of predictive ability is tantamount to control, human behavior simply is not mechanistic enough to be predicted in this way, and we are not indifferent to what we study

(Esterberg 2002:10-2). Critics of positivism in the social sciences also point to the assertion that the author attempts with ultimate futility to speak from a standpoint without a standpoint; that is, "science stands outside the world and can describe it objectively, with complete dispassion. Postmodern critics of positivism maintain that science is already in the world and views the world from the platform of politics, passion, and perspective, necessarily muddying its account" (Agger 2002:8).

A further and often even more contentious stance within the social sciences is that of cultural relativism as opposed to ethnocentrism; the former view I interpret to mean that 'all cultures, their traditions, taboos, practices, and ways of knowing, are valid' as opposed to the latter, 'viewing one's own culture as superior to others.' There is some variation on both themes, such as the interesting example of Christian missionaries, who deploy the techniques of cultural anthropology to better understand the native inhabitants and cultures where they undertake their mission work. They are instructed to adopt cultural relativism as an operational stance in that they might more effectively minister to those who might otherwise perceive them as being disrespectful of the indigenous culture (Grunlan and Mayers 1988). Ultimately this raises the question: "Is Christianity unique, or is it just a religion among religions? Anthropologically, it is the latter. Anthropologists are supposed to practice value-free science. They are not supposed to make value judgments. They are to describe, categorize, and if possible, make generalizations; but they are not to evaluate. To the anthropologist every religion is equally valid, and every religion performs basically the same functions in every society. But the Christian views his religion not only as unique but also exclusive" (Grunlan and Mayers 1988:229).

This raises the rather familiar, commonsense questions often raised with various uses of the word relativism: if every culture is equally valid, every religion equally true, why favor one's own religion or culture over another? Is simply appealing to convention

satisfactory? And also, if it is not possible to be objective with regard to scientific study, particularly when dealing with human beings, then how and why is cultural relativism even possible, or desirable? Clearly in the case of Christian missionaries, cultural relativism involves tailoring a specific religious doctrine to the wider cultural values and needs of one's mission; relativism is not 'complete'. One might take a page from expert in teaching evolution to a religiously diverse classroom Brian Alters (2005) when he argues for drawing a line between 'methodological naturalism' and 'metaphysical naturalism'. On the one hand, methodological naturalism in the sciences involves excluding supernatural influence and causation. This is essential to the exploration of the natural world, for insofar as one could simply say 'it was a miracle' or 'God did it' the exploration (at least the scientific part of it) comes to an end. On the other hand, metaphysical naturalism is the view that there is no supernatural influence or causation, an atheistic or agnostic worldview that does not necessarily follow from methodological naturalism (Alters 2005).

A distinction between methodological relativism, espousing an attitude of amity and mutual respect toward those the social scientist wishes to study in the field, and epistemological relativism, the view that every belief, every way of knowing, is equally true, is sorely needed. The former, when coupled with a healthy dose of reflexivity, makes for effective social science (Bourdieu 2004; Esterberg 2002), while the latter, at least in extreme cases, is naïve, untenable and self-refuting. I offer up this distinction as a defense against increasingly aggressive criticisms of non-mathematical sociological studies. Particular vitriol is leveled at the sociological studies of science in the postmodern tradition.

One scientist in particular, a mathematical physicist, found a novel way to take on the so-called 'Academic Left'. Tired of "postmodernist literary intellectuals pontificating

on science and its philosophy and making a complete bungle of both, [I] decided to write a parody of postmodern science criticism, to see whether it could get accepted as a serious scholarly article in a trendy academic journal" (Sokal 2008:xiii). The man's name was Alan Sokal, the journal was *Social Text,* and the article was called "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity." The article was a fraud, a hoax, which Sokal readily revealed in another journal, making international news and coming to be called 'the Sokal affair'. Why did he do it? "One of my goals here is to make a small contribution toward the dialogue on the Left between humanists and natural scientists—"two cultures" which, contrary to some optimistic pronouncements (probably by the former group), are probably farther apart in mentality than at any time in the past fifty years" (Sokal 2008:93).

What is meant by 'Academic Left'? This label is applied, at least in this context, to feminists, ecologists, Marxists, and various postmodern thinkers who are actively critical of science, particularly those who write in the burgeoning field of science and technology studies. 'Old Left' thinkers such as Sokal believe postmodern critiques of science are undermining the universal, objective validity of science and the broader project of the Enlightenment, fueling the fire of reactionary movements (Sokal 2008; Nanda 2003; Gross and Levitt 1994). On the other hand, sociology of science has been an integral part of sociology since the early decades of the twentieth century, and is viewed by some as "one of academic sociology's most important and intellectually mature specialties" (Lemert 2002:89).

At the turn of the century, a pair of researchers set out to test the hypothesis that these attacks on science, from both left and right, amounted to a sort of general cynicism, and that the mistrust of science was symptomatic of a broader institutional skepticism. A competing hypothesis was outlined suggesting that science was being critiqued on

separate grounds by different social movements with different agendas, the Interest Group Activism hypothesis. By interviewing groups of feminists, environmentalists, political conservatives, political liberals, fundamentalists, and community leaders, the researchers sought evidence that the postmodern writings that came under fire with Sokal's mockery were influencing how science was being perceived. Fifty-eight interviews turned up little evidence that science itself was under attack; the Interest Group Activism hypothesis emerged as the best explanation, showing that each group of thinkers had specific, and different, areas where their ideology overlapped with science (Trachtman and Petrucci 2000). Other statistical evidence does however show a marked decline in institutional confidence, noting that religion, in particular, has shown the most precipitous drop in confidence since the early 1970s (Chaves 2011:77-9).

In the same vein, microbiologist and science writer Meera Nanda (2003) writes of India, describing the scene as people flocked into the streets in celebration, everywhere brandishing an image of the Hindu elephant deity Ganesha, encircled by electron orbits and sometimes toting a gun. They were celebrating the day that India joined the world nuclear community—they had successfully built an atomic bomb. The images evoked a chilling outgrowth of the dialogue of postmodernism and postcolonialist thought, as a society embraced the elements of Western technoculture that were deemed useful while framing them in the traditional images of a burgeoning Hindu nationalist movement. Nanda lays the blame for part of such developments--the demolition of a mosque, bloody rioting in the streets, and the rise of anti-democratic traditionalism as a species of "Reactionary Modernism" reminiscent of the Third Reich's fascist blend of state-of-the-art technology with unmitigated repression of individual rights—at the feet of postmodern critiques of science, with their deference to (and at times romanticism of) local culture and criticism of the universality of science (Nanda 2003).

Interestingly, in a book discussing several elements that led to, and grew from, the hoax he perpetrated on cultural studies and postmodernism, Alan Sokal (2008) finds a curious analogue in the United States, devoting over one hundred pages of his anthology Beyond the Hoax to decrying the apparent lack of effective, systematic criticism of all systems of apparently specious thought, reserving particularly incisive analysis for conservative religious belief (2008:371-436). The criticism of postmodern thinkers and social studies of science seems to turn on the permission that cultural relativism allegedly gives conservative religious movements. The word *secularism* in this context bears closer examination: for Nanda, it represents a way of conducting affairs of the state: "Technically speaking, a deeply religious people can still decide, as a matter of political expediency, to run their public affairs by secular rules. A secular society only requires that the state and the public institutions are not openly and officially associated with any religion and that their laws, policies, rules and regulations are not justified in light of religious doctrines" (Nanda 2003:51).

For Sokal, scientific modernity points to something a bit more specific: "The modern scientific worldview, if one is to be honest about it, leads naturally to atheism—or at the very least an innocuous deism or pan-spiritualism that is incompatible with the tenets of all traditional religions—but few scientists dare say so publicly. Rather, it is fundamentalists who make this (valid) assumption about "atheistic science"; scientists, by contrast, generally take pains to reassure the public that science and religion, properly understood, need not come into conflict" (Sokal 2008:347). Though there are significantly more atheists and agnostics in the scientific community than in the public, and this is particularly noticeable in the United States, scientists hold a diverse array of religious beliefs and views on religion (see Ecklund 2010). Sokal seems to be accusing a majority of his scientific colleagues of intellectual dishonesty.

These are two very different formulations of 'secularism' that bear upon any definition of 'fundamentalism' proffered. It is often asserted by those who hold fundamentalist beliefs that any sort of 'secularism' represents a denial of or infringement upon religion, or that it is itself a form of irreligious fundamentalism. If "fundamentalism refers to a specific type of religious practice that accords special holy writings a non-negotiable status wherein the text must be read and followed in practice in a literal way," then "It follows from this that secularism cannot be a fundamentalism…Secularism is merely a social and political doctrine that makes certain claims about how society can be formed so that different believers and non-believers may live together" (Stjernfelt 2009:40-1). In Nanda's view, this simply means that religion cannot be the basis for the political structure of a society. In Sokal's view, those with a profound understanding of science do not need religion, but this is altogether different from suggesting that religion be actively *suppressed.*

Ideally, a secular society views religion as a personal, familial, or congregational matter, and respects free practice of religion that does not extend to serving as the basis for public policy. Accepting Nanda's moderate conceptualization of secularism, and tolerating Sokal's more pointed assertion and his right to freely express it, is the cost of admission into an open society. Put bluntly, "For those who have eaten of the tree of knowledge, paradise is lost. The more we try to return to the heroic age of tribalism, the more surely do we arrive at the Inquisition, at the Secret Police, and at a romanticized gangsterism. Beginning with the suppression of reason and truth, we must end with the most brutal and violent destruction of all that is human. *There is no return to a harmonious state of nature. If we turn back, then we must go the whole way—we must return to the beasts"* (Popper 1962:200-1, italics in original).

In practice, secularism becomes far more problematic. Growing up in Texas, I have witnessed the perennial controversy over prayer in schools, dichotomized between those who support and those who oppose prayer in schools—each side calling the other some variety of intolerant. What secularism is *not* is prayer from a specific religious tradition being led by faculty or employees at a public school during class time. Beyond that, debate ensues: should students be able to form religious organizations as extracurricular activities? Should a "moment of silence" be permitted, so that students and faculty can choose to pray—or not—at a set time each day? What about prayers before a football game? Or 'one nation under God' as the Pledge of Allegiance has read since the mid-twentieth century? What winds up happening is a series of compromises.

What these proponents of science seem eager to underscore is the nature of science; the notion argued for by logical positivists that "We are not here seeking to oppose a new "Weltanschauung" to an old one, or to improve an old one by the clarification of concepts. The opposition, rather, is between all world-views and science which is "free of any world-view"" (Neurath 1959:283). This is precisely the nature of science that is called into question by the social studies of science and technology, where it becomes apparent that scientific inquiry is a human, social institution and can be examined as such (David 2005; Bourdieu 2004; Webster 1991). What critiques of sociology of knowledge seem to miss is that the methodological relativism that is the linchpin of such endeavors need not be assumed to be an argument for other forms of relativism, as well. The aforementioned missionaries employ cultural relativism to tailor their message to people of diverse heritages; what science and technology studies, along with a host of other 'postmodern' disciplines of the 'Academic Left' are in some sense trying to accomplish is a similar means of understanding how science fits into culture as well as how science can be viewed as a culture, a social structure, itself.

There does not seem to be a clear dividing line between varieties of secularism that can be established a priori, only a decision to conduct affairs of state in a manner that to a clear extent divorces them from the affairs of the church. Nor is there such a dividing line in the case of 'relativisms', for relativism as 'approaching sociocultural norms, situations, and interactions with the assumption that something is going on that is worthy of study' is often (perhaps deliberately) conflated with the 'everything goes' relativism attributed (not altogether wrongly) to thinkers like Paul Feyerabend (2011). Lumping together all studies of science or knowledge by non-specialists from other disciplines constitutes a strawperson fallacy, an oversimplification.

A closer look reveals that Nanda and Sokal do not paint all forms of sociology of knowledge or science with the same brush—Nanda distinguishes between sociologists of knowledge such as Karl Mannheim, Robert Merton, and Peter Berger as well as Marxist critics of science from the latter decades of the twentieth century, which saw more sweeping criticisms of the *content of science* in addition to the social relations that surround it (Nanda 2003:21-2). Sokal, too, does not attack the whole of such studies so much as underscore the (admittedly myriad) examples of wooly prose and apparently 'radical social constructivism' more akin to the self-refuting sort of relativism mentioned above (Sokal 2008:115-43). While neither seem overly captivated by the sociology of knowledge, or various postmodern efforts to 'transgress boundaries', for that matter, their attacks are measured, and not without validity.

In short, what might be referred to as a 'science war' seems at best overblown. A 'cultural cold war' that seems to be shaping up, and something quite disturbing has begun to emerge. While in India, Hindu nationalists celebrate the construction of a nuclear weapon using sacred religious symbols, Americans are deploying GPS navigation systems, smartphones, and computers; we drive cars that burn fossil fuels

while a substantial minority are convinced that the scientific view of the world and universe is false on the grounds that it contradicts religious orthodoxy (see chapters one and two). In this sense, the source of fear, described by the interpretive social scientists while decried by the science apologists, hits close to home; we have come to inhabit a society in which we all eat the technological fruits of scientific knowledge while some of us are busy trying to cut down the tree of Enlightenment science. In the United States, the Religious Right is perhaps the most powerful single voting bloc (see Hynes 2006). The admixture of anti-secularist fundamentalism coupled with the world-ending technological developments of the twentieth century may pose a new and greater threat to humanity than anything that has come before.

Behind this debate I perceive accusations of a failure of nerve; that academics, particularly those of us who contribute to the interpretive social sciences, have been insufficiently critical of such developments. We have failed to stand up to those in our own societies who demand tolerance of their intolerance, and now we are failing to stand up for the people in other corners of the world where the light of reason is small and flickering, and might be snuffed out at any moment. We are placed in a rather awkward position. I have already abdicated any claim to scientific neutrality, so I cannot now claim without contradiction that my descriptive attempts to understand social structures, particularly those that share space institutionalized with science, are completely value-free, and may be used as others wish.

I can only begin to answer such objections here by re-stating the adage that "to the man with a hammer, everything looks like a nail." For the natural scientist, the world is an objective reality awaiting discovery. To the social scientist, the world is constructed by ongoing patterns of interaction. To the humanities student, the world is a text waiting to be read, interpreted, brought to life by the reader. It does not even make sense to say

that one of these is right and the others wrong; they are merely outgrowths of specialization. But I share the interest of those who seek to popularize science, as well as philosophy, literature, and the behavioral and social sciences in that I believe the best way to cope with this situation is to look up from our own areas of (over)specialization from time to time and remember that there is a world beyond them. Questioning the possibility of scientific neutrality does not mean that I must forever discard the self-referent 'scientist' and write polemics instead. It means that I consider it part of my responsibility as an intellectual, even an intellectual-in-training, to be reflexive, to bracket my work by revealing my past, prejudices, and perceptions of implications to come. It is not a perfect solution, but I do not know of a better one.

6.3 Three Cultures and the Discourse of Success

"The banal answer to the question concerning why Social Text published Sokal has to do with the prestige assured by the hierarchy which ranks natural scientists above social scientists and other academics. Thus, if the Social Text issue on "Science Wars" can be seen as a response to the challenge of the anti-hermeneuticist convictions of science apologists, Sokal is a kind of academic mole. An academic mole is what is needed in such an imaginary "cold war" between science and "deconstructionists" or "post-modernists" or "the" Left, because there is no direct alternative to the function of a mole. Any kind of "reasoned" debate would have to be conducted on the ground of science itself, presuming the values of science. It is irrational to question the value of rationality" (Babich 1996:56). Babich eruditely assesses the Sokal affair from the perspective of philosophy. Communication has indeed broken down; there is not a common language by which these disparate means of understanding the world can be reconciled. It is as if two nation-states on the verge of war sent diplomats to speak to one

another, only to discover that each spoke a different language that was wholly unfamiliar to the other.

One can imagine how the two diplomats would try to address their respective situation. It would be a long, tiring, and tedious journey, attempting painstakingly, word by word, to teach one another their respective languages. Yet whose language would wind up being spoken? Would this not, in itself, become a cause for negotiation? How could negotiations for such a 'common language' proceed without a common language? Such is a problem arising out of, and addressed systematically by, E. O. Wilson in his book Consilience: The Unity of Knowledge (1998). In it, Wilson draws upon the Greek legend of the Cretan labyrinth, where Theseus of Athens uses a thread given to him by Princess Ariadne to wend his way through the maze, kill the bloodthirsty Minotaur, and then follow the thread back out. He uses this as a metaphor to establish the winding connection between the branches of human intellectual endeavor (1998:66-7). "The only way either to establish or refute consilience is by methods developed in the natural sciences—not, I hasten to add, an effort led by scientists, or frozen in mathematical abstraction, but rather one allegiant to the habits of thought that have worked so well in exploring the material universe" (1998:9). Anticipating certain objections, Wilson continues by stating that "The Unification agenda does not sit well with a few professional philosophers. The subject I address they consider their own, to be expressed in their language, their framework of formal thought. They will draw this indictment: conflation, simplism, ontological reductionism, scientism, and other sins made official by the hissing suffix. To which I plead guilty, guilty, guilty. Now let us move on, thus" (1998:11). Recalling the examination of logical positivism in the earlier portions of this chapter, it would seem that this additional 'sin made official by the hissing suffix' may fit Wilson's

program, as it bears a striking resemblance to the sort of unified science championed by positivist philosophers.

Unsurprisingly, like our two linguistically incompatible diplomats, even the title of Wilson's book came to be a point of contention. The word consilience is used by a university professor in Charles Darwin's time named William Whewell to indicate a 'jumping together' of things that appear to be separate. Incidentally, Whewell, though a polymath and by any right a genius, is remembered for having coined the word "scientist" (Gould 2003:200-15). "In the seventh century B.C.E. the Greek philosopher Archilochus penned one of the pithiest yet most thoughtful epigrams when he observed: "The fox knows many things, but the hedgehog knows one great thing. Twenty-two centuries later the nineteenth-century British philosopher William Whewell described science as employing a fox-like method to arrive at a hedgehog-like conclusion, that he called a consilience of inductions, or what might also be called a convergence of evidence" (Shermer 2003:144). When one knows that Stephen Jay Gould's final book, published posthumously, was called The Hedgehog, the Fox, and the Magister's Pox (2003) the pieces begin to fit together.

Gould and Wilson disagreed about many things over the course of their tenure, occupying offices down the hall from one another in the Harvard University biology department (Gould 2003:203-5). Perhaps Wilson chose the title in homage to the coining of the word scientist, having argued that the mission of consilience was to be a scientific mission, framed in scientific language. Gould, on the other hand, seemed to believe that Wilson missed the point: "Wilson also exposes an undiminished belief in the superiority of science, and a devaluing based on misunderstanding the aims and definitions pursued by other forms of knowledge and inquiry—an assumption that cannot forge the kind of allegiances he presumably hopes to establish with scholars in the humanities. For

example, his explicit definition, in the following statement, of philosophy as "the contemplation of the unknown," combined with his desire to convert much of this discipline into science (the fruitful study of the knowable and known), will, I am confident, either annoy or amuse most professional philosophers" (Gould 2003:217).

Others have also been critical of this endeavor. "The Harvard entomologist Edward O. Wilson spearheads what may be the most sweeping effort yet to include all of culture under the evolutionary tent. In his 1998 book, Consilience, he outlined a congenial-sounding plan to unite the science and the humanities under the book's eponymous concept. In fact, however, the reader soon discovers that Wilson's vision is that biology explains the humanities. Art, music, literature, and philosophy result from primal evolutionary drives. Rather than uniting the science and the humanities, consilience seeks to subsume the humanities under the umbrella of science" (Comfort 2007:15). Among the humanities, the outgrowth of this becomes evident as Darwinian theory intermixes with literary criticism, seeing these 'primitive evolutionary drives' in classic works of literature from Shakespeare to Jane Austen (Goodheart 2007:11-25; Comfort 2007:14). Some of the writings cited are almost comical in reducing high drama to sex drives and alpha male machismo. Additionally, according to his critics, Wilson has undertaken to supplant theology with science, explaining religion itself in terms of evolutionary forces (Giberson and Artigas 2007:193-223).

What Wilson actually, and tellingly, says in Consilience is more along the lines of, "for its implications throughout biology and the social sciences, no subject is intellectually more important [than gene-culture coevolution]. All biologists speak of the interaction between heredity and environment. They do not, except in laboratory shorthand, speak of a gene "causing" a particular behavior, and they never mean it literally. That would make no more sense than its converse, the idea of behavior arising from culture without

the intervention of brain activity. The accepted explanation of causation from genes to culture, as from genes to any other product of life, is not heredity alone. It is not environment alone. It is interaction between the two" (Wilson 1998:137). This assertion does not seem altogether radical, and seems to fail to account for some of the controversy Wilson faced when attempting to extrapolate Darwinian explanations to account for human interactions (see Chapter Two).

The program Wilson has in mind has radical implications for every single academic field, and the farther from evolutionary biology and the natural sciences a field lies, the more dramatic the implications. Wilson, for his part, is aware of the implications for the social sciences and states, in regard to their fragmentation and apparently slow progress: "I grant that a large measure of humility is in order for any critic. Everyone knows that the social sciences are hypercomplex. They are inherently far more difficult than physics and chemistry, and as a result they, not physics and chemistry, should be called the hard sciences. They just seem easier, because we can talk with other human beings but not with photons, gluons, or sulfide radicals" (Wilson 1998:183). Wilson is in one sense quite right, but misses a critical element in the social sciences. The expectation of the social sciences, from the positivist point of view, involves being able to predict, and possibly control, the social world. In this conception of the social sciences, if I do X, then I can reasonably expect Y to result. This is not the future-predicting efforts of Isaac Asimov, but something more modest, offering the potential for reforming existing societal framework.

Yet the social sciences do not just employ these tactics. Some of social science belongs to the qualitative realm, from grappling with large-scale theoretical elements to studying the structure of interactions between two or three people. Some social 'scientists' do not wish to be called scientists at all, and in fact emphatically reject such a

moniker. These strategies do not neatly fit within Wilson's paradigm—in some ways these types of study fit more readily with humanities disciplines than the sciences. In a sense, social sciences occupy a twilight zone between the sciences and the humanities, and to abandon one set of methods for the other would be like cutting off one's left arm. In fact, not only do the social sciences lie between the natural sciences and the humanities, but there is a sense in which their necessarily interpretive, reflexive elements have served to widen the gulf between the sciences and the humanities. By investigating the production and dissemination of ideas in society, sociology of knowledge in particular produces an odd sort of feedback loop, a snag in Ariadne's thread, in which the social sciences not only study natural sciences, humanities, intellectuals, university life, laboratory settings, and a broad array of other sources of knowledge, but also themselves.

We might think, then, of our two diplomats from warring camps, who have been struggling for days to communicate with one another, are suddenly discovered by a third, from another camp, who, while possessing a working knowledge but not a fluency of the language of each of the other tribes, ambles in wondering what all the fuss is about. This third member of the group cannot simply serve as an intermediary, being unfamiliar with large swaths of information, but sees in her role the possibility of understanding the concerns of the two warring camps by being able to employ, albeit imperfectly, the language of both. The third member cannot simply act as a diplomat, or a translator, or a third adversary, for she is simultaneously all and none of these. Her successes, and her failures, cannot be measured by the scales of the others, for she has a perspective that is partially removed from that of her cohorts. Her success lies not merely in predicting possible outcomes based on current states of affairs, but in being uniquely situated to *understand*.

In sum, the work of establishing meaningful communication between the sciences and the humanities will require the participation of the social sciences as a "third culture." Wilson's project contains great promise, but is in essence what one of the diplomats would say if he could convince the other side that unconditional surrender was in their best interest. In Wilson's project one can see what was right about logical positivism, anticipating the need for, and tremendous uses that could be made of, a language which all knowledge-seekers could effectively speak and understand. One can also see the dangers of assuming that knowledge can be unified, that parts of human endeavor might be exapted and judged a priori in light of how well they fit with the existing unity. With such a language, the unity of knowledge might well be possible, but such a unity does not appear forthcoming. The two languages of the sciences and the humanities do not readily translate. C. P. Snow was looking for a third culture. That third culture might well emerge from the social sciences.

Chapter 7

The Improvers of Humanity

> This enterprise [of challenging disease concepts of behavior] is not an idealistic or quixotic one, because people all the time overcome formidable obstacles to achieve goals and to correct personal problems. People regularly quit smoking, cut back drinking, lose weight, improve their health, create healthy love relationships, raise strong and happy children, and contribute to communities and combat wrong—all without outside expert interventions. What is most striking about modern disease theories of behavior is that they militate against such human potentialities in favor of hypothetical disease mechanisms. In this perverted medical effort, more and more behavior is defined as being out of control, leading to more expressions of loss of control, which are then interpreted as justifying and proving the disease conceptions in the first place.
>
> - Stanton Peele, *The Diseasing of America*

I was in middle school when Kurt Cobain, singer/guitarist for the quintessential grunge rock band, took his own life. On the cusp of my teen years, I had no real understanding of suicide other than the finality of it. I remember our adoration, coupled with a profound sense of loss, while parents and teachers could be heard quietly shaking their heads and lamenting, "What a waste." I wondered: was it his youth; the fact that he had died young that they lamented, the manner in which his life had come to an end? There were rumors of drug use and bipolar disorder. *A waste?* How could the life of a human being be reduced to such a phrase?

I thought about Jim Morrison, Janis Joplin, Jimi Hendrix; about Edgar Allan Poe and Vincent van Gogh—both the sublimity of their art and the psychological and substance use issues that cast long, dark shadows over their lives. I remember when Alice in Chains frontman Layne Staley was found dead in 2002 in his Seattle apartment from an apparent mixture of heroin and cocaine (D'Angelo 2002). As I aged I began to

think I knew what those parents and teachers were expressing—they, too, did not understand. There was the tacit suggestion that if only they had received proper psychiatric care and stayed away from drugs, they would have lived longer and more productive lives. There was also the lingering fear among those concerned adults that young people would see these events and employ a correlation-equals-causation fallacy, believing that because their idols had produced great works of art and used drugs, that somehow using drugs would lead them to produce great works of art as well. Having met scores of such people since middle school, I know that those fears are not unfounded.

I do not wish to reduce the lives of human beings to statements about mental disorder or substance abuse. On the contrary, I wish to draw attention to potentially inappropriate and impossible effort to separate these creative geniuses from their demons. They would not have created the same art, nor lived the same lives, nor died the same deaths, because they would effectively be different people. We live, increasingly, in a medicalized society, in which talk of mental illness and addiction is common. Both are labeled diseases. I wish to take a closer look at the ideology of disease. In this final chapter, I first offer a brief history of mental illness. Then, I use the work of critical authors and researchers to contrast three types of disease and discuss the range of factors that both link to and serve to problematize this typology, using in particular a history of alcohol and alcoholism as an example. In doing so I wish to demonstrate the profound caveats for human freedom raised in relation to medicalizing human behaviors and states of mind.

7.1 Of Lepers and Ships of Fools

One of the most basic conceptual tools in this sort of analysis, at least from a sociological point of view, is deviance. Deviant behavior might be defined simply as

behavior that deviates significantly from the established norms of behavior within a group. Drug use, and behaviors commonly associated with psychological disturbance, are undoubtedly deviant behaviors. Yet it is not enough to simply say that behaviors that fall outside the norm should all be labeled deviant: I am left-handed; does that make me deviant in this 'right-handed world'? I am a man with long hair: this is often considered deviant, though there have been times and places throughout history and into the present when it is not. Howard Becker (1973) notes that according to this view of deviance, "we return with a mixed bag—people who are excessively fat or thin, murderers, redhead, homosexuals, and traffic violators. The mixture contains some ordinarily thought of as deviants and others who have broken no rule at all" (Becker 1973:5). Deviance implies a sort of value judgment—being a 'rule breaker'. As will be demonstrated, value-judgments of this type are a potent and deeply-ingrained part of the modern conceptions of disease.

In the ancient, enchanted world, mental disorders were viewed through a supernatural lens, as indicators that a person was possessed by evil spirits or demons, or that a person had been victimized by sorcery or witchcraft. Distinctions were often not made between mental illness and physical illness; each was referred to a shaman, a village holy person who typically employed either a form of contagious magic, a sort of essentialist belief that what is connected to an object, even when removed, retains a relationship to that object, or sympathetic magic, that two things that are alike can interact with each other. By modern standards, it seems likely that the shamans themselves, in performing frenzied rituals sometimes involving blood, excrement, or mind-altering chemicals, were themselves deviant (Cockerham 2006:4-7).

Both types of magic retain a patina of intuitive plausibility: the vestiges of contagious magic are heard in our speech, such as when finding a stray hair in the house and identifying it as 'my hair'; still in a sense part of me even though it is no longer in any

meaningful way connected to my body. Something analogous to sympathetic magic is still found in the 'like attracts like' thinking when it comes to homeopathic medicine, or the mindset that still subtly convinces us that natural things are always to be preferred to artificial things, even though uranium, rattlesnakes, and the bubonic plague are natural while computers, refrigerators, and water purifiers are artificial. Similarly, modern psychiatry, though heavily influenced by evidence-based medical theory and practice among the Greeks and Romans, still bears similarity to shamanism in providing a shared worldview, developing a personal relationship with patients, expecting a cure, and using shared therapeutic techniques (Cockerham 2006:8-10; Torrey 1973).

Another development arose that has become central to modern psychiatric care: "At the end of the Middle Ages, leprosy disappeared from the Western world. At the edges of the community, at town gates, large, barren, uninhabitable areas appeared, where the disease no longer reigned but its ghost still hovered. For centuries, these spaces would belong to the domain of the inhuman. From the fourteenth to the seventeenth century by means of strange incantations, they conjured up a new incarnation of evil, another grinning mask of fear, home to the constantly renewed magic of purification and exclusion" (Foucault 2009:1). Foucault points in typically poetic manner to the movement of madness, gradually, from a supernatural phenomenon to a medical and a social problem. What is typical of both lepers and the insane in this context lies in the move to segregate them from the wider culture, to ostracize them (2009). From this conception arises both a modern and a premodern parallel: with regard to the pre-modern, it shares the vestiges of shamanic contagious magic, the belief that madness was something that could be caught and passed on; a social phenomenon and a social disease. Evidence of the modern parallel can be found in a sociological conception of mental illness a sort of 'alienation from place', a personal experience of

losing oneself and one's sense of normality. In part this results in a profound sense of *stigma*, a 'mark of shame' that further sets oneself apart from the broader society and a conception of normalcy (Cockerham 2006:222-46; Goffman 1963; Goffman 1971). Madness is separated from society; the mentally ill find themselves behind a double wall erected both by the surrounding world and their own thoughts and feelings.

With the gradual advent of a place 'anywhere other than here' to contain madness, some fascinating and disturbing elements began to congeal. In the eighteenth century, "The Great Confinement," when executions were done away with for unapproved sexual acts such as sodomy, or irreligious words or deeds labeled impiety (but oddly, unsuccessfully attempting suicide was still a capital offense) a new variety of things that inhabited a world not quite sacred and not quite secular came to form (Foucault 2009:87-96). In fact, what were to come to be called asylums at first housed these and other deviants who were viewed as suffering from a sort of immorality, including the unemployed and poverty-stricken. "The poor had the right to be taken care of, but only by accepting confinement in society's "social warehouses" where they—including the sick, invalids, the aged, orphans, and the insane—were removed from mainstream society" (Cockerham 2006:16).

By the nineteenth century, the notion of a 'madhouse' had been well-established. "The first mental hospitals were revealingly called "private madhouses": they were profit-making enterprises, initially operated by apothecaries and clergymen in their capacities as "mad-doctors." Private madhouses catered to members of the propertied classes and functioned in part as substitutes for divorce, which the law did not recognize. In the typical case, it enabled a husband to dispose of his troublesome wife" (Szasz 2009:8). The modern medical model emerged in overcrowded asylums where criminals, alcoholics, and the insane lived alongside heretics, homosexuals, and the poverty-

stricken. One of the early advocates of the disease model of mental illness was Benjamin Rush, who looked to the organic brain as the source of mental illness (Cockerham 2006:20-1). It is also Rush who first postulated that drunkenness ought to be viewed not as a bad habit but as a disease, a "palsy of the will" (in Valverde 1998:2).

The nineteenth century United States witnessed the growth of the medicalization of the mental. This was an era as stamped by cultural biases as the eighteenth. A disease called drapetomania was widely accepted in the antebellum United States, from 'drapetes' for runaway slave—it was an attempt to establish the desire for black slaves to escape their white masters as a form of mental illness (Szasz 2009:19). Coming of age in such an era was another set of social movements was beginning to take shape, a reaction to a quite different morally charged issue: alcohol.

In a nascent eighteenth century America, the reason for alcohol consumption among eighteenth century European settlers in America was perhaps as much pragmatic as recreational. The water was widely considered to be unsafe to drink. "Often the best that could be said of water was that "It's very good for navigation"" (Rorabaugh 1979:97). Water was viewed as a source of contagious disease. Thus, Everyone drank, from infants, who were given toddy as a soporific to adult Americans, who drank liquor during celebrations and social gatherings as well as during working hours and meals (Blocker 2006). By 1830, due largely to the prevalence of inexpensive whiskey, consumption of spirits reached an all-time high (Rorabaugh 1979).

A quote from the second decade of the nineteenth century both sums up the omnipresence of alcohol and the rise of critical attitudes toward it: "Strong drink was a remedy for every sickness, the cordial for every sorrow. It must grace the festivity of the wedding; it must enliven the gloom of the funeral. It must cheer the intercourse of friends and enlighten the fatigues of labor. Success deserves a treat and disappointment needs

it. The busy drink because they are busy; the idle because they have nothing else to do. The farmer must drink because his work is hard; the mechanic because his employment is sedentary and dull. It is warm, men drink to be cool; it is cool, they drink to be warm" (in Steinsapir 1983:266-7). In the nineteenth century, the widespread use of alcohol in the United States came to be matched by a new force: temperance movements. Antebellum social movements and organizations, beginning around the time this quote originated, organized themselves around reform clothed in evangelical Protestant garb, often coexisting with abolitionist sentiment, which made gaining a foothold for such temperance advocates in the South difficult (Szymanski 2003:28-30). In the 1840s, a seminal but relatively short-lived temperance group, the Washingtonian society, served as a sort of prototypical self-help organization of self-confessed alcoholics, also rooted in the rise of Protestant fervor. It is speculated that the Washingtonian society fell apart toward the end of the 1840s due to its focus on both widespread temperance (abstinence) advocacy and an abolitionist stance, causing internal rifts (Bufe 1998:83; Szymanski 2003:28).

The mid-nineteenth century saw the moral intractability of slavery looming large, and the first signs of the Industrial Revolution beginning to sweep the United States, prompting a sort of collective 'revaluation of all values'. Drinking practices in America changed dramatically in the latter decades of the nineteenth century as post-Civil War America began to industrialize. It would be difficult to talk about social life and public space in the nineteenth century without mentioning the saloon. Saloons were visible landmarks in major cities—perhaps this is in part why they became the targets of the temperance reformers, who had been growing in number and strength since the early decades of the nineteenth century. The establishment and rise of the Anti-Saloon League after 1895 attests to this (Szymanski 2003). Through the nineteenth century

temperance advocates radicalized, coming to advocate a nationwide and absolute ban on all alcoholic beverages: beer, wine, and distilled spirits, and as Prohibition gained momentum, the nineteenth century saw the greatest decrease in alcohol consumption in American history (Blocker 2006:230-1).

Saloons had a polarizing effect on public opinion. “The saloon was an incubator of working-class culture; the saloon was a snake pit of vice. It promoted working-class organization; it undermined working-class initiative. It was the poor man’s club; it was the devil’s headquarters on earth” (Powers 2006:145). A deep sense of ambivalence had crept into American culture with the rise of temperance reform and advocacy, an ambivalence that is reflected in above data regarding modern drinking behaviors, an ambivalence that might aptly be called the temperance legacy. The polarization of ideology once again manifests itself, and, when coupled with the historical-cultural world of madness, a new and fragmented sense of what it means to be human, to be sane, and to be sick reveals itself.

7.2 From Biology to Psychology to Behavior: The Diseasing of Humanity

In his work Diseasing of America, behavioral scientist Stanton Peele (1989) distinguished between three types of disease: “The first generation of disease consists of disorders known through their physical manifestations, like malaria, tuberculosis, cancer, and AIDS. The era of medical understanding that these diseases ushered in began with the discovery of specific microbes that cause particular disease and for which preventive inoculations—and eventually antibodies—were developed. These maladies are the ones we can unreservedly call diseases without clouding the issue” (1989:5). Modern microbiology offers clear evidence that these diseases are caused by harmful microorganisms; they represent the types of human problems which have been

medicalized rather uncontroversially. These are biological illnesses; I will say no more about these.

There is a second generation of diseases, including what might be called mental illnesses and emotional disorders. They "are apparent to us not because of what we measure in people's bodies but because of the feelings, thoughts, and behaviors that they produce in people, which we can only know from what the sufferers say and do. We do not diagnose emotional disorders from a brain scan; if a person cannot tell reality from fantasy, we call the person mentally ill, no matter what the person's EEG says" (1989:5-6). Since Peele's work is a quarter of a century old, I turn now to some more modern sources to delineate this second generation as a source of complexity and controversy. At one end of the spectrum is schizophrenia, a species of mental illness featuring profound delusions and psychosis, which has been shown to have a genetic component and is omnipresent throughout the cultures and societies of the world (Cockerham 2006). On the other hand, Oppositional Defiant Disorder (ODD) is considered a mental illness, found in children, characterized by "excessive arguing with adults, active defiance and refusal to comply with adult requests, deliberate attempts to annoy or upset people…frequent anger and resentment" (quoted in Szasz 2009:20). To any with extensive experience with children, I leave it to you to decide the extent to which the latter represents a 'disorder'.

There are also mood disorders like depression or anxiety, which can range from extreme shifts in mood such as with bipolar disorders to mild depression, such as is found in dysthymic disorder. Acute anxiety, panic disorders, and depression can be crippling, even life-threatening, and are the most common form of severe mental disorder (Cockerham 2006:47-53). There are literally hundreds of examples of second-generation diseases, some of which have biological components, and some of which do not. What I

hope to have illustrated is the extent of variation in both the type and severity of these psychological illnesses, and that it is not readily apparent (as has been shown in the preceding historical exegesis) the extent to which sociocultural elements play a role in these diagnoses.

Yet there is another, more elusive dimension of disease: "The third generation of diseases—addictions—strays still farther from the model of physical disorder to which the name disease was first applied to modern medicine. That is, unlike a mental illness such as schizophrenia, which is indicated by disordered thinking and feelings, addictive disorders are known by the behaviors they describe. We call a person a drug addict who consumes drugs compulsively or excessively and whose life is devoted to seeking out these substances…we cannot tell whether a person is addicted or will be addicted in the absence of the ongoing behavior—the person with a hypothetical alcoholic predisposition but who drinks occasionally and moderately is not an alcoholic" (Peele 1989:6). It is this third usage of diseases, as behavioral illnesses, that becomes most problematic when held up to scrutiny.

Over three quarters of Americans (76%) believe addiction is a disease. Approximately the same percentage think complete recovery is possible whether in the case of alcohol or drugs, but a large majority who hold this view also think addicts can only recover if they get professional help (Jones 2006). The disease model of addiction, and alcoholism, has become an American standard, popularized, in part, by the rise of Alcoholics Anonymous and its ubiquitous 12 step program. To understand AA and the genesis of the 12 steps, it would seem a brief glimpse into the Oxford Group is necessary. The Founding Fathers of AA were members of the Oxford Group Movement, the conservative, evangelical brainchild of Dr. Frank Nathan Daniel Buchman, an ordained minister and world-traveling proselytizer, who, after resigning his position at the

Lutheran Ministerium of Pennsylvania over apparent financial disputes, began, increasingly, to spread his particular brand of religious fervor, increasingly basing his life and teachings upon what he came to call divine "guidance" (Bufe 1998:14-5). Ultimately, the forerunners of the 12 steps appear in Buchman's own "personal evangelism", which he spread throughout colleges in the 1920s. The program included: "(1) both public and private confession of sin, especially sexual sin; (2) reception of divine "guidance" during "quiet times"; (3) complete surrender to this "guidance"; (4) the living of a "guided" life in which every aspect of one's actions, down to the choice of dinner entrée, was controlled by God; (5) the practice of the Buchmanite "four absolutes"—purity, honesty, love, and unselfishness; (6) making restitution to those one has harmed; and (7) carrying "the message" to those still "defeated"" (ibid. p. 18). The parallels to the 12 steps are uncanny. Here are the 12 steps, as listed in the book Alcoholics Anonymous, affectionately called the Big Book by members:

1. We admitted we were powerless over alcohol—that our lives had become unmanageable.
2. Came to believe that a Power greater than ourselves could restore us to sanity.
3. Made a decision to turn our will and our lives over to the care of God as we understood Him.
4. Made a searching and fearless moral inventory of ourselves.
5. Admitted to God, to ourselves, and to another human being the exact nature of our wrongs.
6. Were entirely ready to have God remove these defects of character.
7. Humbly asked Him to remove our shortcomings.

8. Made a list of all persons we had harmed, and became willing to make amends to them all.
9. Made direct amends to such people wherever possible, except when to do so would injure them or others.
10. Continued to take personal inventory and when we were wrong promptly admitted it.
11. Sought through prayer and meditation to improve our conscious contact with God as we understood Him, praying only for knowledge of His will for us and the power to carry that out.
12. Having had a spiritual awakening as a result of these steps, we tried to carry this message to alcoholics, and to practice these principles in all our affairs. (Alcoholics Anonymous 1976:59-60).

The content is overtly religious—there are multiple appeals to God, Power, or Him, and they presuppose belief in a Higher Power to which one might turn one's life and will over, that might have a will which one could carry out. A chapter entitled "We Agnostics" suggests that once one determines that one is an alcoholic, a genuine, miraculous spiritual experience will conquer the illness of alcoholism. Further, it is suggested that "…something like half of us thought we were atheists or agnostics" and "To be doomed to an alcoholic death or to live on a spiritual basis are not always easy alternatives to face" (ibid. p. 44). Statistically it seems unlikely that half of alcoholics are nonbelievers given that some 98% of Americans believed in God when the Big Book was written (Newport 2011), but this linkage also adopts an implicitly evangelical stance, framing recovery as a path to salvation, and salvation, to recovery. Though Alcoholics Anonymous is specifically not a temperance movement, some of the ideas its Big Book employs harken back to the temperance movement itself. "Adopting the guise of

evangelical missionaries, American Temperance Society agents delivered emotional sermons punctuated with biblical and perfectionist imagery. According to these evangelists, salvation and sobriety went hand in hand, as "the Holy Spirit will not visit, much less will He dwell with him who is under the polluting, debasing effects of intoxicating drink"" (Szymanski 2003:30).

What is an alcoholic? What is an addict? Modern treatment and recovery approaches address this question through narrative, containing the testimonials of multiple persons that generally fit the 'reformed sinner' ideal type of evangelical Protestantism, telling what Kristin G. Esterberg (2002) calls a conversion narrative, "One particularly compelling form of narrative in Western culture…which tells how an individual changes or how one became something else" (Esterberg 2002:190). 'Alcoholism' might be characterized as a form of spiritual warfare supported by medical authority. This view is supported by ethnographic studies of inpatient treatment centers in which such narratives become self-reinforcing: emphasizing the 'before' image of a hopeless, powerless addict and the 'after' image of a re-born person who has defeated the spiritual illness in session after session leads to ingrained views of what both addiction and recovery are as experiences, as well as leading to the belief that without the recovery center or group, one is certain to drink or use again, and that to do so is to die (Hood 2012).

Consider this style of narrative, and the means by which it distills all possibility into precisely two alternatives, in relation to another startling finding. "Experts like Douglas Talbott claim that 20 or more million Americans are alcoholics. This means that in addition, as many as 80 million Americans suffer from the disease of coalcoholism and require treatment for being members of families with alcoholics. The National Council on Compulsive Gamblers maintains that 20 million Americans are addicted gamblers. Thirty

million or more women could suffer from anorexia and bulimia, but if obesity is also counted, 80 million Americans have eating diseases…Women also seem to suffer more from compulsive love affairs, while men more often become compulsive fornicators—leading to estimates of up to perhaps 25 million love and sex addicts" (Peele 1989:25). These numbers were valid a quarter of a century ago. Given the tendency today to talk of shopping addictions and spending addictions and the like, the total proportion of 'addicts' today is likely higher. Numbers like these suggest that adopting the disease model of alcoholism, and applying it to compulsive and specifically deviant behavior more generally, produces a society in which few are not afflicted with one disease or another!

Herein lies the crux of the matter, both the excesses and limitations of the concept of disease. The definition of the situation is not medical but metaphysical: the regaining of the self through the surrender of the self, a dominant theme in evangelical Protestantism. This finding seems to link together a chain dating all the way back to premodern medicine, in which the supernatural was viewed as the source of disease and suffering, whether biological, psychological, or behavioral. If it is the mission of the Enlightenment project to scientize and 'disenchant' the world, then it is here, the realm of human behavior, that this mission is most obviously far from complete.

7.3 Behavior, Agency, and Experts

Experts are part of our lives, inextricably. The knowledge-base is simply too broad, each discipline and sub-discipline too specialized, to account for it all. One need only set foot in the library of a large, state-funded research university to find compelling evidence in lifetimes worth of books. "We already have far less agency in our lives than we have been led to believe. We reflect and confess, but have been rendered unable to turn a critical eye on society's dominant institutions. Our sense of moral responsibility

has eroded, and we seem less able to feel shame. And we have been coaxed into participating in the creation of our dependence on experts, as [Christopher] Lasch suggests. We are encouraged to believe we are unable to manage our lives; we desperately need the intervention of these experts. Perhaps, then, calling every activity an addiction is overcompensation for the powerlessness engendered by having to symbolically run every direction past a coterie of experts" (Bishop 2011).

Trust us, the experts tell us, from the doctor's office or the podium. But in such an age it is increasingly difficult to determine who the experts *are.* (In this final bastion of pre-modernity that is addiction treatment, the problems and paradoxes of relying on the experts are perhaps the most glaring. For one thing, assessments of the effectiveness of the treatments in place are disheartening: Outpatient treatment programs often 'graduate' no more than ten percent of those admitted, meaning the rest leave the program (or are expelled) without reaching a point at which the experts declare their readiness to return to society. Higher numbers are often generated, but they are generated by the programs themselves, casting suspicion on their validity (Hood 2012).

AA, for example, has taken to conducting Triennial Surveys. Some of the data compiled for the following figures are somewhat older (1989 and prior), but data produced by AA indicated that of those coming to AA, 19% remained after one month, 10% after three months, and 5% after twelve months. "In other words, AA has a 95% new member dropout rate during the first year of attendance (Bufe 1998:91). Perhaps it is unfair to measure the program's effectiveness rate simply based on these abysmal numbers. Only about five percent of diets succeed long-term, and those that are successful manage to make fundamental changes to their lifestyles, such as eating breakfast and getting regular exercise (Agger 2011:31). Exchanging a life at which alcohol is a centerpiece for a life of abstinence would, not unrealistically, require a similar

set of fundamental lifestyle changes. And even if these numbers are an accurate representation of the program's effectiveness, they, more than anything, underscore the difficulty of undertaking such a major lifestyle change, and the persistence of habit. Yet in spite of their significant long-term effects on our health, no one would think to call skipping breakfast or getting insufficient exercise 'addictions', let alone diseases. They, like a diet or drug use, are habits. Habits are simply hard to break.

Considering the low success rate of addiction treatment, perhaps many people simply decide to go it alone. In fact, this must be true; otherwise, as mentioned before, nearly all of us would suffer from one sort of disease or another. "While addiction may indeed look irresistible in the confines of a cage or in a study designed purely to test the chemical properties of a substance, organisms in real environments survey a large range of choices, many of which have greater meaning to them in the long run than does simple enjoyment of a drug high or the discomfort of ridding one's system of a drug. Indeed, even in the most extreme cases of addiction, the decisive factor is the values that addicts have or do not have that either defeat or maintain the addiction" (Peele 1989:188).

The existing treatment model both assumes too much and too little. Too much, when attempting to shoehorn a diverse array of human experiences, abilities, and lives into a variant of a lost-and-found narrative with an emphasis on abstinence and calls this 'medical science'—too little when downplaying the roles of both individual values and social environment in addictive behavior, something that is found, in a broader sense, in the sociology of mental disorders literature (Cockerham 2006; Staub 2011).

Placing addiction within the realm of habit rather than disease permits a far broader array of strategies to be deployed. First, it can be examined over the life course: why, for example, is binge drinking so popular among some college students (see Ven 2011)? Though many of these young students experience serious consequences from

such behaviors, why do some stop, and others continue? Second, a behavior is studied in a manner somewhat different from a disease, for we are neither 'blank slate' victims of our environments nor mindless bundles of primal impulses; we are an interaction between environment and personal makeup, complex, thinking, feeling beings. Third, being diseased places one in a position of victimhood. We may be largely powerless over biological diseases from cancer to the flu, beyond turning our well-being over to the experts and hoping for the best. These experts tell us both what foods to eat and what activities to engage in—or refrain from--to avoid these maladies, and then, if we become afflicted, they tell us how we must respond. Yet as we move ever farther from disease with a discernible biological basis, we are placed in a distinctly uncomfortable position of losing the liberty promised us by life in an open society.

The tide is beginning to turn, as both medical and behavioral experts begin to turn their attention away from a model of obedience and powerlessness and toward personalized medicine, forming a relationship between doctors and patients that maximizes the individual tailoring of treatment. Future advances in genetic research and other cutting-edge technologies are likely to further this trend (Goldberg 2010:242-75). With regard to behavior, both environment and individual come into play. New treatments are being shown to be effective with regard to addiction, not all of which take the all-or-nothing abstinence approach, though they are fighting an uphill battle against the disease ideology (Lilienfeld et al 2010:232-6; Miller and Muñoz 2005). At the same time, perhaps it is time to end the expensive and ineffectual War on Drugs and seek more humane and fiscally responsible means to deal with drug use. Some will argue that dealing with poverty and racism is an essential component of this program (Hood 2012); others will argue for decriminalization of the sale and use of drugs as a libertarian right and a superior alternative (Szasz 1992).

What is strange about the moral terror with which many view drugs, is that the damage done by alcohol abuse each year that offers up some difficult findings. "There are approximately 88,000 deaths attributable to excessive alcohol use each year in the United States. This makes excessive alcohol use the 3rd leading cause of death for the nation. Excessive alcohol use is responsible for 2.5 million years of potential life lost (YPLL) annually, or an average of about 30 years of potential life lost for each death. In 2006, there were more than 1.2 million emergency room visits and 2.7 million physician office visits due to excessive drinking. The economic costs of excessive alcohol consumption in 2006 were estimated at $223.5 billion" (Centers for Disease Control and Prevention 2013). The word 'sobering' comes to mind, and not merely as an ingenuous pun. But prohibition has failed, and “abstinence only” disease models are increasingly suspect. The ultimate consequence of ensuring that addiction is treated as habituated behavior and not a medical condition is that it leaves us free to decide.

Chapter 8

The Demons Begin To Stir

> Avoidable human misery is more often caused not so much by stupidity as by ignorance, particularly our ignorance about ourselves. I worry that, especially as the Millennium edges nearer, pseudoscience and superstition will seem year by year more tempting, the siren song of unreason more sonorous and attractive. Where have we heard it before? Whenever our ethnic or national prejudices are aroused, in times of scarcity, during challenges to national self-esteem or nerve, when we agonize about our diminished cosmic place and purpose, or when fanaticism is bubbling up around us--then, habits of thought familiar from ages past reach for the controls. The candle flame gutters. Its little pool of light trembles. Darkness gathers. The demons begin to stir.
>
> - Carl Sagan, *The Demon Haunted World*

I was sitting in an undergraduate history class when the news broke. My history professor, flushed and visibly nervous, appealed to his own intellect, stating that we were watching history being made, right then and there. School was closed soon after, and we all went home, where many turned on the television and watched the destruction of the World Trade Center carried out again and again on a seemingly endless loop, as if even the media pundits were still trying to convince themselves of the reality of what had transpired. That night, there were no planes in the sky—all flights had been grounded. I sat on the back porch with my family listening intently to the deafening silence, the eerie calm. I never noticed how ubiquitous and routine the sounds of aircraft flying overhead were, the sounds of modernity, until they were gone. We had stocked up on water and fuel. What would September 12 bring? Tomorrow became a source of fear rather than hope.

"The suddenness and speed of the attack resembled a natural catastrophe. There was no warning. There was also no message. The absence of both created the

kind of fear that made most of us know we had not, until then, understood the meaning of the word terror. Like earthquakes, terrorists strike at random: who lives and who does not depends on contingencies that cannot be deserved or prevented. Thinkers like Voltaire raged at God for His failure to uphold the elementary moral rules human beings try to follow. Children should not be suddenly and brutally tormented; something as big as the difference between life and death should not depend on something so small as chance. Natural disaster is blind to moral distinctions that even crude justice draws. Terrorism deliberately defies them" (Neiman 2002:282). The events were called 'terrorism'. They did indeed serve to terrify. A new millennium began not with the promise of learning from the mistakes of the twentieth century, but with a barbaric assault, not merely on modernity but on the dignity of humanity itself. We hoped collectively the horrors of the past were behind us, belonging to a bygone era. Such hopes were shattered that day, not by atomic bombs or the unfeelingly systematic extermination of a people within concentration camps but by a handful of men with box cutters, an utterly premodern assault on an economic Tower of Babel.

The palpable fear of September 11 that thrust many of us into survival mode faded quickly. Over the next few days, things became routine once more. The lights of planes again dotted the night sky. People returned to sports arenas and universities and high-rise office buildings as if nothing had happened. The nation mobilized for 'The War on Terror', but it was a war that, like the war on poverty or the war on drugs, became a slogan. We were not asked to sacrifice. We were asked to go shopping, to fill the bastions of techno-consumerism with warm bodies and cash-lined wallets. Except for the brave few soldiers who found themselves on the front lines, the rest of the nation seemed to sink rapidly into a sort of comfortable amnesia.

Beneath that amnesia, a creeping sense of fear seems to quietly haunt us, almost an extension of the Millennial Y2K panic, a belief that computers had not been designed to cope with the transition from 1999 to 2000, and thus the entire technocracy would come crashing down around us on January 1, 2000. Millennial fear is infectious. No longer did we dream the dreams of a Golden Age. Dystopian science fiction films abounded, and gained in popularity. The nation slid gradually into economic recession. Climate change and nuclear Armageddon exist uneasily in the collective conscience beside conspiracy theorists and doomsday preppers. This is an age that sees in everything from genetically modified crops to work in artificial intelligence the prospect of engineered doom. If anything, the brief paralysis of modern technocratic consumerism on September 11, 2001 offered a new image of a world in permanent crisis. Anxiety abounded as we came to realize that the complexity and interdependence of modernity might also be its undoing.

Most noticeably, the polarization I have chronicled throughout this work began to solidify and amplify. The Religious Right reasserted itself in the wake of the attacks, as "Reverend Jerry Falwell so artlessly illustrated when he interpreted 9.11.01 as God's retribution against America for being a nation of sinners" (Luke 2001:139-40). At the same time, the secular left began to fragment, giving rise to a new strand of anti-theism espoused in a statement by the Freedom From Religion Foundation: "Science flies us to the moon. Religion flies us into buildings" (quoted in Stenger 2012:23). A neologism, "Islamophobia", entered our vernacular. How does one even begin to communicate across gulfs so wide? That is a question that has vexed me for a long time, somewhat longer than the fourteen years that have passed since the World Trade Center attacks.

Karl Mannheim ultimately came to argue that the sociology of knowledge implies a specific role for intellectuals in modern society: we are to be those who are less

interest-bound, less tied to specific social classes and political concerns (Mannheim 1936:153-64). I am forced to wonder today the extent to which that is possible, given the bureaucratization of science and the university, the post-Cold War budget cuts, and the appearance, at least in the United States, of a renewed push toward "more employable" majors. We as a society define in advance which avenues are worth pursuing, and then grease the tracks toward those avenues with high starting salaries in order to assure that our intellectual prophecies will be fulfilled. Engineering and medicine will build the edifices of scientific mastery, biotechnology and computing will chart the frontiers. Institutions attached to governments and private think tanks will fund the research and decide the future of science. Funding for projects that do not use mathematics to test hypotheses may become increasingly scarce.

But the significance of the sociology of knowledge is best illustrated by removing the sociological scaffolding with which ideas are built, all at once. Think of what was written on those half a million scrolls in the Library of Alexandria nearly two millennia ago, and imagine how, if the library had not been destroyed, the world would be altogether different today. We cannot even predict exactly how, because the ideas that would have re-shaped it are gone. Did the ancients know widely that the earth orbited the sun, or that humans evolved from earlier species of life? Did they see the role of the intellectual in Socrates, a questioner of everything, or more in Plato, as expert authority? Perhaps most significantly, did they come to see the potential for a future fundamentally different from the past?

The problem for Mannheim is, to some extent, the same problem we face: the problem of history. When Mannheim described the intellectual as standing to some extent outside the realm of sociopolitical strife, he did so from 1936, a time before the Manhattan Project and the Cold War, before the defeat of fascism, before world-historical

contingencies conspired to reshape the role of the intellectual in modernity. The vast growth of knowledge since then, riding currents of technological achievement funded by geopolitical strife, has changed the role of the intellectual such that she has become, in most sectors, increasingly specialized, and her work has increasingly turned away from 'grand theorizing' and toward more modest, concrete problems. The role of the intellectual in society is shaped in dialogue with the larger society itself—what we know, what we learn, and what we study are products of larger social forces. In a society that values technology, efficiency, and prediction, we should not be surprised to see the turn toward the 'harder' sciences and an emphasis on results thus defined.

If society were different, the role of intellectuals, and the knowledge they proffered, would be different as well. Were any of those Millennial doomsday prophecies to come true in the most complete and pessimistic sense, such as Y2K, and we found ourselves inhabiting a world without computers, credit cards, the Internet, or electricity, the role of the intellectual in society would change overnight. We would again be faced with a crisis akin to the destruction of the Library of Alexandria. We sociologists, along with many other social scientists, might find the complexities of civilization that occupy our time and professional journals all but nonexistent or irrelevant. Studying complex structures, interactions, and intersections in society presupposes a society complex enough to warrant such study. Similarly, if a group of extremists succeeded in banning, censoring, or destroying every thought offered by Charles Darwin, Galileo, and Copernicus, humans and apes would still be descended from a common ancestor, and the earth would still orbit the sun, but no one alive would know it. The development of ideas would have to take place once more, guided by a new set of historical contingencies and sociopolitical caveats—one would suspect that such discoveries would again be made someday, by different people in different times. Time becomes the

unknown quantity, the human sense of temporality, our desire to frame the present as a significant point in history.

What is the role of the twenty-first century intellectual? Are we to train future business leaders and develop new technologies? Clearly this is our lot, but herein lies the significance of the role of the intellectual, as to by Mannheim and confirmed by the Frankfurt School: we must be self-critical, and we must enable others to do the same. It is the reflexive element within the social sciences that enables the realization of this goal—insofar as we can turn the critical lens not only on the broader world but also on ourselves, we are at once humbled and humanized. Insofar as studying the sociology of knowledge might treat historical amnesia, a view of knowledge can be offered that is not gerrymandered to fit a framework constructed within a moment in time and then sold as eternal and certain.

The view from the sky is open to anyone, but only within the confines of a certain kind of civilization: one that values human efforts to understand the world and our place within it, and one that seeks to make available the requisite time, education, and resources to the broadest possible cross-section of individuals. It is a reminder, like those who tirelessly prophesize the end of modernity, that what we take for granted was hard-won and could yet be lost to the contingencies of a broader world filled with intolerance and fear. On the other hand, the view from the ground offers a vision that is as old as humanity itself. The first paintings on the walls of ancient caves testify to this, the belief that narratives connect the individual to the tribe and to the cosmos. The view from the ground reminds us where we have been and who we are. I stress, by examining the humanity of science as well as the science of humanity, the need for, and importance of, both.

Where to now? I am reminded of the quasi-debate between the Frankfurt school and Karl Popper, in which the former saw the role of theory as a means to bring about this large scale change while the latter pushed for reform, for carving out limited areas of social change, viewing revolution as a cure worse than the disease (D'Amico 1991). It cannot be determined, outside of time and place, which approach should, or must, forever be favored. If today I tend to side with Popper against revolution, perhaps it is lack of faith in the intrinsic good of humanity that has led me here. Or maybe it is something more subtle, like the upward mobility that took place in my own youth when my father started his own business when I was in middle school and found modest, hard-won success that led my family out of near-poverty and into the middle class. If, on the other hand, I side with Adorno and believe the need for structural change has passed, it may reflect years of alienating labor, a feeling of being marginalized, a fear that the world as it exists today does not hold within it a stable or desirable place for 'someone like me'. I have found myself on both sides of the divide, and have become increasingly convinced that we cannot step outside of time and place to view the world from a 'standpoint without a standpoint', analogous to the logical positivist view of science discussed in Chapter Six. Such a standpoint may be temporarily and procedurally useful, but no one lives in such a place, for such a place does not exist. We cannot stop being human in order to be scientists, nor can be stop being scientists in order to be human. We must be both at once.

As I mentioned in the introduction, this is a beginning, not an end. I have undoubtedly raised far more questions than I have answered. This was my intention. Whether examining the role of philosophy and of imagination in physics, the role of evolution in understanding morality, or the wondrous and terrifying prospects raised by the development of technology, I hope to have revealed the humanity of science, not

merely ideology but a sense of something deeper and more personal than logic and mathematics allow for. Regarding the rise of the Internet and the proliferation of anomalistic ideas, the profound tension between the sciences and humanities that has been with us since the Enlightenment, and the complex and often ambiguous world of attempting to medicalize human behavior, I hope to have revealed the science of humanity, warts and all, in which I, and for that matter, all of us, take part.

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Biographical Information

Lukas Szrot began studying at the University of Texas at Arlington in May of 2000, five days after graduating from high school. After considering both sociology and psychology, Szrot decided to major in philosophy, completing his B.A. in May of 2004 with a minor in sociology and becoming the first college graduate in his immediate family. After briefly considering graduate studies in philosophy, Lukas opted to take a hiatus from academe. Over the course of the next eight and a half years, he held multiple jobs, including a restaurant manager, heavy equipment mechanic, and performing singer/songwriter. From each of these occupations, Szrot learned to appreciate both the value and complexity involved in human interactions and institutions and their role in producing and disseminating knowledge. Coming to view many of the primary ethical and epistemological questions he investigated during undergraduate studies through an intersubjective lens, Lukas Szrot returned to the University of Texas at Arlington in January of 2013 to complete a statistics prerequisite before entering into graduate studies in Sociology that Fall. After a semester of full-time employment and self-funded graduate education, Szrot was awarded a full fellowship and position as Graduate Teaching Assistant in January of 2014. Upon earning an M.A. in Sociology in May 2015, Lukas Szrot plans relocate with his wife to the University of Kansas to earn a PhD, with the long-term goal of writing, teaching, and conducting research as a sociology professor.