

SOCIOLOGY, SCIENCE, AND THE END OF PHILOSOPHY

How Society Shapes Brains, Gods, Maths, and Logics



SAL RESTIVO

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A Note on the Bibliographical Epilogues

In one of my classes on the sociology of religion, a student asked my teaching assistant why she didn't believe in God. She said: "Because I read books." Every book is the apex of a structure of knowledge. The book is only as good, as trustworthy, as worthy of the intelligent reader's time as the structure of knowledge it is based on. Structures of knowledge are never consistent, coherent, and free of ignorance and superstition. But some, and therefore some books, are better guides to how things work than others. To be educated is to know, but not to know absolutely, how to separate on an ever-increasing learning curve and with improving degrees of confidence the wheat of grounded knowledge (including educated guesses and reasoned speculations) from the chaff of ignorance, charlatanism, lies, and superstition. The books I list here are at the apexes of structures of knowledge that speak through the book in your hands. Some are keys to the more and less established facts of the matter on which I ground my ideas; some are foils included because they have had some impact on the learning communities within which I run. I have also used the epilogues to update material in the text. The epilogues are continuous with their chapters and should be so read. They are not designed to be merely references.

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Prologue

Part 1: Requiem for Plato and the Gods

To the extent that “Western” still has any meaning in a postmodern, postdisciplinary, diversified global culture, we Western-educated intellectuals are wittingly and unwittingly heirs of Plato. This is especially true in the case of our ways of analyzing, explaining, and understanding the brain, god, math, and logic. The philosopher Alfred North Whitehead elegantly identified the Platonic heritage when he described the Western (“European”) philosophical tradition as a series of footnotes to Plato. Plato’s legacy is not a systematic grand theory but rather the benefit of his experience of a key moment in history; he left us to mine a mountain of suggestions. There are two caveats here. The first is Whitehead’s warning that “A science that hesitates to forget its founders is lost” (Whitehead 1917/1974: 115). The second is that we should not rely on the authority of “supreme masters of thought” such as Plato, Aristotle, Descartes, Locke, Hume, or Kant but on the “intrinsic reasonableness” of claims, arguments, and concepts (Whitehead 1929/1979: 39). It is probably wise to keep in mind M.H. Abrams’ (1991: 70) footnote to Whitehead that humane studies are impoverished if they

forget their founders. Great critics of the past should always be with us even as we criticize and amend them to prevent us from becoming too narrow in our viewpoints, repeating old errors, or ignoring ancient insights. This is good advice for me to heed in my sometimes intemperate efforts to criticize and amend philosophy to death. A meditation on Whitehead and Plato and on Abrams and the “great critics” can be considered from the perspective of what I call the “eternal relevance fallacy.” What rationale can we give for continuing to ground our research and theory in the lives and thoughts of men and women who lived hundreds and even thousands of years ago? It is clear that physics, chemistry, and biology have broken the chains that link us to the ancients near and far. The fallacy is that there are compelling reasons to continue to keep ancient and more recent philosophers in our conversations, and that in some cases they should be directing those conversations. I cite this fallacy because I believe we tend to exaggerate the significance of the ancients and near ancients as a form of hero worship, not because Abrams’ point should be dismissed out of hand. Again, I must be careful here since I rely heavily on near ancients, notably Durkheim, Marx, and Nietzsche. But they are special cases since we have not yet caught up to them.

It is important to consider where this is the case and where it is not. We do not invite Plato or Aristotle to our physics conversations. We do invite them to our conversations about human behavior, ethics, and values. The reason for this is that in the case of physics, the ancients have been clearly made irrelevant by advances in a robust science. In the case of human behavior, the relevant social sciences are not or are not considered robust enough to displace ancient and more general philosophical achievements. The social sciences are in fact more robust than generally acknowledged for a variety of reasons generally involving cultural prejudices, ideologies, and blinders. In this book, I champion a robust social science that encourages us to forget our founders from Plato to Descartes, Kant, and Hegel. In a corollary fallacy, I claim that in the wake of the contributions of sociologists from Emile Durkheim to Mary Douglas and Randall Collins, we have nothing further to learn from philosophers and psychologists about the social world. The realization that there is a social level of reality subject to scientific inquiry

eliminates the need for classical and traditional approaches to questions about human behavior. The caveat is that interdisciplinary imperatives that have emerged in the last fifty years have made the traditional disciplines increasingly irrelevant to varying degrees. At the same time, it is important to establish the robustness of the social sciences to establish ground rules for letting them into the streams of interdisciplinarity.

The form of ancestoricide I am recommending here has to be tempered in cases such as Euclid. His geometry taps into phenomena that are for all practical purposes invariant across cultures and sciences. To the extent that our ancestral philosophers and early scientists figured out certain physical, chemical, and biological invariants, they deserve acknowledgment. For the most part we do this not by inviting their ghosts into our laboratories but by incorporating them into our work eponymously or anonymously. Incorporation lends itself to criticism, amendments, and change; the point is to recognize what appear to be invariants without being trapped into idealizing and worshipping them as “universals” outside time, space, and culture and their discoverers and inventors as our contemporaries.

This book was conceived as a “requiem for Plato.” In effect, it is a requiem for philosophy. The problem is that Plato’s ideas on the brain and mind, on God and the gods, and on logic continue to echo in the hallways of the neurosciences, theology, and logic even as both the neurosciences and social sciences give us reasons for forgetting Plato. In this book, I introduce the basic rationale for and nature of the sociological perspective and how it impacts our understanding of the brain, god, math, and logic – all to be thought of as plurals and not singulars as a sign of their complexity. My goal is to show why sociology and anthropology change everything about how we should understand these phenomena. Brains, gods, maths, and logics are human creations manufactured in social and environmental settings out of the materials of the everyday world and the symbols of everyday culture.

There is no Plato *per se*. He is an icon, and if his ideas are a drag on contemporary thought his is a waning influence at best. I take his name to stand for certain traditions that do linger, and if I exaggerate it is to

bring both the dangers and promises of contemporary thinking on brains, gods, maths, and logics into our conversations. With Plato as with any iconic figure, we face multiple challenges, some rooted in issues of translation, some in the internal contradictions that inevitably crop up in a lifetime of writing, and some in the conflicting interpretations among authors themselves and their readers. We must be alert to the threat of anachronisms and Whig histories. Finally, we must be cautious about falling prey to hero worship. This danger exists wherever we encounter idolatry, whether in the case of iconic figures, core concepts, ideas, and themata, or disciplinary perspectives.

In the case of the origins of logic and the identity of “the father” of logic, we could make equally good cases for Socrates, Plato, or Aristotle. We could start with Socrates’ introduction of a science of logic by way of the Socratic dialogue, Plato for making this contribution more widely known and increasingly systematic by way of his “dialogues,” and Aristotle for providing the most complete and systematic logic in the ancient world. Indeed Aristotle is arguably the “founder” or “father” of logic. I will have more to say about the origins of logic in [Chapter 8](#). For now, and in this context, Plato will stand for this tradition in logic. My rationale for this is that “requiem for Plato” is a requiem for Platonism and for transcendental thinking in the study and practice of the brain sciences, religion and theology, and mathematics and logic.

Plato’s views on brain and mind are most prominently presented in *The Republic* and more extensively in *Timaeus*. Plato argues that there are two systems associated with mentality. One is pervasive throughout the body and rooted in the chest. This system is connected to a second system which has the brain as its locus. The latter is the source of reason, the former is associated with the unreason of instincts and emotions we share with other animals. Plato observed that humans have an ability not found in other animals to override unreason. Brain-psyche seems to be distinct from body-psyche. Body-psyche has its own dualism; a superior part physically close to the brain, and a lower appetitive part that drives the need for food and the lust for sex. Plato assumes that there must be a barrier of some kind between the body-psyche and the brain-psyche. He decides that it is significant that the brain (which houses the brain-psyche) is physically separated from the body-psyche by the neck.

Plato assumes that there are souls and that they exist prior to their appearance in living human beings. This prior existence gives souls access to knowledge prior to birth and the experiences of life. Plato argues for the preexistence of the soul first using the Socratic method of induction and experience but later in *The Republic* and later works he relies on logical necessity. The mind which is co-terminus with if not identical with the soul is subservient to eternal unchanging ideas. The aim of “science” is to reduce all truths to one supreme principle. This idea of science is realized today in the notion that it is possible to construct a “theory of everything.” What is behind the contemporary theory of everything quest is the same sort of purist theory of God that guides Plato. The test of truth is consistency, all truths are mutually confirming and rooted in one core idea, a final cause that is called the Good but that transparently means God. Individual thought reproduces perfect divine thought.

Plato stands between Socrates and Aristotle in a moment when the Greek philosophers were condensing millennia of human experience with reason captured in generalizations about inference and what were known to Euclid as “common notions.” Aristotle is the great synthesizer of the very idea of logic. At the end of the day, Platonism is a theory of souls, not a theory of ideas. The great chain of souls links the souls of plants to the souls of the stars (the gods), and the soul of the universe or divine Providence. If there is a chink in the idealist armor of Platonism, it reveals itself in the *Parmenides* where students of Plato from Lutoslawski in 1897 to Cairns in 1989 agree that this dialogue tempers Plato’s idealism to the point that it could be claimed that Plato is some form of materialist.

If there is a materialist thread in Plato’s thought, its weakness is demonstrated in his argument for God. Writing and thinking more than two millennia ago, Plato had some ideas about why we should believe in the gods. He assumes, like many people do today, that something must have created the universe and the things in it. That assumption almost achieves a certain degree of plausibility. The next assumption, that the something that created the universe must have been the gods is easily dispelled. Even some children can see that making the gods or God the primal cause of the universe leads to the question of

what is the primal cause of the gods or God. Here Plato commits the fallacy of the primal cause without a primal cause. He goes on to argue by the fallacy of the majority: most people believe in the gods and so should we all since the majority is likely to be right. In the following millennia, proofs for and against the existence of the gods and God have been offered, often sanctioned by the canons of philosophy and logic, sometimes by the canons of science. All proofs tend to embed their conclusions implicitly or explicitly in their premises, some more transparently than others. Proofs for the existence of God are the most transparent in this respect.

We do not have to diminish Plato's historical significance as the first idealist, a thinker who anticipates Leibniz, Descartes, and Kant, a giant in the pantheon of great innovators in the history of ideas and of thinking itself to recognize that he is obsolete. It is clear that anyone who is familiar with the various embodiment, social, and cultural directions that the neurosciences, philosophy, and even theology have witnessed in recent decades makes the death of Plato an unnecessary announcement. And yet we can still find prominent examples of brains in a vat thinking, idealism, and unadulterated theism in the intellectual arena. Students and doubtless some scholars are still wondering if we might actually be living in "The Matrix." It is therefore important to stress the significance of putting the final nails in Plato's coffin and in the traditions he represents and sustains. O! We knew thee well, Plato!

Let there be no mistake here about how central to my work is the very idea of thinking as reflected in the lives of the philosophers. Already as a child I was at least intuitively attuned to the idea that reason is our most important inheritance. This intuition became more self-conscious as I matured and I was prepared to immediately embrace Nietzsche's aphorism 18 in his *Dawn* when I came across it during my college years: "Nothing has been purchased more dearly than the little bit of reason and sense of freedom which now constitutes our pride." If you are not prepared to embrace this aphorism and champion it, defend it, and realize it in every moment this book is not for you. No part of this book is more driven by this aphorism than the section on religion and the gods, no section requires the reader to embrace this aphorism with more passion and courage.

Finally, let me say that whatever impresses or strikes me about the world we live in, nothing impresses me as much as the recalcitrance of reality. I am sympathetic to and an advocate of multiple realities and diverse ways of knowing, but my multiple realities and my diverse ways of knowing are grounded in a world in which it matters which way we look when we cross the street; and if you travel from New York City to London, it will matter whether you adjust to Londoners' modes of looking left and right when you cross their streets. It matters whether our drinking water is safe to drink or not, no matter where we live and no matter what ways of knowing we practice and defend. This reality is the reality my life, my research, and my theories unfold in.

What about my fantasies, some of my more spiritually inclined friends have asked me; what about my dreams? What about my imagination? These too unfold in this reality of streets, pedestrians, directional signs, automobiles, and drinking water. Perhaps they require a different sensibility to experience and understand. I explored this idea in my novel, *Bring Me the Brain of Nikola Tesla* (2007). My objective was to explore our experience of the brain experientially by telling someone's story from the inside out, from the brain/mind outward. At the same time I wanted to give the reader the sense that telling the story this way could only be done with one's feet on the ground, not with one's head in the air.

As individuals (social beings to be sure), we live our lives of labor with our feet on the ground (even if we are among the few who walk on the moon or float around two hundred and fifty miles above the earth) framed by our births and deaths; and if we live on the thresholds of delusionary supernatural worlds we are still constrained by the recalcitrance of the material world, we are still thermodynamic systems. Societies are evolutionary outgrowths, and if they do not progress, develop, or evolve through distinct stages they certainly change, they rise and decline technologically and economically, and they appear and disappear socially, culturally, and geopolitically. Inevitably, through this book I will engage with people who see things differently than I do, who think differently than I do. Conversations and communications will necessarily be different in different cases. I do not adhere dogmatically to any gentlemen's or gentlewomen's agreement about polite, respectful

dialogue. I have in mind here a particular dialogue, the dialogue between science and religion. I view this dialogue in the same way I view the dialogue between flat-Earthers, birthers, and sane people. We have so much evidence and even proof at the very least by ensemble of probabilities and consilience of evidences (explained further on) that religion, God, and theology have like the flat earth hypothesis dropped out of the conversations that engage the most progressive thinkers, and that there is no longer any grounded justification or warrant for traditional religious institutions and beliefs. They may still, of course, guide and ground humans in their search for meaning and emotional support, but they are no longer guides to how the physical, biological, and social worlds work. More importantly they are not windows that open onto some supernatural transcendent realm of reality.

This happens from time to time, does it not? Certain ideas drop out of the conversation, certain social institutions fall by the wayside. Complex, traditional, and dearly held ideas and institutions do not drop out of the conversation easily. The Ptolemaic universe did not drop out easily, nor did paganisms and polytheisms in the West. Plato, Kant, and Hegel continue to be taken as worthy conversational partners in a world that has dramatically changed materially and intellectually from the worlds they knew and within and out of which they constructed their ideas. My question then is, are there limits to polite and respectful dialogue when matters of life and death, even the life and death of a species and a planet, are at stake? Are we required by the norms of civil discourse to be ecumenicists and tolerant of every idea and every one to the bitter end?

Part 2: The Postmodern Context

This book is designed to exemplify what Randall Collins has called “non-obvious sociology,” and what is known in social studies of science as the sociology of the “hard case.” My perspective on sociology owes much to Mills’ “the sociological imagination” and Collins’ “sociological cogito.” The topics I cover – brains, gods, maths, and logics – all share the quality that they seem today or have seemed historically to be

independent of social, cultural, and historical forces. The topics can also be viewed as coming under the umbrella of social facts that become visible once we, with Emile Durkheim, reject transcendental, immanentist, and psychologistic explanations of human behavior. Part of what is original about my approach is demonstrating how these topics are all connected to the general problem of grounding transcendental and supernatural thinking.

There is, to my knowledge, no book that seeks to build on Durkheim's introduction of sociology as a science that rejects transcendental, immanentist, and psychologistic explanations for human behavior. In his 1912 *The Elementary Forms of Religious Life*, Durkheim followed up his sociology of religion in the closing pages with a sociology of logic. Religion and logic, which each in its own way seemed to escape the boundaries of time and space, are in fact eminently social things. I have adopted that point of view in my book: brains, gods, maths, and logics are all eminently social things.

There are new sociologies abroad that may make my version seem at first glance too influenced by classical social theory and moreover too dependent on Euro-American traditions. The interdisciplinary sociologists are right to want to correct Durkheim's radical sociologism (which was right for his time in rejecting biological and psychological explanations for "social facts"). This interdisciplinary imperative must be paired with disciplinary efforts to improve sociology's robustness profile so it meets its main competitors as explanatory paradigms, biology and neuroscience, on reasonably equal terms on the interdisciplinary landscape. My aim in this book is to contribute to improving the robustness of sociology in the interdisciplinary scientific community. If it is not as scientifically robust as the physical and natural sciences, sociology is more robust than most observers believe. The degree of robustness is related to whether a discipline is guided by the basic protocols and paradigms of science. We have to proceed carefully here since sociologists, philosophers, and historians of science have given us ample reason to be suspicious of one-size-fits-all concepts of science. From Feyerabend's "anything goes" (1975) to Knorr-Cetina's "epistemic cultures" (1999) and Galison and Stump's "disunity of science" (1996), we have seen that scientific practice is not ruled by a single methodological

imperative or theoretical strategy. The variety of sciences is distinguished by a skeptical but uncompromising reliance on evidence checked and rechecked generation after generation.

I am situated in the midst of an ongoing revolution that is changing the structure of inquiry, our inquiring practices, and the way we think and think about thinking. My general fields of competency – sociology, anthropology, and interdisciplinary science, technology, and society studies (especially the field of science and technology studies (S&TS)) – reflect and helped to manufacture this revolution. I have constructed this book as a contribution simultaneously to sociology and anthropology, social science, and S&TS.

I am guided throughout by the new perspective on science that began to evolve in the late 1960s and continues to challenge and change our views about the nature of inquiry even as I write. That perspective is embodied in the interdisciplinary field variously known as S&TS, social studies of science (and technology), science studies, and technology studies. An older tradition of science, technology, and society (or -policy, or -values) studies seems to be gaining ground anew (e.g., the Technology, Culture, and Society department at NYU's Tandon School of Engineering).

We are surrounded by bullshit. Education should be about improving our bullshit detectors, education and citizenship should be about detecting and eliminating bullshit. I am being blunter than my virtual teachers on this subject, Postman and Weingartner (1971), who used the term “crap detector” in their book *Teaching as a Subversive Activity*.

The first step in grasping the problems of our liminal times is to learn to see the world from a certain point of view and to start speaking about things in new ways. If there is a pathway or if there are multiple pathways to solving those problems, they will only follow from this first step. I speak through this book as an *agent provocateur* for a new way of thinking and talking about the hard cases in the context of the rejection of transcendence, immanence, and psychologism. I speak for a new way only in the sense that a very old way of thinking and talking about the world that allows one to see and point out naked emperors is not fully abroad in our world. But make no mistake about it, my perspective is firmly grounded in a nonecclesiastical science, a science that we should

approach with critical skepticism but always turn to as our first and last resorts. Science is a collective ongoing process of inquiry; it is always on the go, always pushing envelopes even those it treasures the most. No single individual can be “scientific”; one is always a scientist in a network of scientists living and dead and far away over horizons s/he will never reach or cross.

Interdisciplinary S&TS is in part a consequence of and player in what has been essentially a Copernican social science revolution. The first point of origin for this revolution crystallizes in the 1840s and gives us classical social theory; the second point of origin, which has roots in the first, crystallizes in the middle years of the twentieth century. My generation came of intellectual age in an era of postmodernism(s). Postmodernism singular stands – or can be made to stand – for a recognition of the profound complexity of the world. It has made many of us cautious and even overly cautious about Grand Theories, Grand Narratives, Grand Essentialisms, and absolutes and universals of all kinds. The essence of postmodernism may be that it describes the instabilities of the twentieth century in a rhetoric of chaos. What is left of Meaning, God, and Truth in the wake of two world wars, a constant stream of regional wars, terrorism, atomic and cultural holocausts, biochemical and pharmaceutical disasters, ecological degradations, and environmental catastrophes that marked the march of the twentieth century?

There have been two multicultural revolutions during the last two centuries. The first was wrought by the imperial and colonial engagements with peoples and cultures around the world that fashioned East and West (cf. Restivo and Loughlin 2000). This revolution was fueled by western movements into the provinces of the “exotic” and “savage.” These engagements were led by missionaries, soldiers, adventurers, explorers, anthropologists, and merchants. The second multicultural revolution during the second half of the twentieth century was fueled by a more assertive Other moving into the landscape of a modern world dominated by Western economies and technologies. Of course, it moved already transformed by the West into a West already transformed by the East. This process, it should be remembered, has a history that covers thousands of years and includes engagements along the Silk Road,

already a trade route between East and West during the Han Dynasty (207BCE–220CE). The pluralities that emerged out of the first revolution were multiplied many times over and strengthened by new levels of self, ethnic, sex, gender, class, race, and cultural consciousness. In the face of the growing awareness of the seemingly endless variety of ways of living and thinking, intellectuals were practically forced to find in this variety a common denominator that reduced them all to or reinvented them as “stories.” Inevitably, science was caught in this net and became for many just another story, or a story period since stories were, it was now claimed, the only strategies available for telling ourselves about our selves and our world(s). Science as narrative featured most prominently in the science communication literature. It was also viewed as a target for the French philosopher Jean-François Lyotard’s analysis of postmodernism and critique of grand narratives. The idea that science was in a sense the inscription devices that figured so prominently in scientific practice (as demonstrated in the early laboratory studies, notably in Latour and Woolgar 1979) also fed overzealous interpreters of the laboratory studies to try to make of science “just another story.”

Postmodernism in extremis led to an out-of-control skepticism about universals, truth, objectivity, and rationality. New relativisms, more complex and sophisticated than the cultural relativisms that were a product of early twentieth century cross-cultural research and political and economic engagements, were resurrected across the intellectual landscape. They were associated in the most general context with postmodernism, but in particular they were considered to be an ingredient of science studies, studies of science (and technology) as social, cultural, and historical phenomena. In spite of claims to the contrary by careless, angry, and uninformed critics (notably Gross and Levitt 1994, but also by otherwise highly respected philosophers like Daniel Dennett 2006: 312–313), none of the leading pioneers in science studies defended an “anything goes, everything is equal” relativism. Not one of them undermined the classical scientific project, indeed they identified with that project. The easiest way to debunk the critics is to actually read what these researchers wrote. The critics rarely name the objects of their criticism but it is clear they have in mind leading figures in S&TS such as me and my colleagues Harry Collins, Karin Knorr-Cetina,

Bruno Latour, and David Bloor among others. All of us are students of science and to different degrees critics of science as a social institution but all of us are champions of the sciences as roads to a self-critical, skeptical realism. Latour, the most visible representative of the science studies movement, has increasingly become an exception under the influence of a pseudo-sociology, ethnomethodology, a predisposition to philosophy, and at the end of the day a turn to metaphysics. Latour – more than any of his colleagues – may be responsible for fueling the critics of science studies who view the field as relativistic, antiscience, and a threat to Western reason.

The term “critical realism” is one I and others (notably the late Donald T. Campbell among my colleagues) have used to distinguish ourselves from naïve realists. “Critico-skeptical realism” stresses the point that science requires a vigilant critical and self-critical skepticism about facts, evidence, experimental outcomes, theories, and in short about everything scientific. We should refer to these values respectively as organized criticism and organized skepticism (originally identified as one of the norms of science by Robert K. Merton) to stress the fact that they are social phenomena. The critical and skeptical attitudes and orientations I have in mind must be managed so that they do not become obstacles to inquiry but rather play facilitative roles. The scientist must be able to harbor uncertainties about certainties and realize that science is a collective practice and a process that unfolds continually through time, space, and culture. In the wake of the excesses of postmodernism and its critics one would expect in liminal times, it has become necessary for those of us who have not been intimidated by these excesses to demonstrate again how to tell the truth, how to be objective, how to be a scientist, how to be a thinker (cf. Smith 1996).

Postmodern excesses go hand in hand with constant efforts to resurrect the agent that ascendant structural and radically materialist approaches tend to keep eliminating. The extreme view of the agent is a free-willing individual who, like Ayn Rand’s John Galt, can only exist in the literary, philosophical, or theological imagination. There are many resources brought to bear on the project of resurrecting and sustaining the agent, among them chaos theory, self-organization theory, information theory, genetic theories, the brain industry, and the recurring

rehabilitation of transcendental, immanentist, and psychologistic perspectives. These have all served, intentionally or not, in one way or another, to privilege the agent and sometimes to sneak in or claim outright some version of free will. Under such conditions it is no wonder that rational choice theory can continue to show up in contemporary sociological theory. If the agent is going to survive our structural paradigms, it is not going to be as a free-willing, atomistic, rational Ayn Rand individual. In this conflict, I enter the lists as a champion of freedom and not of the illusion of free will. I discuss the arguments against free will in [Chapter 4](#) (and see the discussion of Benjamin Libet's experiments on neuroscience and free will in the bibliographical epilogue for [Chapter 4](#)).

In order to understand human beings as social and cultural animals, we have to avoid five traps: the trap of individualism; the trap of competition; the trap that we are our genes or our brains; the trap of the social itself; and the trap of our own cultural blinders. I will have opportunities throughout this book to caution myself and my readers about the cultural blinders that might limit the extent to which my views fail to address, embrace, or incorporate the diversities of the Other. For example and in particular, to what extent is the reason, the science, the objectivity I defend contaminated not just by Western culture in general but by Judeo-Christian values and gendered ideas in particular? To what extent are ingredients of my worldview surrogates for the "God" I criticize? I believe there are two ways in which I avoid these contaminations: (1) I am by virtue of my education and training heir to rivers of worldviews that flow into the crucible of humanity's heritage from all times and places; and (2) the history of global intercourse has created a global intellectual culture that is an amalgamation of East and West, North and South, male and female, us and other. This still leaves us with the necessity of monitoring and criticizing with our interlocutors just how far we have escaped particular cultural biases.

We have to avoid these traps in order to see three nonobvious facts: that humans are always, everywhere, and already social; that there are many animals that exhibit what can be loosely called "social" behavior, but humans are the most social of the social animals and social in a qualitatively different way; that they are the most rhythmic of all the

animals and that their entangled rhythms are the roots of consciousness, emotional expression, and communication; and that their adaptations and survival on the evolutionary stage are strong functions of cooperation. Contrary to popular ideas about Darwin and the theory of natural selection, evolution is not all about or even primarily about competition. The cooperative principle plays a crucial role in evolution. Cooperation as an adaptive factor in evolution has its roots in the emergence of cell-proximity in primitive organisms. More complex forms of “colonial cooperation” followed, manifested in cell collaboration and the emergence of multicellular animals, and later internal fertilization among amphibians and reptiles. These harbingers of the social were significant adaptive strategies.

More advanced cooperation emerged among the mammals. The placenta, mammary glands, and long gestation and dependency periods added a new dimension to the dynamics of evolution. The survival of the young became dependent on extended caring behavior by a social network of adults. Grouping behavior and sociation (generally, and less technically than in Georg Simmel’s formal sociology, stabilization of relationships linking individuals) in the “lower animals” led to a form of social behavior in insects such as ants and bees, swarm behavior, societal behavior in the “higher mammals” and eventually to the strong forms of society and culture that developed among humans. Some theorists have found in the principle of cooperation the seeds of what we know as “love” in human culture. The idea is that love, in all its manifestations, reflects the cooperative principle in evolution. One can indeed argue that the cooperative principle has been humankind’s principle adaptive mechanism. Cooperation is the way we manipulate social organization and different forms of social organization give different levels of survival potential.

The productive activity of humans, whether it is mundane or innovative, ideational or material, is impossible outside of society and culture (The Robinson Crusoe fallacy; see Brothers 1997). The centripetally inclined individual with an isolated inner life and living outside the causal influences of the outside world (social, physical, and biological) is not merely a myth but an outright impossibility. There is a sense in which many of us may at some level realize this; we understand that we

cannot escape our experiences. But this intuitive understanding often fails to trump the culturally imposed ideology (notably in the West but especially in America) that we are free-willing individuals whose behavior stands outside the causal nexus of society and environment. It is not merely that we cannot escape our experiences; we are those experiences. Focusing on brains and genes instead of societies and cultures is a reflection of and a factor in promoting resistance to the sociological perspective. I am therefore obliged to preview my remarks on brains and minds in [Chapter 4](#). I will also have to make some preliminary remarks on mathematics and logic, the subjects of [Chapters 7](#) and [8](#).

Even while we confront the cognitive dissonance of the myth of individualism and the fact of social, cultural, and environmental influences, some of us (notably in American society) are ready to cede our free will to our genes and brains. It is important therefore to understand that we are not our genes and we are not our brains. This does not mean that genes and brains do not play a role in determining our behavioral repertoires, in making us into who and what we are.

Nineteenth century biological thinking set the stage for the gene-centrism of twentieth century biology and an obsession with brains as the seat of mentality and of the self. That kind of thinking fueled eugenics and the idea that the brains of the dead held the key to who they were in life. For more than fifty years, Einstein's brain has been the subject of endless studies on the assumption that his brain holds the clues to who he was and what he thought. If Einstein's brain was thought to be the key to understanding scientific genius, Lenin's brain had already been set aside as the key to political genius. One has to wonder why Einstein's brain wouldn't be examined to explain his rather naïve ideas (however humanistic) on politics, religion, and the history of science.

Gene-centrism and neuro-centrism have helped to generate enormous leaps in our knowledge about genes and brains. To the extent that they have reductively sought to explain human behavior they have failed. To the extent that they are today integrating their advances with those of the social and behavioral sciences, they have succeeded in motivating the search for an interdisciplinary paradigm for explaining human behavior. The value of this interdisciplinary imperative has been undermined by

disciplinary asymmetries. Biology and neuroscience have robust theoretical, evidentiary, and methodological scientific and public profiles. Sociology's scientific profile has a robustness that lies hidden behind cultural and scientific prejudices. Sociologists like Randall Collins and Dalton Conley (the first sociologist to be awarded the National Science Foundation's Waterman Award for "exceptional individual achievement in scientific or engineering research") have been helping to raise awareness of sociology's robustness. For the moment, the invisibility of sociology has led to at least one biologist claiming that biology is the science of the social and to neuroscientists being given credit in the media for bringing the significance of the social to public and scientific attention. It is against this background, that I want to explore the reasons for resisting the flash and glamour of gene- and brain-centrism. But first let me assure the reader that we should applaud the introduction of social thinking wherever we find it even if the source of the thinking is outside sociology proper. This is the kind of development that makes our era part of the Age of the Social (which I date from the 1840s). We are obliged to ask, however, whether social thinking outside of sociology and of social science in general is giving us the most robust methods and theories available. There might be some advantages to looking at the same time to the social sciences themselves.

My life's work can be seen as a continuing effort to save truth, objectivity, and yes science from these various excesses, including the excess of trying to dethrone Grand Narratives and Grand Theories using thinly disguised Grand Narratives and Grand Theories. When I say I want to save truth, objectivity, and science, I do not mean that I want to save them in their classical or modernist forms. To save science means to save thinking and inquiry, not the modern social institution of science. A kind of courageous caution is required everywhere we turn on these matters in a world (literally, the planet earth) that no longer will reward naïve and simple approaches to our social, political, economic, and environmental problems.

Reason and the sense of freedom are dearly bought and easily lost. The struggle for reason is a never-ending one, but it is especially in liminal times that we must be most vigilant and prepared for struggles in defense of reason, conscience, and ultimately survival. We have

wandered into a landscape of complexities that has changed and challenged first our classical systems of classification and categories and now the very fabric of our worldwide cultural inheritances. The urgencies in this landscape – some challenging our very survival as a species – have pressed us to embrace new classifications and categories by way of new ways of organizing our lives. This is how in fact we will in the end, if we are successful, answer the liminal challenge and construct new logics and rationalities. This is at the same time a process that easily and necessarily leads to excesses and the rise of irrationalities masquerading as the appropriate strategies for the post-liminal period. We can embrace new modes of inquiry, thinking, and knowing too soon and with too much certainty. And indeed some of us have done just this in our exuberant search for secure foundations. It is no wonder that when our logics and rationalities fail us, when our words fail us, that the world(s) they re-present inevitably fall(s) away and we find ourselves denying truth, objectivity, and reality and doing it with the passion of an Archimedeian “Eureka!” On the other hand we can also err through being excessively critical and skeptical and fail to embrace truths and facts we should embrace. Thus we are always faced with what in statistics we refer to as Type-1 and Type-2 errors, though with different levels of specificity. It is useful to consider starting over and adopting the entry strategies of the skilled anthropologist entering a cultural landscape for the first time.

As his ship anchors in the open bay off the island of Tikopia on the “Polynesian fringe” of Melanesia in 1926, the twenty-five-year-old New Zealand ethnologist Raymond Firth is uncertain of what awaits him. The natives are already in the water, climbing aboard the vessel shouting to each other in an unknown tongue. Firth wonders how he is going to gain control over this turbulence by scientific means. Newly arrived in the field, Firth is faced with intangibles. He is engulfed by the life of the society but cannot focus, cannot see it. He begins to take notes knowing that this is a necessary part of the process. He will eventually recognize these first notes as replete with mistakes; at his best, his jottings will be inadequate and all will have to be discarded. But this start is necessary. Firth cannot yet separate patterns of culture from accidental individual actions. Every gesture may hold some hidden meaning. He is frustrated

because he cannot understand the language, so easily and effortlessly exercised by the children but that he can only look forward to painfully acquiring. Firth realizes that so much was passing him by, that he was in his words a “moron” among the natives. However, as a trained and educated anthropologist he knows that he is already savoring the feast of knowledge that will eventually fall into his grasp. Enmeshed in this unknowable turbulence he is already aware of the delights of discovery.

Like Firth, I have been obliged to start taking notes immediately as I have engaged the hard cases (cases that seem immune to sociological explanations), and at no time have I felt more like a “moron” than upon entering the lands of mind and brain. More or less similar experiences accompanied my beginning explorations in the sociology of mathematics and logic, social and sociable robots, and religion and god. This book is about these hard cases and hard cases by definition challenge our intuitions and the apparent transparency of our experiences. People lay and learned would be less trusting of their intuitions, common sense, and the apparent transparency of their introspections if they were up to date on the development and history of sociology and anthropology. There is a social level of reality (society *sui generis*) that is as distinct from the physical level of reality as the physical level of reality is from the biological level of reality. The distinguishable levels of reality are all parts of the natural order and thus overlap and interpenetrate one another. When all is said and done these distinctions are to some extent arbitrary but the phenomenal world will continue to sustain the distinctions opposing analytical concerns with practical ones. In order to appreciate the complexity of the natural order it is first important that you be able to see the social, the physical, and the biological. Once you can see the social (described by novelist Don DeLillo as the “unseeable texture of life”) many problems that have seemed intractable when the only tools we had to address them came from the physical and natural sciences will suddenly begin to yield answers and promote understanding.

There is so much literature available today on the topics of brain, mind, religion, and god that I don't have to make it my job to review all the details of what we know today. Less is available on social and sociable robots and even less on mathematics and logic. My objective in this book is to introduce a perspective on the world that will reinforce

emerging and emergent ideas about how the worlds of brains, gods, maths, and logics are shaped and organized by social and cultural forces.

As an interdisciplinary intellectual I am faced with trying to keep pace with the ever-increasing complexities emerging out of our relentless inquiries across the full spectrum of human experiences. The research fronts in the sciences that ground my work are moving rapidly and increasing in technical and conceptual sophistication almost on a daily basis, especially in the brain sciences. This ascendancy into complexity is happening in an age that has been characterized by poets and philosophers as a decline into chaos. At the same time that we are experiencing a general disruption of our classical modes of classifications and categories and the disciplines they define we are stretching those classical modes to their limits. Disciplines (as the philosopher Ian Hacking has put it) are administrative and educational categories. Sciences in practice, especially in the contemporary interdisciplinary climate, constantly cross and blur these categorical boundaries. The Age of Postmodernisms has made the search for grounds or foundations, laws, truths, and objectivities ever more problematic. Postmodernisms have wreaked havoc with all of our boundaries, and left us both weaker under their impact and stronger as we search for ways out of the chaos of a godless world of inquiry, a world without foundations, a world without classical truths. The less pessimistically driven dynamics of postmodernism direct our attention to the social and cultural nature of telling the truth, and therefore to a new understanding of where and how to look for the truth. I am referring here to truth, not the God surrogate, Truth. Truth with a small "t" is corrigible, not absolutely certain, stable but not obsessively equilibrate. Most of all, truth in this sense is useful without being an intimidating authority. Some truths do approach a level of stability that closes them off to the costs of further inquiry. We are not going to overturn the truth that the earth is not flat; we are not going to overturn the truths of the vulnerabilities of unprotected flesh to the harms of weapons. There are such truths which one could say approximate to Truths in all sciences. We can recognize such truths without making ourselves zealously obedient to them or worshippers in a Cult of Truth. And make no mistake about it. For all of the diversity, probabilities, and chaos that characterize

the world at large, it is still possible for us as scientists to identify patterns, regularities, and lawfulness. Personally, I have been struck more by the essential recalcitrance of nature, by “the indifferent cosmos,” than by its opportunities for a variety of possibilities and choices or its proliferation of awe inspiring sights, smells, sounds, tastes, and textures that tend to anesthetize analysis.

It is no accident that a particularly recalcitrant blindness to the “social” is characteristic of what we loosely refer to as “capitalism.” The term “capitalism” should be understood to refer to an ideology not an actual or ideal economic system. Given the characteristics of our planet, our species, and the way they interact, the assumptions of capitalism in its various modeled and theorized forms cannot be met in practice. It is, of course, possible to behave as if capitalism works and then predictably we end up damaging humans and their ecosystems. Perhaps cultures inevitably destroy planets but behaving as if capitalism works may be the most destructive activity humans have engaged in historically in terms of the political economy of everyday life.

The reason for “social blindness” under the political economic regimes generally labeled “capitalist” is that commodification reifies those features of the intellectual world commonly understood as “abstractions.” Things are set apart from life, from social relations. And as “thingification” or commodification proceeds, it more and more obscures social relations in general. This process encompasses human bodies and social interactions. One of the bewildering manifestations of this process is the denial of the social construction of reality. “Social blindness” (which I tentatively call “dissocism”) is one of the consequences of the pervasive capitalist ideology in the West. I will have more to say about dissocism further on in [Chapter 2](#).

In [Chapter 4](#), we will see what happens if we sociologists interrogate the brain and its interlocutors, the neuroscientists. In the following chapters, I will interrogate robots (social and sociable), religions and gods, maths, and logics. Classically, these subjects have been the arbiters of the limits of the sociology of knowledge and belief. They are no longer immune to sociological analysis. This mode of analysis entails a critical approach to alternative causal perspectives on human behavior.

Students and teachers, professors and researchers, and educators in general are becoming increasingly victimized by generic administrators fostering secrecy, suspicion, and subversion and proliferating tools of surveillance, accountability, and assessment. Their goal has not been to facilitate quality teaching and research but rather to control the genesis and transmission of ideas in support of an ideologically conservative agenda. Generic administrators, increasingly led by human resources officials, have been extending the tools of micro-management into the very heart and soul of academic freedom, including the machining of curricula, courses, and syllabi. The schools and notably the universities have become crucibles for the commodification of inquiry and the reduction of knowledge to a pabulum. The convergence of the twin processes of bureaucratization and professionalization are fueling the end of the university, the end of science, and the end of objectivity. (Sal Restivo 2011)

This book is not a “safe place.” A “safe place” idea is now abroad in our universities. Universities should be safe places for students physically. They should not be safe places for the ideas they bring with them from their homes and cultures. An opinion piece appeared in the *New York Times* while I was finalizing this text. Judith Shulevitz’s (2015) contribution was titled “In College and Hiding from Scary Ideas.” I personally experienced this fear of ideas during my teaching career, especially in my last years in the classroom as a tenured full professor, and the problem became increasingly apparent during the early years of the twenty-first century. What am I doing by exposing young people to “scary ideas?” Our universities are becoming places we go to feel safe and to enjoy intellectual law and order.

To be prepared to learn is to be prepared to learn new things, new perspectives, new values. To be prepared to learn new things is to be prepared to leave old learnings behind. It is, as Salman Rushdie has pointed out, to be prepared to be offended. If you are easily offended or offended at all, you will not learn. The university should be a safe place for you to tune down your capacity for being offended so that you can move forward to new places. By what right do I place myself in a position of educating by offending or educating at all?

Many years ago, Peter Berger (1963), in his classic *Invitation to Sociology*, offered a rationale for disrupting people’s beliefs, mythologies,

and faiths. Put differently, why shouldn't we just leave people alone and let them believe whatever they want to believe? This is a very significant question to ask when teaching undergraduates, but it has broader societal implications. We find in Berger and Rushdie a worldview that takes for granted that inquiry – unfettered by direct “policing” – is justified because it promotes greater awareness and thus provides resources for resisting oppression and makes solving problems of self, society, ecology, and planet more likely. Inquiry in this sense cannot be pursued without suffering and risk. To be in touch with the inquiring class is to be civilized. Max Weber wrote that such contact for those who do not end up making inquiry their calling, their vocation, will make them less rooted in their prejudices, more critical about their commitments, more skeptical about what others claim, and perhaps more compassionate about their and others' efforts to construct meaningful lives. I will have occasion later on to turn to Nietzsche in defense of becoming a disciple of truth. I am obliged to inquire, to interrogate, to question authority. My calling gives me a platform which I am also obliged to use in order to fight oppression, “A”uthority, and totalitarianism. Teaching and learning are on the one hand their own reward, but on the other they are the grounds for uplifting humanity and in the most practical sense improving our abilities to adapt, survive, and thrive individually and collectively. If your goals are happiness and peace of mind then you should choose faith and unquestioning belief. The disciple of truth, on the other hand, is obliged to search, to think, to inquire, to interrogate. Finally, all I am left with in defense of what I do is “Here I stand.” In keeping with the strong sociological message of this book, it is important to note that this “I” is not the individual I, the narcissistic I, or the idiosyncratic I. The I, as Nietzsche taught us, is a grammatical illusion. The I in “Here I stand” represents the community of knowers I am situated in; and that community is a particular moral order. It is not a well-defined contemporary community but a community whose members come from all times and places in human history.

There is a divided history that on the one hand wants to keep the masses in the dark about these matters and on the other wants to educate them. In his *Pantheisticon*, John Toland (1670–1722) advocated keeping the truth of Reason separated from the doxa of the masses.

This position was echoed notably by Diderot (1713–1784), Montesquieu (1689–1755), Thomas Jefferson, and philosopher Charles Taylor (b. 1931). Voltaire (1694–1778) and Swift (1667–1745) argued that “civilizing” the masses would subvert the state’s power. Spinoza (1632–1677) famously argued the alternative view that the masses or “the mob” can be educated. Not too long ago, a well-known sociologist complimented me on the treatment of religion and god as social constructions in my *The Sociological Worldview* (1991) but questioned whether I should be making these ideas available to students. Eagleton (2015), who reviews these ideas in some detail, remarks on “the wit” who said that it is only when religion starts to interfere with your everyday life that it should be given up. It is my contention that religions and the gods, as reflections of the illusion of a transcendental or supernatural realm, are today interfering with our everyday lives, our collective capacity to identify and attempt to solve problems that threaten our planet and species. Just as we need strong advocates for identifying climate change as a clear and present danger, just as we need powerful, even militant champions of evolutionary and geological theory against Creationism and intelligent design, I believe we need strong advocates for bringing the sociological truths about religions and the gods into our classrooms and our public forums.

Bibliographical Epilogue for the Prologues

The Network Society. This book was written against the background of and with resources provided by the age of postmodernisms and the emergence of what has variously been labeled “the information-,” “the knowledge-,” and “the network-society.” The term “network society,” nettsamfunn, was coined in Norwegian by Stein Braten in his book *Modeller av menneske og samfunn* (1981). Later the term was put to use in Dutch by Jan van Dijk in his book *De Netwerkmatschappij* (1991) and most famously by Manuel Castells in *The Rise of the Network Society* (New York: Blackwell, 1996), the first part of his trilogy *The Information Age*. In 1978 James Martin used the related term “The Wired Society” indicating a society that is connected by mass- and telecommunication

networks; see his *The Wired Society* (New York: Prentice-Hall, 1978). And see Lee Raimie and Barry Wellman, *Networked: The New Social Operating System* (Cambridge MA: MIT Press, 2012); Roxanne Hiltz and Murray Turoff, *The Network Nation: Human Communication via Computer*, revised edition (Cambridge MA: MIT Press, 1993); and Mark Graham and William H. Dutton, editors, *Society and the Internet: How Networks of Information and Communication are Changing Our Lives* (Oxford: Oxford University Press, 2014).

The Cooperative Principle. I was prepared to recognize the cooperative principle in evolution by my introduction to the writings of Peter Kropotkin, especially his *Mutual Aid* (New York, New York University Press, 1972; orig. publ. 1902). My first detailed introduction to the idea came from Roderic Gorney's *The Human Agenda* (New York: Bantam Books, 1973). Ashley Montague's *Darwin: Competition and Cooperation* (New York: Henry Schuman, 1952) is dedicated to the memory of Peter Kropotkin as the author of *Mutual Aid*, which he recognizes as one of the early efforts to counter Herbert Spencer and T.H. Huxley, who over-stressed competition in Darwin's theory of evolution. Montagu provides an extensive list of references supporting the idea of the cooperative principle in evolution. In this context, the most important of Charles Darwin's works is his *The Descent of Man and Selection in Relation to Sex*, Vols. I & II (London: John Murray, 1871; available in many modern editions including Vols. 21 and 22 of *The Works of Charles Darwin*, edited by P.H. Barrett and R.B. Freeman (London: Routledge, 2016). A companion literature on love as an evolutionary mechanism is, I have argued, a reflection of love as a manifestation of the cooperative principle in evolution: S. Restivo, "An Evolutionary Sociology of Love," *International Journal of Sociology of the Family* (1977) 7 (July-December), 233–245; and "The Sociology of Love," pp. 117–146 in S. Restivo, *The Sociological Worldview* (New York: Wiley-Blackwell, 1991). Additionally, see P. Sorokin, *The Ways and Power of Love* (Boston: The Beacon Press, 1954); and Thomas Lewis, Fari Amini, and Richard Lannon, *A General Theory of Love* (New York, Random House, 2000).

The "Forget Your Founders" Aphorism. A.N. Whitehead's "founders" aphorism was originally uttered in an address to the British Association,

Newcastle titled “The Organization of Thought,” printed in *Nature* (September 28, 1916), 98, 80; it can be found in his *The Organization of Thought* (London: Williams and Norgate, 1917; published in 2015 by Andesite Press in New York. His remarks on the “supreme masters” appear in *Process and Reality* (New York: The Free Press, 1979; orig. publ. 1929). Abrams’ footnote on Whitehead’s famous aphorism appears in his *Doing Things with Texts: Essays in Criticism and Critical Theory*, rev. ed. (New York: W.W. Norton & Co., 1991).

Mary Douglas. Mary Douglas was one of the most important influences on my work (I once told her that I considered her one of my virtual teachers, a concept she quite liked). She is a link in the Durkheimian tradition through her teacher Edward Evans-Pritchard who was influenced by Durkheim and more directly by Malinowski during his time at the London School of Economics. Douglas’ entire corpus is of enormous significance in the social sciences, but *Purity and Danger* (London: Routledge & Kegan Paul, 1978) stands out for me.

Plato. On latent materialist and social ideas in Plato, see Wincenty Lutoslawski, *The Origin and Growth of Plato’s Logic: With an Account of Plato’s Style and of the Chronology of His Writings* (orig. publ. 1897; available from London: Forgotten Books, 2012); and more notably Cairns’ remarks on the Parmenides in his introduction to Edith Hamilton and Huntington Cairns, eds., *Plato: The Collected Dialogues, Including the Letters* (Princeton: Princeton University Press, 1989).

The Hard Case. In S&TS and the new sociology of scientific knowledge (SSK), “hard case” refers to the scientific content of the natural and physical sciences. In the classical Mannheimian (e.g., Karl Mannheim, *Ideology and Utopia; an introduction to the sociology of knowledge* (New York: Harvest, 1936) sociology of knowledge and the Mertonian sociology of science that dominated the field from the 1930s to the 1960s – see Robert K. Merton, *The Sociology of Science* (Chicago: University of Chicago Press, 1973) – social roles, norms, and social organization could be approached sociologically but not the factual content of science. S&TS and SSK broke through these limits following a variety of “strong programme” (introduced by David Bloor in *Knowledge and Social Imagery*, Chicago: University of Chicago Press, 1976, 1991) developments leading to studies in the sociology of mathematics and logic. It is

important to remember that already in his *The Elementary Forms of Religious Life* (1912), Durkheim had sketched a sociology of logical concepts. For references to the very idea of the hard case see, for example, H.M. Collins and Robert Evans, "The Third Wave of Science Studies: Studies of Expertise and Experience," *Social Studies of Science* (April 2002) 32, 2: 235–296; and Jonathan Potter, "Representing Reality: Discourse, Rhetoric and Social Construction," Chapter 1 in Johnathan Potter, *Representing Reality: Discourse, Rhetoric, and Social Construction* (London: Sage Publications, 1996).

The Sociological Imagination. The locus classicus for this concept is C. Wright Mills, *The Sociological Imagination* (Oxford: Oxford University Press, 1959). Later contributions in the history of this idea include Randall Collins' introduction of "the sociological cogito" in his *The Sociology of Philosophies* (Cambridge: Harvard University Press, 1998); and Karen Fields' clarifying remarks on "eminently social things" in her introduction to her translation of Durkheim's *The Elementary Forms...* (1995). Durkheim's sociology, by virtue of his rejection of psychologism and transcendental thinking, introduces social construction as the fundamental theorem in sociology.

Teaching and Education. If you came of professional age in the academy during the 1960s and whether like me you were active in radical social movements or not, you likely would have read Neil Postman and Charles Weingartner's *Teaching as a Subversive Activity* (New York: Delta Books, 1971) and the underground manuscript and later book Jerry Farber's *The Student as Nigger* (New York: Pocket Books, 1971). These books helped fan the contemporary flames of antiauthoritarianism in education and society at large. For one of the many signs of the dangers to the very idea of education today, see Judith Shulevitz, "In College and Hiding From Scary Ideas," *The New York Times* (March 21, 2015).

Science and Narrative. In *The Postmodern Condition: A Report on Knowledge* (Minneapolis: University of Minnesota Press, 1984), Jean-François Lyotard might have been describing the skepticism toward metanarratives in postmodernism or he might have been prescribing skepticism. Critics pointed out first that the descriptive mode didn't correspond to the fact that metanarratives were still operating in the

intellectual world, and second that he was wrong in thinking that the social and epistemic validity of science was grounded in meta- or Grand narratives. However, the main literature on narrative and science focused on science communication and the public understanding of science. See, for example, S.M. Stockmayer, R. Gore, and C.R. Bryant eds., *Science Communication in Theory and Practice* (New York: Springer, 2001); S.L. Montgomery, *The Scientific Voice* (New York: The Guilford Press, 1995); J.W. Bertens and D. Fokkema, *International Postmodernism: Theory and Literary Practice* (Amsterdam, The Netherlands: John Benjamin Publishing Co., 1997, p. 94); Lucy Avraamidou and Jonathan Osborne, "Science as Narrative: The story of the discovery of penicillin," *The Pantaneto Forum*, Issue 31: July 2008, (<http://www.pantaneto.co.uk>).

S&TS. There are a number of excellent introductory texts on S&TS. See, for example, Wenda Bauchspies, Jennifer Croissant, and Sal Restivo, *Science, Technology, and Society: A Sociological Approach* (New York: Wiley-Blackwell, 2005); Sergio Sismondo, *An Introduction to Science and Technology Studies*, 2nd ed. (New York: Wiley-Blackwell, 2009). The former adopts a self-consciously sociological approach, the latter offers a more philosophical perspective. For an in-depth exploration of the origins and development of the field and its core subject areas, see Sal Restivo (editor-in-chief), *Science, Technology, and Society: An Encyclopedia* (New York: Oxford University Press, 2005). Critics of the field and participants in the "science wars," include Paul Gross and Norman Levitt (respectively a life scientist and a mathematician), *The Higher Superstition: The Academic Left and its Quarrels with Science* (Baltimore: Johns Hopkins University Press, 1994); Alan Sokal and Jean Bricmont, *Fashionable Nonsense: Postmodern Intellectuals' Abuse of Science* (New York: Picador/St. Martin's Press, 1998). Sokal and Bricmont are both physicists, and Sokal is notorious for publishing a parody of postmodernist science studies disguised as a legitimate research paper in *Social Text* (1996). For a critical introduction to the "science wars" and a bibliography of the key writings edited by an STS scholar, see Ullica Segestrale, *Beyond the Science Wars: The Missing Discourse About Science and Society* (New York: SUNY Press, 2000). For a defense of the idea that social constructionism is neither

antiscience nor naively relativistic, see Sal Restivo, *Science, Society and Values: Toward a Sociology of Objectivity* (Lehigh PA: Lehigh University Press, 1994). For a defense of the idea that postmodernism, far from undermining the search for truth has in fact taught us how to tell the truth, see Dorothy Smith, "Telling the Truth after Postmodernism," *Symbolic Interaction*, (Fall 1996) 19, 3: 171–202.

On Capitalism, the Very Idea. On the nature good and bad of capitalism, we have no choice but to begin with Karl Marx. In order to understand Marx it is important that values are included as key parts of any economic analysis. It seems to me that very few people who are critics of Marx have actually read anything he's written. Read everything, especially *Grundrisse: Foundations of a Critique of Political Economy*, written between 1848 and 1867 (Baltimore: Penguin Classics, 1993), and *Capital* (Baltimore: Penguin Classics, in three volumes: I 1992, II 1993, and III 1993); orig. publ. in German as *Das Kapital*, 1867–1883); and then read Terry Eagleton, *Why Marx Was Right* (New Haven: Yale University Press, 2012), and Howard Zinn, *Marx in Soho: A Play on History*, 3rd ed. (Chicago: Haymarket Books, 2012). Thomas Piketty's *Capital in the Twenty First Century* (Cambridge: Belknap Press, 2014) has received enormous attention and praise around the world and deservedly so for its statistical grandeur. But Piketty, who apparently hasn't read Marx closely or at all, gives us a view of capitalism stripped of all the social relations and values so central to Marx's approach. Worth reading nonetheless for the story it tells about wealth. See also K. William Kapp, *The Social Costs of Private Enterprise* (New York: Schocken, 1971); William A. Williams, *The Great Evasion* (Chicago: Quadrangle Books, 1964); Charles Derber, *People Before Profit* (New York: Picador, 2003); Claude Meillassoux, *Maidens, Meal and Money: Capitalism and the Domestic Community* (Cambridge: Cambridge University Press, 1981); Michel Beaud, *A History of Capitalism: 1500–2000*, new edition (New York: Monthly Review Press, 2001); Fernand Braudel, *Civilization & Capitalism* in three volumes (New York: Harper and Row, 1982, 1982, 1984). The anarchists in the tradition of Kropotkin offer the most viable economic perspective for the world as it is biologically, ecologically, and socially. I review this literature and provide a bibliography in my *Red, Black and Objective: Science, Sociology*

and Anarchism (New York: Routledge, 2016). None of the critics of capitalism have contrasted the assumptions behind the various models of capitalism and the realities of humanity biologically and sociologically and planet earth; I discuss this in my *The Age of the Social* (New York: Routledge, 2017). Those who read Adam Smith's *Wealth of Nations* (New York: Bantam Classics, 2003; orig. published 1776) as the bible of capitalism need to be reminded that he also wrote *The Theory of Moral Sentiments* (Cambridge: Cambridge University Press, 1994; orig. published 1759).

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2

The Science of Society

The Discovery of Society

This book takes you on journey to and through the sociological imagination. My goal is to help you understand how sociologists think and talk. I will use this way of thinking and talking to explore the substantive case studies at the center of this project – brains, gods, maths, and logics. I begin by establishing a context for doing sociology and doing it in a way that invigorates emerging narratives on the nature of science, knowledge, and belief. That context is the contemporary networked world in which information flows have become planetary. Information flows are conditional promises for the optimally unfettered flow and diffusion of knowledge.

The idea that society is real, and that humans are always, already, and everywhere social crystallized in the writings of the nineteenth century social theorists and philosophers. We humans evolved into folk sociologists by virtue of the fact that we are ultra-social animals. We developed proto-theories about how our families and communities work. These proto-theories were generated coincidentally with the emergence of norms, values, and beliefs, and our capacity for

anticipating the consequences of our and others' actions and reactions. These proto-theories became more systematic among the thinking classes of the ancient civilizations. A word of caution: some if not all of the ancient names used in the next few paragraphs cannot be assumed to be historical figures. They could be composite characters, allegorical figures, or symbolic representations for idea complexes. Here they stand at the very least as iconic representations for ideas and social movements.

The early pre-Socratic philosophers (who emerged out of the mobile merchant classes and were initially "philosopher-merchants" (Thales, whether real, a composite character, or an iconic creation, is an exemplar) who, in connection with their interests and activities as merchants, observed human behavior, sought to understand it, and proposed theories and policies to explain and control society. Plato, for example, discussed forms of political organization and the dynamics of states and leaders. Plato represented a "purer" philosophical era than Thales but one more closely aligned with the ruling oligarchs. He worked in the interest of a conservative ideology motivated in part by the chaos of the Peloponnesian wars, but his approach was a kind of typological proto-social science. Aristotle was a bit more analytic in studying society in terms of parts and wholes. He developed a theory of the household based on observations of political associations. His analytic approach to individual and society, his focus on identifying types of social phenomena, and his emphasis on defining social and political terms hinted at a science of society.

In ancient China, Confucius analyzed society in terms of five elemental relationships: ruler-subject, husband-wife, father-son, elder brother and younger brother(s), and friends. He also argued that the ancient kings provided good government because they honored the virtuous, the noble, and the old; they revered the elders; and they were kind to the young. Like Plato, Confucius had a conservative agenda. Just as Plato's conservatism was fueled by the Peloponnesian wars, so too Confucius' conservatism was fueled by the Warring States period. While Chinese history can be periodized into cycles of dynastic consolidation breaking down into warring states followed by dynastic consolidation, the Warring States period refers to the events leading up to the victory of

the state of Qin in 221 BCE, unifying China for the first time (Qin dynasty). Periodizations vary but the period is generally believed to have started around 475 BCE.

The ancient philosophers weren't sociologists – they were not part of a culture of scientists studying society, social relationships, and social institutions. Technically speaking, they weren't "philosophers" in the modern sense either but rather, as I suggested earlier, philosopher-merchants and philosopher-politicians. But sociology grew over millennia out of the seeds of these ancient efforts to grasp the nature of our family, community, and cultural lives. They could already formulate one of the basic sociological questions, expanding Harold Lasswell's (1958) famous definition of politics: "Who gets what, when, where, how, and why?"

It is not clear that social inequalities are inherent in human societies, but they are certainly endemic to civilization as we know it from the ancient Egyptians, Babylonians, Greeks, Persians, Romans, Indians, Chinese, and all the earliest civilizations we know of in the four hemispheres (east, west, north, and south). Awareness of and attention to social inequalities have elicited two basic perspectives from ancient to modern times: support for a system of inequalities based on the idea that they are necessary to social life, just and equitable despite appearances, and/or inevitable; and on the other hand criticism and denunciation of inequalities as unjust, human made to support certain minority interests, and unnecessary to the proper functioning of societies. We know these perspectives in modern terms as respectively representing conservative and liberal or radical ideologies. In the broadest terms and with some unavoidable simplification sociologists can be located in two camps, one conservative (manifested in the theoretical position known as functionalism) and one liberal or radical (often labeled Marxist or radical sociology).

The ancients were unsurpassed social observers and analysts for centuries. There were noteworthy developments nonetheless between 1 BCE and 1400 CE, notably in the contributions of the Arab Muslim historian Ibn Khaldun (1332–1406 CE). Even though his works were carried out in defense of his religious beliefs his insights on the nature of society are valuable enough to identify him as one of the early founders

of sociology. At about the same time, Ma Tuan-Lin (1245–1322 CE) was writing in China outside the tradition of dynastic and military histories. In *Wen Hsien Thung Khao* (the encyclopedic Comprehensive Studies in Administration), he emphasized causality in history much as Ibn Khaldun did in his science of culture.

Fundamental developments occurred between 1300 and 1600 CE notably in the works of Machiavelli (*The Prince*, posthumously 1532), and Jean Bodin (1566, *Method for the easy knowledge of history*). Between 1400 and 1800, steps continued to be taken in the direction of a sociological perspective, including some wrongheaded ones that were nonetheless significant. The most important development during this period was the idea of the social contract. Aeneas Sylvius (1405–1464, Pope Pius II) and the Anglican priest and influential theologian Richard Hooker (1554–1600) were among the precursors to the philosopher Thomas Hobbes (1588–1679) in proposing the social contract idea. The idea most closely associated with Hobbes posits a pre-social state of nature characterized by a war of everyone against everyone. It is unlikely that Hobbes believed this literally. The imagery was designed to underscore the belief that the agreement among people to unite for their mutual benefit took the form of an irrevocable assignment of their individual powers to an all-powerful sovereign. Hobbes' theory was basically an explanation and justification for royal absolutism. More importantly it did not hold up against the increasing evidence for the idea that humans appear on the evolutionary stage not as pre-social individuals in a state of brutality, not as individuals at all, but rather as social beings. Even though social contract theory was wrongheaded, it was one of the converging provocations for the emergence of a science of society. It was analogous to a failed experiment in physics which nonetheless teaches us something about the physical world and points the way to new and better experiments.

The theory of progress was another provocation. It has become increasingly difficult in our time to sustain “the idea of progress” and its optimism about human and societal perfectibility. It did, however, play an important role in the works of Saint-Simon and his protégé Auguste Comte, two of the major figures in the early history of sociology. Comte is widely credited with introducing the term “sociologie” in

1838. The term appears in fact to have been coined by the French essayist Emmanuel Joseph Sieyès in an unpublished manuscript in 1780. Following these developments in the 1700s and early 1800s, sociology quickly developed into a recognized academic discipline.

I have selectively sketched some of the highlights in the history of the sociological imagination. My objective has been to give the reader a few anchor points – names, dates, and ideas – that mark the emergence and crystallization of the invisible Copernican sociological revolution. In the wake of this revolution, our understanding of the nature of science, and of reality itself, has been undergoing its own revolution.

Science and Society

What does science look like, then, from the perspective of the invisible sociological revolution? Consider the case of mathematics, the classic example in the sociology of knowledge (with logic) of a human activity that nonetheless seems to have no roots in the everyday world. However, mathematical knowledge is not (borrowing some phrases from the anthropologist Clifford Geertz's analysis of art as a cultural system) simply a "parade of syntactic variations," a set of "structural transformations," or "concatenations of pure form." The more we immerse ourselves ethnographically in math worlds, the more we are impressed by the way mathematical forms or objects increasingly come into view as sensibilities, collective formations, and worldviews. The foundations of mathematics are not located in logic or systems of axioms but rather in forms of life. Mathematical forms and objects embody math worlds. They contain – indeed they are – the social histories of their construction. They are produced in and by math worlds. It is, in the end, math worlds, social networks of mathematicians, not individual mathematicians, that manufacture mathematics. This idea has not gone unnoticed by mathematicians and philosophers of mathematics. Their sociological understanding is inevitably, however, limited. Take, for example, philosopher Philip Kitcher's views on the nature of mathematical knowledge. Kitcher (1985) seems to understand that knowledge has to be explained in terms of communities of knowers, and that stories about knowledge

can be told in ways that reveal how knowledge is acquired, transmitted, and extended. From a realistic perspective this is the only story Kitcher can tell; but he is intent on making his story confirm rationality and well-founded reasoning in mathematics.

Rationality and well-founded reasoning (and, more generally, cognition) cannot be separated from social action and culture. Where it appears that we have effected such a separation it will turn out that we have simply isolated mathematical work as a sociocultural system, and told a sociologically impoverished story about how that system works. The extent to which mathematics is an autonomous social system (institutionally speaking) will vary from time to time and place to place, and so then will the extent to which an empiricist epistemologist (e.g., Kitcher) can construct a rational explanation for mathematics. But “rational” refers to the rules governing a relatively well-organized social activity. “Rational” is synonymous with “social” and “cultural” as an explanatory account. It is not a simple function of the individual exercise of some form of reasoning faculty. On the other hand, explaining the content of mathematics is not a matter of constructing a simple causal link between a mathematical object such as a theorem and a social structure.

The sociological problem is to look to both “external” contexts and “internal” networks. A common error is to imagine that only “external” milieux hold social influences. Second, the sociological task is to unpack the social histories and social worlds embodied in objects such as theorems. Mathematical objects must be treated as things that are produced by, manufactured by social beings through social means in social settings. There is no reason why an object such as a theorem or an equation should be treated any differently than a sculpture, a teapot, or a skyscraper. Only alienated and alienating social worlds could give rise to the idea that mathematical objects are independent, free-standing creations, and that the essence of mathematics is realized in technical talk. Notations and symbols are tools, materials, and in general resources that are socially constructed around social interests and oriented to social goals. They take their meaning from the history of their construction and usage, the ways they are used in the present, the consequences of their usage inside and outside of mathematics, and the network of ideas they are part of.

Mathematics, science, and knowledge in general are crucial resources in all societies. Systems of knowledge therefore tend to develop and change in ways that serve the interests of the most powerful groups in society. Once societies become stratified, the nature and transmission of knowledge begin to reflect social inequalities. And once knowledge professions emerge, professional boundaries tend to shield practitioners from the realities of their broader societal roles even while they define a realm of systemically (institutionally) autonomous work. Science and math curricula in such contexts are certainly influenced by professional interests and goals, but they are also conditioned by the social functions of educational systems in stratified societies.

Science worlds are social worlds, and we must ask what kinds of social worlds they are. How do they fit into the larger cultural scheme of things? Whose interests do they serve? What kinds of human beings inhabit science worlds? What sorts of values do science worlds create and sustain? Scientific change in and out of the classroom must always be examined closely in order to understand its relationship to wider social changes. It follows from all I have said that reforms and changes in general cannot be effectively carried out in isolation from broader issues of power, social structure, and values. If, on the other hand, we adopt conventional scientific tools and ways of working to help solve social, personal, and environmental problems, we will fall short of our goals. It is therefore unreasonable to suppose that social reformers and revolutionaries could eliminate science from society, and equally unreasonable to suppose that science reformers and revolutionaries could force science as we know it today into some "alternative" shape independently of broader social and cultural changes. A "science for the people" is only possible in a "society for the people." It is possible, of course, to experiment with the idea of a science for the people without first having a major social revolution. The original Dutch science shops are an example of such an experiment. There is now an International Science Shop network. The science shop is local, participatory, and organized around the issues and problems of civil society. It is designed to promote public awareness and public understanding of science and to provide access to science and technology by community locals and non-profits. The science shop movement, like the gentlemen laboratories of the

seventeenth century, may hold the seeds of a scientific revolution in the context of a global social revolution. But for now what we have are pockets of a science for the people at the local level increasingly linked into a worldwide network. The original science for the people and radical science movement of the 1960s introduced science shop changes but on a more restricted scale.

Platonism, apriorism, and foundationalism (along with the gods) are dead. But the protective, awe-inspired, worshipful orientation to science survives. This is understandable, readily as a vestigial homage to the culture and conversations of the West (as in the works of philosopher Richard Rorty, whom I've described as the John Wayne epistemologist because of his Americanist views), less readily as a vestigial homage to the god of the West (as Oswald Spengler realized). The dialogue between the sociology of knowledge and epistemology has flirted with a radical sociological reconstruction of our understanding of science and culture. It is futile to try to construct an epistemologically relevant sociology that falls short of a full-fledged worldview analysis, critique, and reconstruction of science and culture.

Highly visible arch-skeptics and science advocates like Michael Shermer, founder of the Skeptics Society and editor-in-chief of its magazine *Skeptic*, and Bill Nye "the Science Guy" are uncritical advocates of science and champions of science in the face of the challenges of Creationism and Intelligent Design. They are strong advocates if not necessarily self-critical ones in an era during which science does not always fare well in the public imagination. Things are so bad that in her acceptance of the Democratic nomination for president, Hillary Clinton felt it necessary to proclaim, "I believe in science." We must trust science not as worshippers but as skeptics and as sociologists of science. I will have more to say about this later.

We must fully extricate ourselves from the hold that Plato has had on us or we will never be able to fully appreciate sociology and anthropology as the revolutionary sciences (or forms of life) they are. When we make this move, we will find ourselves confronted with the end of a certain way of doing inquiry, and finally with the end of a certain way of living. The death of god presages the death of epistemology (for a philosophically radical perspective on this move, see Schumacher 1989).

And if it doesn't mean the end of philosophy, it means the end of a certain way of doing philosophy. For the moment, sociology and anthropology stand ready to take their place as among the most important cultural productions of industrial civilization. They may go the way of philosophy eventually, but attacks that promise their premature demise are attacks that undermine our future as a culture capable of meeting the challenges of the emerging global, multicultural society. Kafka's assertion in *The Trial*, "logic is doubtless unshakeable, but it cannot withstand a man who wants to go on living," would find ready endorsement from among some of the most notable thinkers of the last two hundred years. These thinkers held such views not because they were "relativists" or underappreciated the value of science, mathematics, and logic, but rather because they appreciated the dialectical complexities of social structures and cultures. They were critics of the cult of science and that cult's intense faith in science. In order to appreciate this, we must recognize that when we talk about science, truth, logic, and related ideas, we are always talking about social relations.

This way of seeing sensitizes us to the progressive and regressive aspects and potentials of words, concepts, and ideas that as social relations can embody inequalities, destroy environments, inhibit individual growth and development and undermine inquiry. The next time someone wants to ask an expert about the nature of science or god, s/he had better turn to a sociologist or anthropologist if s/he wants to escape Plato's clutches and learn something.

Many of the details in the following chapters have been appearing in public and scholarly venues for forty years and more. The chapters on maths and logics are based on my published and unpublished writings and lectures over the past forty years; the sociology of math and logic (and science) is not as much in the public eye as ideas and myths about genes, brains, and gods. The public media have been simultaneously telling us that brains and genes are independent agents and that the brain and genes are susceptible to and reflect environmental and even social influences. And Western media have been overflowing for decades with news stories that God and Jesus might be human creations. I will add two things to these emerging narratives in this book. First, I will offer the reader general overviews of where we stand on these topics

insofar as they have become, and are, grist for the sociological mill. Second, I will show that brains, gods, maths, and logics are connected in the sociological project of rejecting transcendence, immanence, and psychologism as causal matrices.

Given widespread misconceptions of the nature and contributions of sociology and serious prejudices concerning the validity of sociological research, my objectives in this book must necessarily be general and relatively modest. For now, let's pause here for a moment to address a problem I know has occurred to some of my readers, the problem of reductionism. As soon as some of you hear terms like "social construction," "sociological theory," or "social causes," you are ready to call the kind of sociology I advocate "reductionist." Let us be clear. If my goal was to explain social things in biological or physical terms and logics, that would be reductionist. If I went looking for the causes of our thoughts and of our very consciousness among the neurons, that would be reductionist. It would be reductionist because it ignores a level of reality that already holds the proximal and distal causes of these phenomena. If it is not reductionist to explain the physical world using physics, or to explain the biological world using biology, why is it reductionist to explain the social world using sociology? Could it be that those who cry "reductionist" do so because they cannot see or don't believe that there is a social world? Or is it because even those who admit sociology to the intellectual arena don't consider it a legitimate science? How else can I explain sitting down in an English pub and being asked by a distinguished historian of mathematics to explain why a sociology of mathematics isn't reductionist?

I have already been cautioned about being reductionist in my pursuit of a sociology of mind and brain by some correspondents from the neurosciences. In the midst of an intellectual culture dominated in the extreme by a commitment to genetic, brain, and individualist explanatory paradigms – in short, by a commitment to immanentist, psychologistic paradigms – I am like Durkheim was practically forced into extreme sociologistic corners. The situation is exacerbated by the power given to physical and natural scientists over explaining human behavior.

There is a caveat concerning "the sociological voice." Sociology has some more growing to do: it is still building and making efforts to

communicate a robust disciplinary profile. For this reason, even as we move into an interdisciplinary landscape, it is important to take time out along the way to practice a little disciplinary imperialism. The Copernican sociology revolution still needs to undergo, loosely speaking, its Newtonian and Einsteinian revolutions. It may be that Randall Collins has already given us our Newtonian revolution. In any case, there will be for some time a tension between interdisciplinary and disciplinary imperatives.

The term “social construction,” which is in my framework the fundamental theorem of sociology, has been a source of confusion and contention within sociology and between sociology and other disciplines, especially philosophy. In science studies it can arguably be identified as the most important cause of the science wars. With full awareness of the fallacy of the last word, I offer here the last word on social construction.

The word social, as in social construction, is not a synonym for political, religious, economic, or ideological, false, or arbitrary. To say that scientific facts, technologies, and ideas are socially constructed is not to say that they are fabricated out of thin air, made up any way we please, or the direct causal product of external social and cultural forces. The social construction of objects and ideas refers to the moment-to-moment, day-to-day, night-to-night minutiae of social interactions that make up the social processes and constitute the social institutions of invention and discovery. The social is not only in the external social and cultural milieux and contexts of science and technology, and of scientists and engineers, but in their organizations and networks – and indeed in their and our very selves. The social in this sense is pervasive and no more transparent than the forces and fields of the physical world. There are no reasoned and reasonable alternatives to the reality that we invent and discover in and through our interactions with others in the context of a social ecology and an *umwelt* on a particular planet. Any other alternative leads us into realms of irrationalism, spiritualism, and transcendent (ir)realities.

Sociology has begun to cast its shadow over the field of artificial intelligence research, long the province of the view that brain, mind, and self are freestanding, independent, and autonomous entities, accessible introspectively, reflexively, and transparently to thinkers

themselves. What we now see is a conception of cognition as embodied action materialized in social and sociable robotics engineering and theories of mentality. Major breakthroughs are already evident in the arenas in which mind and brain are the focus of attention.

There have been similar developments in social psychology, cognitive anthropology, and educational theory, and communication. The time is right for exploring just what it is that gives sociologists co-jurisdiction in the hallowed fields of brains, minds, gods, maths, and logics so long dominated by philosophers, theologians, and psychologists, not to mention physicists, artificial intelligence researchers, and cosmologists. It is important to take note of recent developments in the life sciences that have become the new sciences of the social, fields of rediscovery against the background of the invisible social science revolution. The life sciences, in particular biology and neuroscience, are succeeding in raising the public's and the scientific community's awareness of the social where social scientists have failed. On the one hand, life scientists have been to varying degrees, and with varying degrees of self-consciousness, encountering social influences in their studies. On the other hand, the very idea of The Age of the Social is based on the observation that the realm of the social has been coming into view over the last couple of hundred years as a feature of the unfolding human condition. Let's look at where that unfolding has taken us in our world today.

The World we Live in

I stand with all of you at a point in history dominated by the intersection of The Age of Postmodernism(s) and The Age of Hybrids. The twentieth century was witness to a variety of worldwide movements and developments in communication, transportation and exchange loosely captured in the term "globalization." The entire world was engulfed by a single but multidimensional and nonhomogeneous network of information, exchange, and communication. The political economy of globalization left many openings for social critics who were concerned about the growing disparities across class, sex and gender, regions, and nations, but the fact that more and more of the earth's peoples were being

brought into an embryonic world system was undeniable. We have seen the end of the local manifested in the disappearance of traditional farms, neighborhoods, and villages. Nineteenth century social theorists and philosophers were already developing a binary view of the impact of industrialization captured in such polarities as *gemeinschaft-gesellschaft*, rural-urban, and country-city. In many cases, the traditional pole (e.g., rural) was viewed with nostalgia while the emerging pole (e.g., urban) was viewed with dismay. There was a great concern for the loss of community even while the idea of progress was being fueled by the achievements of the great industrialists. Those achievements were diminished to some extent by the recognition that the great industrialists were “robber barons.”

We are now living in a new form of the local that is deeply integrated with the global (thus prompting the introduction of the term “glocal”). Just as in the nineteenth century, there is a widespread sense of the loss of community amidst all these developments. And a new group has taken on the mantle of the robber barons, leaders in the financial community.

The twentieth century was characterized by an increase in the scale of human activity and consciousness that has enveloped the world. This global system is now the arena of every human concern, interest, vision, and dream. Regional increases in the scale of societies have occurred throughout history. In the fifteenth century BCE, for example, a cosmopolitan civilization emerged in the Middle East as changes in scale broke down geographical and cultural barriers. Such developments have often been accompanied by ideas about world unity or one world. The linguistic roots of the one-world concept can be traced to the Cynic word *kosmopolis*; the practical roots of the idea lie in actual or dreamed of increases in sociocultural scale. Some version of this idea is generally part of the ideological toolkit of conquerors, and is grounded in an expansionist, imperialistic, and dominating orientation to cultures outside the conqueror's current sphere of influence and control. Alexander, for example, conceived the goal of his conquests to be the establishment of *homonoia*, that is, of human concord among the nations he conquered. The idea of world order also occurs in the writings of philosophers and generally is grounded in an idealistic view of the basic unity of

all human beings. For example, the Stoic, Zeno of Citium (d. 262BCE), conceived of a world ruled by one divine and universal law. One needs to be careful in distinguishing the one-world ideas of military adventurers and of philosophers. Often the philosophers (along with theologians) are responsible for providing an ideological or mythological defense of a conqueror's expansionist activities. Conquerors are not lone rangers who make and change history by themselves as Tolstoy pointed out in his book *War and Peace* and as Trotsky, with a mixture of brilliance and self-justification, reflected on in his autobiography. They represent, and are used as representations of, particular social (including class) interests and structural dynamics that move rather than follow from the actions of "great men." The Scottish philosopher Thomas Carlyle is usually associated with the "Great Man" theory of history. The multidisciplinary Herbert Spencer countered Carlyle's theory in the midst of the crystallization of the social sciences in the middle part of the nineteenth century, pointing out that the "great man" was a creation of social conditions and social contexts.

In China, the idea of *ta t'ung* (one world) originated in the pre-Confucian era and has survived into modern times. In Islam, the universal society appears as *dar-al-Islam*, the abode of Islam. World order is a central theme in Western intellectual history. In Dante's *De Monarchia*, the theme is manifested as the *Respublica Christiana*. It is reflected in Francis Bacon's concept of global unification through the parallel growth of science and culture. And it appears in a variety of grand syntheses sketched by Comenius, Hegel, Marx, Comte, and others.

The remarkable quality of the twentieth century was an extraordinary change in sociocultural scale. Everything points to the twentieth century as arguably the greatest sociocultural and sociopolitical watershed in human history. Unlike our predecessors, we can ground our ideas about a world society in the reality of planet-wide systems of transportation, communication, exchange, and a wide range of cooperative and conflictful relations among peoples and nations. The vocabulary of the world-minded reflects the challenges inherent in trying to comprehend the emerging future, and it conveys different visions: post-historic, postmodern, post-industrial, post-civilizational, and transhumanist.

Many modern visions of world order are informed by a Baconian notion of divine providence. For some thinkers, the industrialization and unification of humanity are inevitable. Some of these thinkers are motivated by a divine teleology that promises the emergence of a cross-cultural, planetary, and even cosmic consciousness. For some observers, however, the future is less certain. Alongside the vision of one world, we find the vision of no world. Our most likely future according to some scientists and futurists may be a devolution into an agrarian existence. Our possible futures – collectivized and free – are personified in the conflict between the post-historic bureaucratic-technocrat, and the One World citizen oriented to enhancing the quality of human life on a global scale.

There is, across the variety of imagined world futures, a pervasive Western and masculine bias, and a metaphysics of inevitability. This should not obscure the significance of the image of a world society. There is a need for practical responses to the obstacles preventing or allowing efforts to establish wider nets of cooperation among the world's peoples. There is also a need for a framework that can help us analyze and understand the realities of conflict and cooperation in today's world. The idea of "the ecumene" provides such a framework. It is more general than other world order ideas (cf. world systems theory, Wallerstein 2004; and Castells information age network society trilogy: 1996, 1997, 1998; on globalization theory see Cornwell and Stoddard (2001) and Falk's (1999) critique).

The liberating celebration of the local can become a new kind of (globalizing) imperialism, a fascism of the immediate. Globalization, on the other hand, can become a fascism of the universal. Glocalization can become a fascism of the golden mean. But in the convergence of the local, the global, and the glocal we have an ecumene emerging with a kind of fragile inevitability. The idea of the ecumene as a level of sociocultural and organizational evolution and development was introduced by the anthropologist Gordon Hewes (1965). An ecumene is a set of civilizations linked by sea routes and overland routes (and air routes in the modern period) and other networks of transportation and communication. These are the pathways traveled by merchants, diplomats, missionaries, traders, soldiers, migrants, and the dispossessed. The result is that the nations and cultures these travelers come from tend to varying

degrees, toward a common but not unified cultural base, sharing ideas and technologies. In the most prosaic sense we see this when we fly into airports all over the world and more or less readily find our way to the arrival areas, taxi stands, and our hotels. The information age has added a new less-visible dimension to the networks that connect us.

Ecumenes tend to be expansive. New areas and people are incorporated through trade, conquest, colonization, and missionary activities. Ecumenical affiliation may also be attractive for the leaders of societies outside the ecumene. The long-distance transportation and communication networks within the ecumene are also a basis for reaching out to areas beyond the ecumenical boundaries.

The process of ecumenization is imagined to begin in an historical era characterized by the isolation of nuclear civilizations. The ecumene emerges when communication, transportation, and exchange linkages across these and secondary civilizational centers produce a certain level of effective interaction. Our own century has seen the emergence of ecumenes. In some of these systems, a high degree of cultural similarity is associated with political disunity, as in Latin America, Africa, and India.

In its original conception, ecumenization was defined as the unilinear development and diffusion of Western culture imbued with a clear intimation of inevitability. We can nonetheless draw on a modified conception of the ecumene to study increase in scale at the sociocultural level. The earth can be considered a geophysical, biospherical environment upon which sociocultural history unfolds. A global ecumene of sorts is now in existence as a consequence of the development of links between, among, and across subsystems on the same order as those that originally led to the Old World ecumene: local primary communities, local and regional sociopolitical units, and civilizations. In addition to the Old World ecumene, it is possible to identify two other major ecumenical systems, one in the Chinese culture-area, and another on the Indian subcontinent. Smaller-scale ecumenical systems can be identified in the Middle East, South America, and Africa. In these terms, the global ecumene is emerging out of the development of linkages between and among major and minor ecumenical systems. The process of ecumenization, whether the frame of reference is the Old World, China, or the globe, depends on the movement of persons engaged in such prosaic

activities as foreign trade, diplomacy, missionary work, translation, science, journalism, and tourism. It is important to keep in mind that there is a dark side to ecumenization. The unification of regions, independent states, and diverse cultures has often been the work of conquerors such as Alexander and Napoleon. They pave the way for the everyday activities that actually create new sociocultural systems. The fact that ecumenization can occur without conquest does not necessarily mean that the process is completely free of military or quasi-military forces. The role of multinational corporations and economic forms and forces in provoking the development of the Common Market in Europe, for example, is not a role free of vestiges of militarism and actual military support and intervention. Today, some pirates wear three-piece business suits, and they “deal” rather than engage in swordplay.

It is not difficult to understand why a comprehensive study of the historical unfolding of the increase in scale of human activities has led to the creation of ecumenical theories which are sustained by the idea of progress. The commitment to the idea of progress, however, is an example of what might be called “the fallacy of chronological causality,” described by Durkheim. The stages we can variously use to periodize human history are only a series of changes and not causally connected. I do not interpret this to deny the validity of searching for laws of social change (e.g., invariant sequences). In studying the increase in scale of human activities, our objective should be to construct theories which specify relevant variables, and the conditions for ecumenization and decumenization. The emergence of the modern world ecumene has made it necessary for social scientists to develop concepts for describing and interpreting the emergence and development of collectivities possessing some form of cultural boundary, but not the usual political and geographical boundaries.

The sociologists John and Ruth Hill Useem used the term “third-culture” to refer to the cultural patterns created, shared, and learned by people from different cultures as they interact in conflicting and cooperative relationships. The term “third-culture” has some drawbacks. It has entered the literature of the sociology of science in an entirely different sense through S. A. Lakoff’s critique of C.P. Snow’s “two cultures” idea. The term also reflects its roots in bi-national studies.

The Useems eventually broadened the empirical referent for “third-culture” to include international and multinational linkages.

The anthropologist B. W. Aginsky’s concept of “lateralization” was also designed to capture human activities that cut across conventional sociocultural boundaries. A lateralization is composed of individuals who interact in groups with varying degrees of structure. They can function with different degrees of involvement with the various governments they are legally bound to and come to express similarities in their activities and skills, material objects, ideas, and goals.

Lateralizations are defined by person-to-person contact. They involve segments of the societies involved, and are maintained over time through the interactions of people with similar cultural orientations, and shared systems of communication and control. Such systems make possible a continuing process of reciprocal diffusion. The concept of lateralization was developed in the context of fieldwork among the Pomo people of the western United States and other indigenous peoples. The concept can be broadened to encompass the complex inter- and intra-national dynamics of, for example, scientific activities. Science may be the best example of a third-culture or lateralization. I would therefore like to examine science from this perspective with three objectives in mind. The first is to reveal the nature of science as a third-culture, lateralization, or, in economist Kenneth Boulding’s terms, a “superculture.” Second, I want to explore the potential of the social network vocabulary for solving some of the conceptual difficulties that arise in studying third-cultures and lateralizations. Finally, I want to return to the theme of a new worldview of science and say something about the promise for creating a viable world, and what such a world might look like.

There are many human activities which are important in the struggle to create a viable world. The struggles between world order and world disorder forces are being carried out in virtually every institutional sphere. On the political level, there are global activities that range from the work of the United Nations to such activities as the internationalization of black and minority power, the feminist movement, and the world citizen movement; these are in conflict with local and regional nationalist and ultra-nationalist movements. In religion, narrow sectarianism seems to find an opposition in ecclesiastical ecumenization

and the Charter for Compassion proposed by Karen Armstrong and endorsed by Desmond Tutu and the Dalai Lama. In the economic sphere, nationalistic trade policies vie with common markets, an emerging international monetary system and internet-based exchange instruments, multinational corporate activities that challenge conventional political and economic boundaries, and theories of international political economy. In education, the struggle is between training for vocations and professions, education for wisdom, and in some cases a specific orientation to education for the world society of the future. In all these arenas there is a struggle over whether the activities should be under the control of the private sector or the public sector (even though this distinction is difficult to realize in practice).

There is a biological dimension to these ecumenical globalization developments – that is the hypothesis that we are now living in a new bio-geological age, the Anthropocene. In the context of the conventional classification of bio-geological epochs, we are living in the Cenozoic era, the most recent of the three major subdivisions of animal history. The earliest period is known as the Paleozoic and this was followed by the Mesozoic era. Within the Cenozoic era, the most recent roughly three million years is known as the Quaternary Period. The Quaternary is divided into two periods, the Pleistocene (2.588 million years ago to 11.7 thousand years ago) and the Holocene (11.7 thousand years ago to today). The Anthropocene has been proposed as a third period within the Quaternary era that begins in the middle of the twentieth century. According to proponents of this new division, the Anthropocene refers to the period during which human activity became the dominant influence on the planet's ecology and biosphere.

The Third-Culture of Science

Important linkages are being established among the peoples of the world through the activities of scientists. I choose them as the focus for this narrative for two main reasons. First, I have specialized in the study of science, scientists, and scientific knowledge for almost fifty years.

Second, scientists are an important part of our world heritage and crucial players in developing paradigms for survival. Scientists are trained and educated specifically to point out that naked emperors have no clothes.

The third-culture of science is the cultural (including intrascientific) patterns created, shared, and learned by scientists of different societies who are engaged in activities that link their societies, subsections of their societies, and professional networks. The concept of a scientific third-culture links the cross-societal activities of scientists to the development of an international scientific community, and the development of cross-societal linkages which ideally foster increasing communication and cooperation among the world's peoples. To the extent that the scientific process and the general increase in cross-societal movement of scientists and other persons is unimpeded, we can expect the transactions between scientists and the "reality" they study to generate a dynamic system of values, norms, and beliefs (concomitant with the growth of scientific knowledge) which will challenge conventional cultural boundaries.

Scientific inquiry is delicate and vulnerable, conditioned by its socio-cultural context and historically subject to periods of growth and decline. Industrialization encompasses the challenges to scientific progress raised by professionalization, bureaucratization, and ideology. These processes pose problems for scientific inquiry which cannot be solved by will or administrative devices.

In the 1960s, challenges to the health of science were countered by "critical science" (represented by scientists who advocated social responsibility in science), "radical caucuses" in professional scientific meetings, the Science for the People movement (rooted in the United States), the Radical Science Movement (rooted in the United Kingdom), and the later development of Science Shops in Europe. Critical, radical, and feminist science have had a variable and precarious potential for generating new forms of scientific inquiry in response to the dysfunctions of professionalization, bureaucratization, and ideology. A third-culture of science emerging out of these counter-processes on the foundation of a disappearing and older scientific tradition may indeed finally affirm the vision of science as a microcosm of and stimulus for a world community. In any case, science is a model third-culture and can serve as a focus for developing a sociological vocabulary for third-cultures in general.

Science is neither homogeneous nor static; nor is its sociological reality captured by such notions as “scientific community” or “invisible colleges.” It would help to have a vocabulary with which to describe and comprehend the heterogeneity and dynamism of scientific activities, especially one that could be applied to third-cultures in general. One promising possibility is the vocabulary of social networks and social sets. There are many more and less complicated network vocabularies and models. I have chosen to describe one that is more anthropologically intuitive than the more sophisticated network theories used, for example, by complexity theorists.

First we must distinguish a social network from a social group. A group is a bounded unit. A network, on the other hand, ramifies in every direction, and, for all practical purposes, stretches out indefinitely. Networks can be either close-knit or loose-knit. A person’s chain of interactions may or may not lead back to him/her. At its limit, the close-knit network is a group or category. We can now develop a vocabulary for describing worldwide scientific activities as a relational system constituted of categories, networks, formal and complex organizations, and identifiable core groups, cliques, factions, seminars, and caucuses. This entire system is stratified at individual, group, organizational, national, and regional levels. The advantage of the social network vocabulary is that it is ideally self-contained; the necessary concepts are logically related to one another. Let me illustrate the type of scheme that might emerge from a careful study and application of this vocabulary.

There is a set of human beings who have the attributes associated with the position, role, and status of scientist; they constitute a social category. “Scientist” is a variable; individuals are more or less scientists, depending on their experience, qualifications, credentials, and the ideas accepted by scientists themselves and outsiders about who is and who is not a scientist.

Scientists are located in all parts of the world, but their activities, persons, products, organizations, and technologies emanate from, feed-back to, and converge on major centers which are relatively stationary geographically. Centers can be defined regionally, institutionally, in terms of nations, or in terms of organizations. Transcenters are defined as the convergence points of activities, persons, products, organizations,

and technologies around goals which manifest a consciousness and desire among scientists to develop, maintain, and diffuse in perpetuity transnational systems of transportation, communication, and exchange in science. The distinction between centers and transcenters is not always clear-cut; but, for example, the American Physical Society is more like a center, and the International Conference on Weights and Measures more like a transcenter.

There are rules for combining the elements of the system of scientists; for example, norms, values, belief-systems, paradigms, and interests direct predictable associations of certain types of scientists with certain specifiable types of relationships. This usage of set and rule is a crude variation on the logical, mathematical, and informational sense of these terms; but it is interesting to note that in the latter sense, a group is defined as a set characterized by self-closure. That is, suppose we have a given set of numbers, sequences, operations, or symbols and a rule for combining any two of them. If this results in an object that also belongs to the set, then that set becomes a group. Correspondingly, we can conceive that collectivity of scientists as a set, and norms, values, interests, and so on as rules for combining elements of the set, that is, bases for group formation. Such combinations would be groups. The combinatory rules must, obviously, be science-related. Thus, if several scientists discover that they have a common interest in ring theory and arrange to work together, they become a scientific group; if several scientists combine around a common interest in fishing, they do not form a scientific group. The concept of self-closure is interesting because it suggests the development of bonds between and among scientists in the set according to rules which can be specified.

Viewed in global perspective, the number and types of scientists undergo changes. New elements are added, and old ones shifted in position, status, and role. Scientists are constantly leaving the system in different ways, by changing their specialties within and across disciplines, changing professions, semi-retiring, retiring, or dying. At any one time, we can identify different subsets (e.g., social groups, cliques, factions) which are more or less enduring. Under such conditions, changes in the social system of science are certain to occur. The very idea and the very definition of "science" and "scientist" vary over time.

Spelled with a small “s,” “science” is the root of the basic modes of human reasoning; “Science” is a social institution. “Science” as a social institution is coupled to and reflects the particular society and historical period in which it functions, “science,” by contrast is relatively stable; we might even say it is species specific.

One source for organizational and institutional changes may be grounded in two types of temporary groups, the international seminar, and the caucus. The caucus in particular seems to provide a flexible form of organization for persons who must deal on a day-to-day basis with enormous increments in information and in general scientific activity. Such disciplinary caucuses may be counter-processes in response to problems generated directly and/or indirectly by professionalization and bureaucratization. Associational caucuses, such as radical caucuses, black caucuses, and women’s caucuses, at professional scientific meetings are usually counter-processes to professionalization and bureaucratization. Sometimes, however, they are the work of people trying to create alternative professional and bureaucratic arenas. But the caucus can be a counter-process for generating new developmental sequences, and organizational forms resistant to self-aggrandizement.

The view of the social organization of science I have sketched is an example of how we might be able to capture the complexity of third-cultures in sociological terms. This is a prerequisite for understanding third-cultures as facilitators of and obstructions to the development of some form of world order. Contemporary sociologists of science have developed a variety of ways of describing and analyzing science as a social institution. Some are very sophisticated while others fall short of the kind of self-contained vocabulary I have just outlined.

In our digital age, the third-culture perspective on science and international activities has in its favor a certain intuitive accessibility to organizational and institutional complexities. The spread of networked digital information and technologies requires reimagining the concepts of third-cultures, lateralizations, and supercultures. They are still viable ideas but they have become information-dense, and in conjunction with the proliferation of computers, cell phones, and tablets the face-to-face features of transportation, communication, and exchange can no longer be taken for granted. Patterns of affiliation, social organization, political

economy and everyday life are being transformed in ways that are impacting the very idea of what it means to be human and what it means to be social. The co-presence characteristic of *homo sapiens*' life is being replaced by networked interfaces-to-interfaces. Co-presence gives us our humanity, our emotional lives, our very consciousness. Culture modulates co-presence, so in a sense we are not facing an entirely new phenomenon. The difference, however, is that digi-presence is a cultural modulation that transforms cultures all over the world, and can potentially reach into every cultural nook and cranny on the planet. However restricted "digital citizenry" is now, it has a volatile potential for facilitating a World Commonwealth of equality and compassion as well as for fostering Big Brother social orders.

The developments leading up to the Anthropocene era were industrial and technological; those defining the new era are information and communication technologies. The new information-based global ecumene may reside in an embryonic state in a New World Information and Communication Order, a term used by the MacBride Commission, a UNESCO panel chaired by Nobel Peace Prize laureate Sean MacBride in the early 1980s. The philosophical standpoint of the commission is reflected in the title of one of its reports, "Many Voices, One World." The Big Brother alternative could be characterized as One Voice, One World.

The Information Ecumene is associated by some observers (e.g., Antonio Negri) as a social order in which labor is devoted to immaterial production. Critics point out that there is only so much attention we can give to producing knowledge and cultural artifacts; we are organically designed to need and to consume industrial and agricultural products. This critique can be answered by the idea that all of our material production can be turned over to robots. I will have more to say about this idea and the Big Ideas it has generated, transhumanism and the beyond humanity movement, in [Chapter 5](#).

In any case, understanding science is crucial for thoughtful people and especially for people in leadership positions. Sociologists of science have contributed mightily to helping us understand scientists in terms of their everyday practices as opposed to the traditional myths and ideologies of science. A better understanding of science also contributes to

understanding sociology itself as a science. As we move on now to a more direct engagement with sociology *per se*, we must distinguish high and low traditions.

The High and Low Traditions in Sociology

The high tradition in sociology traces its roots to the revolutionary discoveries about self, society, and culture made between 1840 and 1930 by Karl Marx, Max Weber, Emile Durkheim, Harriet Martineau, George Herbert Mead, Charlotte Perkins Gilman, Franz Boas, Ruth Benedict, Alfred Kroeber, W.E.B. DuBois, and others. Many readers, even professional sociologists, may find the idea that sociologists and sociological thinkers have made discoveries pretentious at best. But in fact there are many findings in sociology that qualify as discoveries. The works of Weber and Durkheim, for example, include discoveries about the social nature and roots of religion. Their discoveries or their identification of the grounds for later discoveries bear directly on our understanding of the nature of science. They demonstrated or pointed to selves, minds, thinking, and consciousness as social facts, social structures, social institutions, and social constructions. All forms of knowledge and belief are, we can say today, social and cultural constructions. What this means is that all of our discoveries and inventions whether true or false, successful or not, are the result of human beings interacting, communicating, and making in the context of their families, communities, occupations and professions, and societies and cultures in particular environments and ecologies on planet Earth. It will be helpful in thinking about sociological discoveries to learn from sociologists of science that discovery is not a simple matter of finding something new in the world; it is not a once and for all “eureka” moment. It is actually a rather complex and inventive social process that involves, among other factors, priority conflicts, techniques of communication, negotiation, power relations, crystallization of the discovery over time, and changing and conflicting attributions of the discovery to one or more individuals, groups, or cultures. As a result, the distinction between discovery and invention is not always clear and at the end of the day may be no distinction at all (cf. Brannigan, 1981).

The low tradition is represented by the motley collection of titles in the sociology sections of shopping mall bookstores (where David Dukes can show up next to Emile Durkheim), images of sociology as a “soft science,” a form of socialism or social work, and a pretentious inquiry that disguises common sense and the obvious in the jargon-infested trappings of a social pseudo-science. Even the idea that sociology is a “hard science,” to the extent that it imports a sexist and scientistic view of the field from the physical sciences, and stresses formal and methodological concerns over substantive social ones, is part of the low tradition. It is this low tradition that grounds the 11th commandment authored by the conservative political commentator George Will – “thou shalt not commit sociology.” Curiously, as anyone knows who follows Will (who has a doctorate in politics from Princeton) in print and on TV, he regularly commits if not sociology per se, statistical sociology with a vengeance.

The discoverers of society carried out a Copernican revolution that transformed our understanding of self and society. They identified the group as the center of the human universe. This achievement does not subordinate the individual to the collectivity. Rather, it reveals how varieties of individual growth and development, and the formation of different types of persons, are dependent on forms of social organization and culture. Through its influence on the sociology of science and knowledge, the Copernican sociological revolution has also had an impact on our understanding of natural and physical realities. We are, in fact, in the midst of a second sociological revolution that is changing our conception of the nature of knowledge. The seeds of this revolution were planted during the earlier revolution. It is only recently, however, that sociologists have developed the appropriate tools, concepts, and orientations to pursue Emile Durkheim’s conjectures on the social nature of logical concepts, and Oswald Spengler’s ideas on mathematics and culture.

A new sociology of science has developed over the past fifty years. Sustained empirical research on scientific practice has revealed that dichotomies such as fact and value, theory and practice, and objectivity and subjectivity grossly oversimplify reality. They are not, indeed, separable in any of the usual ways which many people, including intellectuals

and scholars, traditionally took for granted. The idea that scientists can be value-free or value-neutral has been discredited. All of this does not entail the relativistic conclusions that all modes of knowing are equal, or that we can never really know anything. It does mean that we need to be more sophisticated about evaluating what and how we know. We have to attend to sociological factors that enhance or inhibit our ability to understand and explain our experiences in ways that can appropriately be called objective. Objectivity, however, is not something we can achieve in any final, absolute, or pure sense. We can, nonetheless, improve the degree of objectivity in our knowledge by reducing the number of factors that make it likely; we will experience the world in terms of individual interests, hopes, wishes, illusions, delusions, or hallucinations, the goals and values of interest groups, or the overarching values of a society. We also need to be alert to the extent to which we seek knowledge primarily to temper our fears and calm the terrors that assail us. It is unrealistic to think we can eliminate all such factors, but their impact can certainly be reduced. That is one of the functions of education and professional training. Eliminating such factors from our accounts of matters of fact is not something we can achieve as individuals but rather only collectively and generationally.

We have to constantly be on guard against relying on faith, authority, tradition, narrow self-interest, and implicit assumptions about the reality of some thing or event ("a fact is a fact," "facts speak for themselves"). All or some of these factors will, again, to be realistic, play a role in our arguments and explanations, but we should strive to become aware of and to control them. We can do this by orienting ourselves to a critical, skeptical explanatory mode of inquiry; evidence should be sought from multiple sources and evaluated in an open-ended, expanding, and reflexive (self-critical) framework, and conclusions accepted cautiously and tentatively. We should never have absolute faith, belief, or trust in anything we feel, do, or think. Everything should be open to criticism and change, including our convictions about our own disciplines, in my case sociology. Our aim in inquiry should be a cautious conviction about conjectures based on well-founded evidence. One way to achieve this is to sustain a sense of humor about even our most serious concerns and convictions. The ultimate guarantor of truth is the unfettered unfolding

cumulative process over time of our collective inquiries by way of generational continuity.

There is a strong humanistic impulse in the high tradition that alerts us to the perils of unbridled authority and unconditional obedience. This impulse can even show up in the works of the more socially and politically conservative thinkers as an unintended consequence of their sociological analyses. The humanistic impulse compels us to reveal, resist, and root out all forms of oppression and exploitation of humans by humans, and commits us to improving the conditions under which people live.

Sociology can be variously described and experienced as, or in terms of, a discipline, profession, course, textbook, lecture, definition, or statements on a blackboard. I have not found much in this variety, or in the public, private, and professional images of the field, that expressed my experience of sociology as a way of seeing and organizing reality as a whole – a worldview. Nor was I satisfied that the best of these presentations and images conveyed the complexities of social and cultural reality, or the challenges and difficulties of sociological understanding. Most importantly, they failed to communicate the revolutionary findings of the best sociological research.

One of the consequences of global dynamics in our time is that disciplines and disciplined reasoning have become problematic. Frames have fragmented, flown apart, interpenetrated, and become fuzzy around the edges. The poet Yeats and the philosopher Derrida among others were early narrators of our descent into chaos. The Age of Postmodernisms has made the search for grounds or foundations, laws, truths, and objectivities ever more problematic. Postmodernisms have wreaked havoc with all of our boundaries, and left us both weaker under their impact and stronger as we search for ways out of the chaos of a godless world of inquiry, a world without foundations, a world without classical truths. What is often overlooked is that postmodernism may have taught us something about how to tell the truth, how to be objective and how to avoid the cults of truth and objectivity.

Let's get a little closer to the sociological imagination. Consider the very idea of "social cognition." Psychologically, social cognition can be understood as an information processing activity which leads to the

more or less accurate (or accurate for all immediate practical purposes) perception of the dispositions and intentions of others. Exercising this ability leads to “social knowledge.” We know that there are some individuals who are selectively deprived of this kind of knowledge (e.g., individuals who fall on the more socially disabling end of the autism disorders spectrum). Given that humans are the most radically social life form (see the discussion of eusocial species further on), social cognition has to operate at the level of processing any information which culminates in the accurate perception of the dispositions and intentions of social groups. Social blindness is as much a pathology as mind blindness (the inability to read others’ minds, or to take the role of the other), keeping in mind that there is on this view an “absence of social knowledge” spectrum syndrome (“dissocism”) just as there is an autism spectrum syndrome (therefore, we can speak of a “dissocism spectrum syndrome”). Continuums abound. It’s one thing to harbor theories about how the everyday social world works and quite another to grasp the reality of society *sui generis*. The latter ability becomes increasingly crucial coupled with a general scientific acumen as the social problems of our species rise to the level of threatening the extinction of the species and/or the destruction of the planet as a base for supporting life forms.

A revolution in our understanding of the world around us has been unfolding for about two hundred years, a revolution that remains virtually invisible to the general public, and a large segment of the intellectual and scholarly communities. That revolution has revealed the reality of society and culture as generators of a complex causal web that is behind what we humans are, what we do, and what we think. It has grounded an emergent interdisciplinary revolution in our understanding of the nature of science and reality that came to light in the late 1960s. For two hundred years sociology and anthropology have been developing a robust scientific profile outside the mainstream of the public understanding of science. And for about fifty years, the interdisciplinary field of science and technology studies has been transforming our understanding of science and technology as social products, social institutions, and socially situated. Some hints of these developments have reached the intellectual community in two forms; on the one hand we have distorted and misunderstood ideas about “the social” and “social construction of science” attributed to

the weakened reasoning of a vaguely defined group of “postmodernists.” In general, the public and scientific imaginations have been blocked from the actual nature of these developments by the preeminence and notable achievements of the physical and natural sciences combined, notably in the United States with a psychologistic cultural mythology. On the other hand, we have seen a more or less sociologically viable notion of “the social” emerging in the neuro- and life sciences and even in the turn to practice in philosophy.

While the robustness of the social sciences remains veiled by cultural prejudice and the ideology of science, the very idea of the social is increasingly being brought to the attention of scientists and humanists. We are in an age of the social in a way the ancient Greeks were defined in part by an age of philosophy that adumbrated systematic organized science. The idea of the social has at the same time shown up as a factor in the emergence of interdisciplinary studies from the late 1960s on. This movement has created an arena of debates and discussions over new ways of conceiving the development of science, technology, the arts, and culture in general. A door has been opened for the disciplines of sociology and anthropology to take a more central place among the disciplines merging into interdisciplinary sciences.

My main objective in this book is to facilitate the process of bringing sociology (inclusive with anthropology and social psychology) into our debates and discussions as a discovering science. But I do not want the term “discovering science” to be understood as making sociology a slave to or immature offspring of the physical and natural sciences. I use the words “discovery” and “science” nonetheless, but stress that in my usage they carry reconstructed meanings as a consequence of research in the new sociology of science, that is, the sociology of science that has emerged over the past fifty years. I want, then, to alert you to an invisible revolution wrought by sociological discoveries and the new sociology of science they have spawned.

Sociology has had to overcome a bad reputation. Much of what it has stood for has indeed been, as its critics claim, needlessly obtuse and empty. Even sociologists have wondered at times if they were saying anything. But there is a core of significant worldview shifting discoveries at the core of sociology. These discoveries are associated

with the high tradition. The nineteenth-century social thinkers developed very sophisticated ideas about the self, the mind, and science as social constructions. Their writings crystallized more than two thousand years of conjectures about the social origins of the gods and religion, and set the foundation for the application of social thinking to mathematics and logic. By the early 1900s, it was already clear that the emergence of the social sciences was grounding a rejection of transcendence, immanence, and psychologism. In brief, the sources – the causes – of our actions and thoughts are to be found in the physical, natural, and social ecologies of our planet and not in supernatural realms, or simply in our genes and brains, or in individual context free psychologies. We are perhaps ready to finally realize the full implications of Aristotle's identification of the distinction between the *physikoi* ("physicists") who sought natural explanations for phenomena, and the *theologoi* ("theologians") who looked to supernatural causes for their explanations.

The emergence of the social sciences combined with the already prominent physical and natural sciences to offer empirically grounded answers to the perennial questions, problems, and paradoxes thought to be under the exclusive jurisdiction of religion and philosophy. In some cases, it was thought that the phenomena were entirely outside the realm of natural explanations and not subject to critical analytical thinking. The myth of the pure knower without will or pain living outside of time and space, and the ideas of pure reason and absolute truths, already enfeebled by the achievements in the physical and natural sciences, has continued to weaken and wither.

Building on the insights of the nineteenth-century social thinkers, twentieth-century social scientists and social philosophers increasingly recognized that pure reason and absolute knowledge assume an eye without direction, inactive, and without interpretive powers. No human being has such an eye, an eye that only sees. Human eyes always see something. It is more accurate to say that we are programmed to seek to see something. "Something" does not come into view all at once. All seeing and knowing is perspective, process, and context. Today, we understand that all knowers and knowing are situated; thinking and activities always occur in contexts. Moreover, we have realized the virtue

of the philosopher Nietzsche's advice that we allow as many emotions and eyes as possible to speak in our inquiries. The more emotions and the more eyes (i.e., the more perspectives) we bring to a situation, the more complete and objective our understanding of the situation will be. This is the starting point for the sociology of objectivity I first proposed in 1974. Because sociology has unfolded as an invisible revolution, the most robust findings and discoveries of the field have failed to reach the public and intellectual arenas. Some of the most important contributions to this invisible revolution have come from Randall Collins. Among his many achievements, Collins fashioned a causal sociology of philosophies that is generalizable to intellectuals (including scientists), and it is worth summarizing for illustrative purposes some of the main points of his theory (Table 2.1).

Even with the contemporary achievements of Collins and others, we are still dependent on the intellectual resources of the nineteenth-century social thinkers. Their contributions are still part of the

Table 2.1 Principles of intellectual innovation

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- (1) major intellectual work tends to be concentrated in time, space, and social connections;
 - (1a) intellectual work is almost always concentrated in the same time period as other work of a similar degree of innovativeness and scope;
 - (1b) notable intellectual activity typically has been concentrated, at any given time, in a small number of places;
 - (1c) the most notable philosophers are not organizational isolates, but members of chains of teachers and students who are themselves known philosophers, and/or of circles of contemporary intellectuals;
 - (2) the number of intellectually active schools of thought is almost always on the order of three to six (law of small numbers);
 - (3) schools of thought rise and fall due to the fortunes of their organizational bases;
 - (4) periods of greatest intellectual creativity are periods of major organizational transitions;
 - (5) factional loyalists produce a steadily lengthening corpus of scholastic materials;
 - (6) conflict among rival positions produces a trend toward abstraction and self-conscious reflection on intellectual objects;
 - (7) new positions are produced by the negation of preexisting positions along the lines of greatest organizational rivalry.
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Source: Randall Collins (1998)

contemporary fund of cultural capital that has helped us to fashion such counterintuitive notions as the sociology of god, truth, nature, reality, objectivity, and logic. There is a masculine Euro-American bias in the selection of certain men to represent this invisible revolution, but it is a revolution generated and sustained by men and women across the spectra of social and intellectual classes, sexes and genders, cultures, and history. I have read across the literatures in sociology that have been generated across cultures and social categories. I have learned a great deal from recent developments in sociology – from feminist and postcolonial sociology to the works by sociologists representing different traditions from Bourdieu and Foucault to Habermas and Luhmann, and from Castells to Ferrarotti and from Donna Haraway to Sandra Harding and Evelyn Fox Keller. They have not all resonated with me the way the works of Marx, Nietzsche, Durkheim, and the anarchists from Kropotkin to Emma Goldman have. The modern sociologists who have been most influential in forming my sociology after Mead are C. Wright Mills, Mary Douglas, Randall Collins, and Karin-Knorr Cetina.

The Contemporary Rediscovery of the Social

Many centuries passed before the nineteenth-century social thinkers crystallized the idea of the social and created a pathway to the social sciences. The social sciences went on to unfold an invisible revolution in our understanding of society, culture, and the social self. Today, life scientists, mostly apparently ignorant of or dismissive of the history of the social sciences as discovering sciences, are rediscovering the idea of the social and being credited as the explorers of this “new” domain of human life. They are certainly giving the idea of the social a more public face than the social scientists have been able to achieve.

One of the most important of these rediscoverers is the preeminent Pulitzer Prize-winning biologist E.O. Wilson. Wilson, unlike many of the rediscoverers, does have a grasp of the achievements of anthropology and social psychology. In his 2012 *New York Times* bestseller, *The Social Conquest of the Earth*, Wilson brings to the educated general reader a powerful defense of the idea that humans are fundamentally social, and

in a way that is radically different from the ways in which all other animals are social. No social scientist that I am aware of has given such a fine-grained analysis of the evolution of humans as a radically social species. Anthropology and social psychology are among the social sciences that inform and complicate Wilson's bio-centrism. The reviewers of Wilson's book, like Wilson himself, seem to have some vague notion that he is addressing questions that classically belong to philosophy and other humanities along with some social sciences; but they show no awareness of the achievements of sociology. I don't want to make too much of an issue here since some of those achievements are enfolded into the achievements of anthropology and social psychology. Wilson is conversant with.

The invisibility of sociology in the emerging discussions of the social on a public stage interests me more as a problem in the sociology of knowledge and less as a matter demanding the establishment of disciplinary priorities. It is important to recognize that we are living in an interdisciplinary age and that there are multiple pathways to key ideas, including the idea of the social. Biologists approach the idea by way of the more general concept of the "eusocial."

Biologically, humans are assigned to the general category of eusocial animals. Their group members are generationally situated and primed in evolution to cooperate within a division of labor. I prefer the term "cooperation" as opposed to the biologically inclined scientists' focus on "altruism" because cooperation is a social concept and altruism implies a focus on individual motivations. Humans stand apart from all other eusocial animals because all humans are reproductively competitive, they form highly flexible alliances exogamously and endogamously, and employ complex cooperative mechanisms. The communication networks humans generate exceed by orders of magnitude those of any other animal. Wilson, the once and always biologist, points out the biological proclivities for the emergence and evolution of our uniquely eusocial species. These proclivities include the large size and limited mobility of our earliest ancestors, specialization among the earliest primates for life in the trees, and bipedalism.

A key biological principle in the evolution of eusocial species is the primacy of the nest. All eusocial species begin by building nests that they

can defend against intruders. The human equivalent of the nest is the campsite. It is significant that Wilson tells us what sociologists and anthropologists have known for at least a century, that the evolution of society from egalitarian levels of villages to chiefdoms, states, and ultimately civilizations has been driven not by changes in our genes but by cultural evolution.

The evolutionary pathway to eusocial humanity is a series of non-teleologically determined preadaptations. Operating in accordance with the principles of natural selection, each preadaptation was an adaptation in its own right, a response to prevailing species and environmental conditions. Each adaptation falls into a series of preadaptations only after the completed series comes into sight. Incidentally, this aspect of natural selection answers the “irreducible complexity” argument of the defenders of intelligent design. Wilson lists the relevant preadaptations as follows: large size and relative immobility; specialization to life in the trees; the emergence of the ability to grasp, and great and opposable thumbs; finger and toe tips evolved into nails, cutaneous ridges on palms and soles, and an enhancement of the sense of touch; larger brain; greater dependence on vision and then binocular vision; bipedalism; lengthening and straightening of legs, elongation of the feet, and reshaping of the pelvis; increasingly flexible forelimbs and improved efficiency in throwing objects and killing at a distance; the evolution of *homo sapiens* in a savanna forest characterized by a “complex mosaic” of local habitats; the control of fire; and the emergence of the human nest (the campsite).

Our primary adaptive mechanism is not “general intelligence” but our command of social skills. Within this complex set of preadaptations, we have left the ways of the field wanderers and evolved into cohesive “campsite carnivores.” As humans evolved in their increasingly complex and dense social networks, they developed a symbolic life that led to language and enhanced the species’ musicality, and rhythmicity. We are the most rhythmic of the animals and this is a significant source of our capacity for imitation, communication, consciousness, and compassion.

Wilson introduces the idea of gene-culture co-evolution, a step in the direction of the new model of socialization I developed in which the unit of socialization is the system of interconnected subsystems from molecules, cells, and genes to neurons and neural networks to bodies and

their organs to systems of social interaction. I will have more to say about this later in my discussion of brains and minds. The complex interactions characteristic of *homo sapiens* are integrally and causally connected to the complexities of our brains.

It is important to notice Wilson's failure to recognize society as a *fact sui generis*. He is at the end of the day unable to detach himself from the biological level of analysis even after so clearly identifying the uniqueness of human eusociality. Consider his analysis of the origins of religion. He recognizes that there is a relationship between religion and tribalism. This puts him on the threshold of the sociological discovery that crystallized in the works of Emile Durkheim (see [Chapter 6](#)). He also understands that compassion is in some sense universal and related to the development of religion. He doesn't see that compassion, while it is indeed universal and a key component of religion and tribalism, is a centripetal force and therefore a force that works against cross-societal, cross-cultural connections, communication, and cooperation. He therefore fails to reach Durkheim's insight that society is *sui generis* and that religion is the symbolic representation of the tribe, and God the personified symbol of society. For Wilson, religion is the logical consequence of the dynamics of biological organization. The possible sources of an explanation for religion and in particular for the "phantasmagoric" nature of creation myths are physical laws (which he dismisses) and physiology and medicine (to which he turns). Society (and sociological reasoning) are not within the realm of his explanatory discourse.

There are other efforts abroad to communicate the idea of the social by philosophers and journalists and it is important to identify how these treatments differ from the way sociologists deal with this idea. These are curious efforts indeed since they tend to proceed without acknowledging the sociology literature or by citing it in ways that fall short on understanding. Among the most prominent of these efforts are those of philosophers John Searle and Ian Hacking and journalists David Brooks and Nicholas Wade.

The Age of the Social is defined as the era (beginning in 1840) during which the nature of the social as a level of reality *sui generis* emerged, developed, crystallized, and spread across the societal landscape. The awareness of the social and its crystallization and systematization took

place within the provinces of the emerging social sciences and social philosophy. This work took hold and became a greater part of the cultural heritage in Europe than elsewhere. The resistance to these developments was greatest in the United States with its cultural commitment to individualism. Nonetheless, sociological thinking has slowly made its way to the public's attention through the efforts of more ideologically and politically acceptable conduits – journalism in the first place and then philosophy along with the non-social sciences, especially in recent times biology and neuroscience. So even as *New York Times* journalists David Brooks and Nicholas Wade have brought their readings of sociology into the public arena, sociologists have not yet been welcomed to bring home their message on their own terms. Philosophers tend to be generally suspicious and dismissive of sociology or openly ignorant of its perspectives and methods. Nonetheless, they have no qualms about taking up explanations of “the social.” John Searle is a prominent representative of the “I don’t know what the social is but I’m going to explain it anyway” perspective.

Educated general readers, who are unlikely to have encountered Durkheim outside of a college or high school sociology course, will meet him in the pages of Brooks’ *The Social Animal* (2011) and Wade’s *The Faith Instinct* (2010). Brooks mentions Durkheim as the researcher who demonstrated that the fewer one’s social connections, the greater the likelihood that person will commit suicide.

The blurbs’s eye view of what Brooks achieves in this book is that he “reveals the deeply social imprint of our minds and exposes the bias in modern culture that overemphasizes rationalism, individualism, and IQ.” Reviewers recognize that this is a synthesis and not original research (Brooks is very clear about this), but a “blend of sociology, intellect, and allegory” (as the Kirkus reviewer put it). For all of his emphasis on the social, Brooks is a captive of the brain industry. His view is that brain, mind, and consciousness are the seats of our identities. This book demonstrates how one can become attentive to the social and yet remain alienated from it. This is first and foremost a book about the conscious and unconscious mind. Why, then, is it titled *The Social Animal* and not, for example, *The Conscious and Unconscious Foundations of Social Life* or *of Society*? Why not *The Cognitive Animal*, or *The Conscious Animal*?

“We are not who we think we are,” Brooks writes. This message is retrieved by the reviewer for *The Economist*, who writes that the book is a “fascinating study of the unconscious mind and its imprint on our lives.” Brooks’ goals in this book are (1) to show us how the conscious and unconscious minds interact and to reveal the “central humanistic truth . . . that the conscious mind can influence the unconscious”; (2) to show that a variety of research fields have converged on the following findings: (a) emotion is relatively more important than pure reason; (b) social connections causally trump individual choices; (c) character trumps IQ; (d) emergent, organic systems are more prominent features of the evolutionary landscape than linear mechanistic ones; and (e) we have multiple selves, not a single self; and (3) to demonstrate the social, political, and moral implications of these findings.

Brooks wants to counteract a cultural policy bias that privileges the mechanical, the rational, and the technical. *The Social Animal* would have been an appropriate title for this book if Brooks had recognized that the facts about social connections and multiple selves are the truly revolutionary core of the research findings he synthesizes. He is of course right that the way we experience ourselves (to the extent that we are guided by the myth of individualism) is misleading. In Brooks’ view, we are “actually” driven by unconscious processes. Social blindness keeps Brooks from recognizing that “the social animal” is constitutive of our conscious and unconscious minds.

In his *The Faith Instinct*, Nicholas Wade demonstrates the consequences of being afflicted with social blindness. He reviews the contributions of the classical sociologist Emile Durkheim but doesn’t actually hear Durkheim’s message. On page 7 of his book he writes the following: “The rules of sentence formation are so complex that babies must presumably possess an innate syntax-generating machinery, rather than having to figure out the rules for themselves. The existence of such a neural mechanism would explain why infants learn to speak so effortlessly, and at a specific age, as if some neural developmental program is being rolled out at that time.” What he fails to see is that the choice isn’t between innate machinery and figuring things out for themselves. The choice is between innate, individual, and social (interactional) causes. What makes Wade’s statement so curious is that on that

same page he writes “People survive as social groups, not as individuals, and little is more critical to a social species than its members’ ability to communicate with one another.” The other curious thing is that Wade, like Chomsky, appears to have never been a child learning a language or observed a child learning a language. Only a severe case of social blindness could lead them to claim, to quote Wade, that infants learn to speak “so effortlessly.”

Arrogant Innocence and Ignorance Among the Philosophers

I have trouble taking philosophers seriously to the extent that they are happy to rely on their own intuitions about the world based on their particular experiences and professional education and not check first to see if perhaps someone else has tackled or solved the specific question or problem that has captured their attention. John Searle is one of the best examples of this kind of philosopher. I have great respect for Searle’s professional achievements, his lucid writing style, and his ability to engage the international community of scholars in his endeavors. I am baffled, however, as to how it is possible for him to take on “the problem of society” as if Emile Durkheim and his successors never lived. Searle, like the Red Queen in *Alice in Wonderland*, seems capable of entertaining impossible thoughts. On the one hand, he recognizes that “other people” must play a special role in the structure of conscious experience. He does not “yet” (1992) know how to analyze individual consciousness in social terms. What does he do? He doesn’t bother to consider whether perhaps someone else, maybe in another discipline, has considered and perhaps solved this problem (say, for example, the social philosopher/sociologist George Herbert Mead). Just five years later, with little or no consultations with the sociologists, he somehow manages to figure out that social institutions exist as a result of human agreements rooted in their capacity to symbolize. He titles this 1997 book *The Construction of Social Reality*. He does not, if the index is any indication, intend this to be a counterpoint to Berger and Luckmann’s *The Social Construction of Reality* (1966).

We arrive at 2010, and Searle gives us *Making the Social World*. The title suggests that he has made progress regarding the sociological problem of society. I accept the fact that there may be and indeed are multiple disciplinary and interdisciplinary paths to the sociological imagination, and in particular to a sociology of mind, brain, and consciousness. What can explain, however, how after more than a century of the unfolding of sociological paradigms, Searle, who obviously knows the discipline and its key figures, can act as if he is working in a sociological vacuum and needs to invent a field called "The Philosophy of Society." The objective of this "new" field is to study human society.

Let me pose the problem this way. The Philosophy of Society is a different animal than, for example, the Philosophy of Physics. No one would mistake the philosophy of physics for physics. Physicists are the scientists who study the laws of nature that help us explain the physical world. Philosophers of physics, by contrast, reflect on the results of the physicists' science (metaphysically and epistemologically, for example). The philosophy of society as Searle imagines is not the study of the results of an empirical science (one that does in fact exist and does produce results, that is, sociology) but the study of society per se. Imagine if Searle invented a philosophy of physics devoted to the study of the laws of nature. He would be told in no uncertain terms that there were already professionals doing this, professionals called physicists. Given that we have sociology and sociologists, the only reason Searle can ignore them is that he doesn't consider them substantively, methodologically, or theoretically viable scientifically or philosophically. Even if this were true, the philosophy of society would then be a prelude to a sociological science of society. But Searle is not prepared to see things this way. And the reason is that he is a victim of social blindness.

Society is not "sui generis" for Searle. It naturally unfolds from but does not detach from more fundamental physical, chemical, and biological phenomena. Society for Searle is essentially a linguistic and logical phenomenon and not the proper domain for an empirical science. Society has a logical structure and therefore requires logical analysis. This commits Searle to an individualistic paradigm and a belief that society is created by agreement and by way of utterances. Humans, he claims, can create a reality by representing it. Agreements reached by way

of utterances are significant because they give rise to rights and responsibilities and more; and these are the glue that binds society. This is nothing more than a variety of the very social contract theory that Searle criticizes because it assumes language-speaking creatures who get together in a state of nature and form a society. Searle adopts the same model of individualized humans willfully forming a social contract but on the basis of meaningful utterances rather than language.

The philosopher Jean Paul Van Bendegem of the Free University of Brussels has cautioned me that for some subjects, X , X is not always that different from the philosophy of X . He agrees with me that Searle's approach is not well-founded but that there is an argument that could be made to support him. Philosophy, logic, and mathematics have classically been viewed as universal tools for analyzing and explaining all forms of scientific reasoning. While it may be true (and I don't concede this) that some physics, A , is not that different from the philosophy of A , I believe this idea fails in the case of sociology and the idea of society *sui generis*. It fails in this case because philosophy is a child of the natural and physical sciences at its core. Given the history of philosophy, it is reasonable to expect to find physics and biology inside the philosophy of physics and the philosophy of biology. Society *sui generis* falls outside of the physical and biological realms of reality and enters science long after the birth of physics, biology, and philosophy. There is no sociology in philosophy and so we cannot expect the philosophy of society to have the same credibility and conceptual power as the philosophy of physics.

Reviewing the philosophical and biological perspectives on society, I am most impressed by Wilson's contributions. He lays out in scientific detail the biological scaffolding on which humans emerge as the most radically social of the eusocial animals. Indeed, his narrative reveals the emergence of society as a reality *sui generis*. Wilson fails to see this outcome and therefore at the end of the day can only turn to biology to explain human institutions such as religion.

My objective in these first two chapters has been to introduce in a general way the idea of society as a reality *sui generis*, and to underscore the uniqueness and significance of humans as a eusocial species. Looking at ourselves today, it is hard not to be awed by our cultural achievements

and at the same time dismayed by the limits of our capacity for compassion, cooperation, and co-existence. The ultimate caveat on our evolutionary “success” is that at the end of the day culture may destroy the planetary system on which it evolved. Wilson, for example, views us as an “evolutionary chimera,” “mindlessly dismantling the biosphere.” We are obliged to keep this in mind as we move on now to explore some of the most exciting achievements of the human capacity for imagination, curiosity, and science.

Coda

I am in agreement with the efforts by Lewis Gordon (2006) and others to decolonize the disciplines. This also involves critiquing Euro-West-Centrism (Prasad, 2016). However, disciplines like selves are (recognizing first that they are, following Hacking, administrative and educational categories) large and contain multitudes (in Whitman’s sense). The terms interdisciplinary and transdisciplinary are equally subject to Gordon’s criticism – these are products of the colonizers’ intellectual tool kit. They are also part of the multiplicity of the disciplines. We can go further and argue that every word is a multiple (I think Nietzsche and Spengler would support this idea along with Wittgenstein). The multiplicity I refer to here is a “multiplicity-in-use” and here is where we should locate the intentions, motives, ethics, and values of any given discipline-in-use. In this way, the lower the multiplicity quotient of a discipline the more it is fair game for being categorized as decadent. Without such an approach to disciplines, sciences, knowledges, and words we will find it impossible to move without meeting a decolonizing barrier. This all comes back to the idea of modern science as a social problem (Restivo, 1988; 1979). It is modern science as a social institution bred and nurtured in the West that should be the target of decolonizing criticisms. Here is where revealing the discursive contexts of science should be focused. We do not want to find ourselves in the position of arguing that cross-culturally relevant ideas in science cannot be forged within ethnosciences. The Chinese, Indians, Americans, and Russians who want to send a rocket to the moon will not get there by

criticizing the tyranny of Science as a Euro-Western phenomenon but only by taking into the account the ideal rocket equation. In its simplest form the equation is in words:

In order to reach low Earth orbit from the ground, your delta- v must equal at least 9.4 kilometers per second. To get that value, you'll need to adjust the other variables in the equation. Initial mass (m_0): The total mass of your spacecraft plus the mass of your fuel and fuel tanks; Final mass (m_1): The total mass of your rocket after the maneuver is complete; Effective exhaust velocity (v_e): This is basically how much thrust your rocket can produce.

The point is that no matter where we launch on the planet and no matter who launches in what language, from what culture, given a starting point and a destination, the energy expenditure to escape earth's gravity is given. In choosing a propellant for our rocket, we (East or West, South or North) are constrained by the amount of energy that can be extracted from a chemical reaction – combustion of a fuel and oxidizer. When we take on science as a form of Western imperialism, we need to make our point without stranding or blowing up our rockets. Chinese ethnosience gave us the compass that works everywhere. Indian ethnosience gave us the zero as a number and trigonometric functions. Even in assigning discoveries like these we cannot always be certain that they are purely indigenous. The point is that science with a small “s” is a human resource that can be mined anywhere with greater or lesser “purity.” As long as science unfolds continuously, ethno-impurities will be filtered out over time and give us ideas and things that work on the human stage and escape for all practical purposes any ethnic stamp. In the next chapter, I want to explore what happens if we adopt the sociological cogito in dealing with the way we as a culture think about genes and brains.

Bibliographical Epilogue for Chapter 2

For an approach that takes seriously the East-West North-South divides but with the objective of saving science, see S. Restivo and J. Loughlin, “The Invention of Science,” *Cultural Dynamics*, 12, 2 (July, 2000): 57–73.

They address issues of the two multi-cultural revolutions and the East-West exchange. The authors approach the history of science through the lens of orientalist discourse. On the question of the tyranny of Euro-West-Centrism, see Lewis Gordon, *Disciplinary Decadence: Living Thought in Trying Times* (New York: Paradigm Publishers, 2006); and Amit Prasad, "Discursive Contextures of Science: Euro/West-Centrism and Science and Technology Studies," *Engaging Science, Technology and Society* 2 (2016): 193–207. Restivo and Loughlin are relevant here for their effort to save science; and see Restivo and Bauchspies (1996); Sal Restivo, "Modern Science as a Social Problem," *Social Problems* 35, 3 (1988): 206–225. "Joseph Needham and the Comparative Sociology of Chinese and Modern Science: A Critical Perspective," (1979). A case can be made for the argument that ethnosciences embody specific tyrannies and that the possibility of other tyrannies is realistic; see S. Restivo, "Joseph Needham and the Comparative Sociology of Chinese and Modern Science: A Critical Perspective," pp. 25–51 in R.A. Jones and H. Kuklick (eds.), *Research in the Sociology of Knowledge, Sciences, and Art*, Vol. II (Greenwich, CT: JAI Press, 1979); Chinese translation in *Selected Translations in Science of Science* 1, pp. 14–24 (Academia Sinica, Beijing, 1989); reprinted in *Chinese Science & Scientific Revolution*, papers honoring Joseph Needham, edited at the Institute for History of Natural Science, Beijing, PRC, 2002, pp. 179–213.

For as long as I have been engaged with sociology my work has rested on two pillars of scholarship: first, I have from the beginning considered sociology a discovering science; and second, I have been profoundly structural and materialist in my thinking. The first major paper I wrote in graduate school was on the concept of social structure, and I produced several revisions of that paper as I moved through my PhD program. I read Alexis de Touqueville's *Democracy in America* (London: Penguin Books, 2003; orig. publ. 1835) in college and it is in this book that the concept of "social structure," to my knowledge, first appears. Something about my early experiences growing up in a poor, working-class Italian-American family prepared me to be seduced by the concepts of social structure and historical materialism and so I found thinkers like de Tocqueville extremely inviting. Karl Marx, then, was a friend from the first pages I read in *The Economic and Philosophical Manuscripts of 1844*

(Amherst, NY: Prometheus Books, 1988). I had a similar experience reading Emile Durkheim. Three of his works stand out in my development as a sociologist: *Suicide* (London: Routledge & Kegan Paul, 1952; orig. publ. 1897), *The Elementary Forms of Religious Life* (New York: The Free Press, 1995; orig. publ. 1912), and *The Rules of Sociological Method* (New York: Simon and Schuster, 2011; orig. publ. 1895). Durkheim remains to this day the best classical source for the concept of sociology as a science, the idea of society *sui generis*, and the concept of the social fact.

The dichotomy between social structure and agency is a distraction. There have been sophisticated redrawings of the boundary that mutually embeds or separates social structure and agency. These sophisticated and subtle efforts in social theory seem to me at the end of the day to be more about saving agency and in the extreme free will; see for example, Pierre Bourdieu, *Outline of a Theory of Practice* (Cambridge: Cambridge University Press, 1977); and *The Logic of Practice* (London: Polity Press, 1990). I am by temperament and theory more inclined to look to the determinants of our behavior rather than to the arguable spaces that demonstrate agency. We are, when all is said and done, our social structures. Along the way to understanding social structure and early on I found the following books especially helpful: S.F. Nadel, *The Theory of Social Structure* (London: Cohen & West, Ltd., 1957); Peter M. Blau (ed.), *Approaches to the Study of Social Structure* (New York: The Free Press, 1975); and Lewis A. Coser (ed.), *The Idea of Social Structure: Papers in Honor of Robert K. Merton* (New York: Harcourt, Brace Jovanovich, 1975). The latter collection is a reminder that I have found it pays to go back every once in a while to Merton to be reminded about how to think sociologically. Merton always retained much of the sociological realism he learned from Marx and the mean streets of Philadelphia. I have benefited over and over from keeping his *Social Theory and Social Structure* (New York: The Free Press, 1968) close to hand. His defense of Boris Hessen's historical materialism interpretation of Newton's *Principia* against G.N. Clark's criticisms is a classic demonstration of the priority of social structures over individual motives (Chapter XXI, pp. 661ff.).

Friedrich Nietzsche taught me to be profoundly and critically realistic and to think of unfettered inquiry in terms of thinking rather than

science. In the introduction to his translation of Nietzsche's *Twilight of the Idols/The Anti-Christ* (New York: Viking Penguin, 1968; orig. publ. 1889, 1895), R.J. Hollingdale wrote that we read Nietzsche so that we can think well, think at all, and think differently. See in particular Friedrich Nietzsche, *The Will to Power* (New York: Vintage Books, 1968), based on Nietzsche's notebooks from 1883 to 1888, edited and translated by Walter Kaufman with the assistance of R.J. Hollingdale. There is a narrative thread on mind, thinking, and consciousness that runs throughout this book that contributes to the development of the sociology of mind.

Against this classical background, I was easily drawn to the writings of George Herbert Mead (for his theories of consciousness and mind more than for the contributions that led to the development of symbolic interaction theory), C. Wright Mills for his sociological imagination, and Randall Collins for his sociological cogito: G.H. Mead, *Mind, Self, and Society*, ed. by Charles W. Morris (Chicago: University of Chicago Press, 1934); C. Wright Mills, *The Sociological Imagination* (New York: Oxford University Press, 1959); Randall Collins, *Conflict Sociology: Toward an Explanatory Science* (New York: Academic Press, 1975): this is an underappreciated Newtonian effort in social science; and *The Sociology of Philosophies: A Global Theory of Intellectual Change* (Cambridge, MA: Harvard University Press, 1998), a brilliant exposition of the sociological cogito. My reference to Lasswell's famous definition of politics comes from Harold D. Lasswell, *Politics-Who Gets What, When, How* (New York: Meridian Press, 1958).

There are a number of excellent introductory texts on science and technology studies. See, for example, Wenda Bauchspies, Jennifer Croissant, and Sal Restivo, *Science, Technology, and Society: A Sociological Approach* (New York: Wiley-Blackwell, 2005). This book could put an end to criticisms of STS as antiscience and relativistic; see also Sal Restivo and Wenda Bauchspies, "How to Criticize Science and Maintain Your Sanity," *Science as Culture*, 6, Part 3, 28 (Spring 1996): 396–413. Criticisms of this sort would instantly evaporate if critics would actually read the authors they paint with the antiscience and relativism labels based on prejudicial assumptions grounded in a fear of "the postmodernist threat." And see Sergio Sismondo, *An Introduction to Science and Technology Studies*, 2nd ed. (New York: Wiley-Blackwell, 2009). For an in-depth exploration of the

origins and development of the field and its core subject areas, see Sal Restivo (editor-in-chief), *Science, Technology, and Society: An Encyclopedia* (New York: Oxford University Press, 2005). On my differences with Bruno Latour see “Bruno Latour: The Once and Future Philosopher,” *The New Blackwell Companion to Major Social Theorists*, edited by George Ritzer and Jeffrey Stepinsky (Boston: Blackwell, 2011), 520–540. This article includes critical annotated accounts of Latour’s major works.

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Carolyn Mullins, *Theories and theory groups in contemporary American sociology* (New York: Harper and Row, 1981); Nicholas Mullins, "The Development of Specialities in Social Science: The Case of Ethnomethodology," *Social Studies of Science*, 3,3 (1973): 245–273; Nicholas Mullins, "The Distribution of Social and Cultural Properties in Informal Communication Networks Among Biological Scientists," *American Sociological Review*, 33,5 (1968):786–797; and most notably, representing a middle ground between formal network analysis and the intuitive network analysis I introduce, see Randall Collins, *The Sociology of Philosophies* (Cambridge, MA: Harvard University Press, 1998). On the sociology of discovery, see Augustine Brannigan, *The Social Basis of Scientific Discoveries* (Cambridge: Cambridge University Press, 1981).

John Searle's pseudo-sociology shows up in his *The Construction of Social Reality* (New York: The Free Press, 1997; cf. the serious sociology in Peter Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Anchor Books, 1967); and John Searle, *Making the Social World: The Structure of Human Civilization* (New York: Oxford University Press, 2010). For examples of the pseudo-sociology in current journalism see David Brooks, *The Social Animal: The Hidden Sources of Love, Character, and Achievement* (New York: Random House, 2012); and Nicholas Wade, *The Faith Instinct: How Religion Evolved and Why It Endures* (Baltimore: Penguin Books, 2010).

Finally, I want to make special note of my friend and colleague, the late John Schumacher's *Human Posture: The Nature of Inquiry* (Albany, NY: SUNY Press, 1989). I was the general editor for SUNY Press' Science, Technology, and Society series and urged John to write and publish this book. The philosopher Patrick Heelen wrote the following blurb that appeared on the back cover of the book:

I like the originality of the theme. One hears much today about semiotics and the structure of signs, about language, texts, theory, and narrative but not of posture. Schumacher asserts that posture is the underlying condition for humans (like bees and other animals) having a world, for humans (unlike other animals) being free within it, for humans (like animals) communicating within a world and (unlike animals) inquiring about it.

This is an engrossing work. It owes much to M. Merleau-Ponty. The work, however, is strikingly original in its analysis of posture; it is elegantly written and often eloquent; it is contemporary in its references and in the way it addresses the problematic of mind and brain, space and time; and it is a learned work which ranges over many disciplines in a fascinating way. It shows precise knowledge and keen appreciation of many branches of modern science, physics, psychology, linguistics, neurophysiology, and ecology, while at the same time it is deeply concerned with the way that science has alienated us from our bodies and senses by making us think of our bodies solely from the outside in. The sustained and insightful analyses of space and time are particularly rewarding.

I solicited Heelan as a reviewer, and in the letter accompanying his review he wrote that the book should go up on your bookshelf next to Derrida and Foucault. It is unfortunate that this book did not receive the attention such a review suggests it should have attracted. Many of John's views have found their way into my work in ways so deeply entwined with whatever can be considered "my own" that it is impossible to tease them apart. Had John been more cosmopolitan and productive he would indeed have made it into the pantheon of the great philosophers of the twentieth century.

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3

What About the Gene and What About the Brain?

Media headlines play an important role in determining how the general public thinks about genes. To a certain extent, even taking into account the likelihood of distortions that occur in translating scientific statements into headlines, the headlines do reflect genetics as a cultural production. The headlines furthermore gain credibility because they reinforce the individualism that is part of America's core ideology (see Callero 2013 on "the myth of individualism" and Barlow 2013 on "the cult of individualism" as an enduring American myth).

Here are some typical headlines that have appeared since the 1990s:

Parkinson's researchers zero in on gene.
Found: A gene that controls place memory
Is there a gene behind suicide?
Variant gene tied to a love of new thrills.
The "gay gene" and the politics surrounding it.
Scientists find how "obesity gene" makes people fat.

The headlines have continued into the twenty-first century, including claims about a God gene (2004), a monogamy gene (2008), and a morality gene (2011). While gene fever may still be impacting the

general public and the media, it is showing signs of abating as more and more research focuses on epigenetics. Epigeneticists study how the environment and experiences turn genes on and off without disturbing the integrity of the DNA. We increasingly hear spokespersons for the idea that while DNA may shape us, we also shape our own DNA. “We also shape” should be understood to mean that our experiences in our social ecologies can and do change the way genes are expressed.

The sorts of headlines itemized above reinforce the idea that some if not all of our organic and behavioral characteristics are caused by genes, and perhaps by single genes. Critics of gene-centrism have claimed that research over the last few decades has failed to demonstrate the validity of that idea and that the search for genes that “cause” common diseases has hit a dead end. No one should doubt the critical role of genes in the disease process and in how health and illness unfold in our individual and collective lives. But it is now clear that that role is not a simple one. The World Health Organization estimates that there are more than ten thousand human diseases that are monogenic. Such diseases (categorized as dominant, recessive, and X-linked) are caused by a single error in a single gene. Meanwhile, the possibility of identifying genes that cause complex behavioral traits, repertoires, and syndromes has become an increasingly remote fantasy.

It is no longer controversial to claim that both genes and the environment shape our behavior. The problem has been and is to tease out the relative influences of genetic and environmental factors on specific behaviors. This is only a first analytically necessary step that is from the beginning keyed to rejecting a clear demarcation between genetic and environmental causes. It is also important that the general public learn not to give more weight to the relative influence of genes than is warranted given the science of genes. One way to approach this classical nature versus nurture problem is illustrated by a 2007 Salk Institute study. The specific behavior at issue in this study was Williams syndrome (WS). Children with WS typically have low IQs but are notably very sociable and easily drawn to strangers. The incidence of WS is estimated to be one in 20,000 worldwide. The Salk researchers compared children with WS in the United States and Japan. They assumed that the two cultures are significantly different; the difference is

summarized in two proverbs: “the squeaky wheel gets the grease” (US); and “The nail that stands out gets pounded down” (Japan).

The authors’ findings are based on a questionnaire in which parents were asked to rate their children on “tendency to approach others,” “general behavior in social situations,” “memory for names and faces,” “eagerness to please others,” “empathy,” and “tendency for other people to approach their child.” Critics can point to oversimplified assumptions about cultural differences, especially assumptions that ignore centuries of interaction between the two cultures. One can also point out problems with the methodology. Criticisms aside, the study showed that despite differences in socialization and cultural context, children with WS in both cultures rated significantly higher on “global sociality” and “tendency to approach strangers” than their non-WS peers. This cross-cultural (or cross-national) result is assumed to demonstrate that genes are at work here, and thus that nature trumped nurture. What should we consider in evaluating these results critically?

Consider first that there is no easy way to tease out and assign variability in nature and nurture studies. All study subjects are always already socialized, so we have to be very careful about evaluating nature versus nurture dynamics. Biases about the primacy of genes are often wedded to ignorance of the nature and complexity of social and environmental factors and this can readily compromise nature versus nurture studies. If researchers are not aware of the possible causal influences of social and environmental factors, they cannot take them into account. If they are aware but don’t know how to identify and isolate such influences, then they still cannot take them into account. One of the most prominent examples of the problems that can arise in nature versus nurture studies is the Minnesota Twins studies. They are worth a careful and detailed exploration.

Why are twins important in the nature versus nurture debate? The reason is based on the biological facts about the two types of twins. Monozygotic (MZ) twins result from the fertilization of a single ovum by a single sperm. Traditionally, MZ twins have been considered genetically identical, a fact that, as discussed further on, must be reconsidered in the light of our current understanding. But MZ twins are always the same sex and often are strikingly similar in appearance. Dizygotic (DZ) twins result when two separate sperm fertilize two separate ova more or less

around the same time. DZ twins are thought to share about fifty percent of their genes. Hereditarians are keen to draw our attention to the fact that almost without exception, the IQs of MZ twins are correlated to a considerably higher degree than is the case with DZ twins. The correlations range from 0.70–0.90 for MZ twins and 0.50–0.70 for DZ twins. Comparisons are made between MZ twins and same sex DZ twins. In the absence of a sociological imagination it is easy to accept such correlations as *prima facie* evidence for the heritability of IQ.

If we consider the two types of twins from a sociological perspective we find that MZ twins are an “attractor” for environments that are more alike than the environments experienced by people in general. MZ twins tend to look alike, and this leads parents, relatives, friends, and teachers to treat them alike. MZ twins will often be mistaken for one another. They spend more time together engaged in similar activities than is the case for same sex DZ twins. MZ twins are less likely to have spent nights apart during their childhood, more likely to dress alike, to play together, and to have the same friends compared with DZ same sex twins. In addition to these factors that construct their matching identities, there are twin conventions (organized meetings) for MZ twins of all ages that further reinforce their likenesses. Overall then, MZ twins have more similar environmental experiences than DZ twins.

The DNA of twins has posed some legal dilemmas. In 2016 in Great Britain, a twin was charged with dangerous driving and possessing a lock knife. He claimed it was his twin brother, and he was cleared because DNA could not distinguish one twin from the other. In a French case, twins were jailed based on evidence implicating them in a series of rapes. One of the twins finally confessed and that allowed his brother to be cleared. Cases like this are not likely to cause problems for the legal system in the future. It now turns out that thanks to research in epigenetics we have learned that identical DNA sequences can be distinguished because you can test for other structures attached to the sequences that differentiate them (Craig and Wong, eds.: 2011; Blumer and Osborne 2011).

It is important to note that while “nurture” and “environment” are often conflated, they need to be distinguished. Nurture refers to the willful, active engagement of humans with humans in the process of

socialization. Environment is, by contrast, the relatively passive context for socialization, though it is the source of material socializing processes. This is a moot point however because at the end of the day neither nature/nurture nor nature/nurture/environment offer an adequate framework for contextualizing and causally grounding human behavior.

The flaws and frauds of the early work on heritability, notably for schizophrenia by Franz Kallman and for IQ by Cyril Burt, fueled the public imagination long after the research had turned out to be non-replicable. Kallman and Burt were both eugenicists, and while Burt clearly seems to have presented fraudulent results, Kallman's work was like Burt's inadequately documented but it was not fraudulent. Research like this reinforced culturally supported simplistic genetic theories. Kallman argued for "eugenic-prophylactic measures" based on his findings, and Burt was adamant about not wasting educational resources on those persons with low IQs. It remains the case that Americans in particular seem susceptible to hereditarian arguments. This is no less true for the general public than it is for certain segments of the scientific and intellectual communities even though support for the hereditarian position has largely failed the tests of acceptable evidence.

More recent research using more sophisticated analytic techniques is subject to the same criticisms as the early studies. Within the confines of the twin studies, the new research tends to confirm the early twin studies estimates of genetic influence on key personality traits (extraversion, neuroticism, conscientiousness, agreeableness, and openness). The course of the newer research, however, has led to an increasing appreciation for environmental, social, and cultural influences on account of, for example, shortfalls from hundred-percent concordance in MZ twins. We might now be able to take advantage of the twin studies to explore environmental influences. It now appears, for example, that monozygotic and dizygotic MZ twins and perhaps DZ twins are differentially impacted by prenatal experiences.

The correlations for identical twins on cognitive abilities greatly exceed those for fraternal twins, a result that has been remarkably consistent over three decades of research. However, genetic effects do not imply genetic determinism and do not rule out environmental influences. But nonetheless the consistency of such results does not

necessarily even establish effects. One of the things to consider here is that neurotransmitter genes, the most behavior-specific genes, have variable pathways associated with variations in behavior and in fact cause that variability. There are no one-to-one “dedicated correspondences” between specific neurotransmitter genotypes and behavioral phenotypes. Because neurotransmitters impact a wide range of behaviors, it has proven difficult and it may be impossible to identify predictive correlations and causes.

Briefly, then, twin studies are controversial because the science is at best equally balanced between cause and critique, and because the positive claims about genetic causality tend to undermine arguments for interventionist public policies, notably public education. We need to be careful here because this is an arena in which ideology is often a volatile contaminant in constructing, conducting, analyzing, evaluating, and reporting the science. For example, supporters of public education and the welfare state are almost certainly going to resist findings that support some form of genetic determinism. It is important to point out, then, that behavioral geneticists themselves, with the exception of a vanishingly small minority who use the science to bolster their prejudices, do not argue against the value of public education and social welfare programs. On balance, however, it does not appear that we are justified in giving grounded scientific credibility to the twin studies. The two basic assumptions guiding the twin studies – that MZ twins are genetically identical and the “equal environments assumption” – are both wrong. More generally, the science of twin studies is not merely controversial but methodologically weak and thus should not be used to ground policy decisions or inform public understanding.

Let us be clear about the biological science here: (1) the human genome is not a blueprint that governs who and what we are; indeed it ended the myth of a one-to-one relationship between a gene and the trait inheritance process; (2) the role of genes in relation to abnormal conditions and pathologies is not analogous to their role in healthy individuals; (3) if you want to use Huntington’s chorea to illustrate genetic determinism (a disease caused by a “typographical error” in the DNA), then you must consider Alzheimer’s and most other diseases; they are correlated with errant genes that correlate with the probability

not the certainty of getting the disease; (4) genes are pleiotropic, they carry and communicate a multiplicity of messages. Genes are more complicated than we thought they were.

Let me conclude this section with a little sociology of science and statistics. Genetics research, like brain research, may be more susceptible to social, cultural, and political pressures than other sciences because they are embedded in an individualistic cultural milieu. They are at least as susceptible to these pressures as other sciences. If you are a lay reader of the genetics headline stories you should know something about the role of statistics in research and the halo effect.

The halo effect means that results published in prestigious journals like *Science* and *Nature* will grab and hold the attention of scientists, the media, and the public even as contradictory evidence accumulates in less prestigious but peer-reviewed journals. The statistical issue is that results can and are “data mined” in search of a particular statistical result that gives a p-value of 0.05. That value means that the odds are less than one in twenty that the results (correlations) could have occurred by chance. The odds in favor of a real result improve dramatically if they are replicated at the same 0.05 level of significance in other studies. Peer reviewers will be looking for a p-value of 0.05 in evaluating whether to recommend publication of a given paper. There is some evidence that if you stack up all the results of published papers on a particular correlation (such as the relationship between a genetic variant of the serotonin transporter gene and depression), they can be explained by chance. In lieu of becoming an expert in every science, or becoming a sociologist of science, you will be served well by learning some basic statistics and probability theory. This will allow you to evaluate the likelihood that a given scientific result in any science using statistics is sufficiently convincing to merit clinical applications.

There are many ways science as a social institution can ensure that its processes lead to valid results. However, this is never simply a matter of institutional controls or the integrity of scientists. Bureaucratization, professionalization, and commodification increase the likelihood of fraud in science because they create organizational layers and niches that hide bad science. Some sciences are more prone to fraud than others. High-profile sciences like genetics and the brain sciences are

most at risk because they reflect core values of the culture at large in which they operate. Scientists are under pressure to produce results consistent with those values, results consistent with those values are less likely to be carefully scrutinized, and positive results in these fields will advance careers. The more science becomes like a business in the most vulgar senses of that term, the more carefully the products of science should be subject to caveat emptor.

What about the Brain?

Similar problems accrue to our ideas about the brain. The brain became the center of key questions in the humanities and social sciences in the later decades of the twentieth century. It is widely assumed across the sciences and in the public arena that the neurosciences are the key to solving society's major mental, emotional, and behavioral health problems. Nation states have been mounting "decade of the brain" programs since President Bush's announcement of the "decade of the brain" in 1990. These programs continue to draw significant national and international resources, and brain studies are a key feature of the European Commission's twenty-first-century research agenda. Other important initiatives fostered by Big Neuroscience agendas include Japan's creation of the Brain Science Institute in 1997, and the 2013 "The Brain Forum" in Jeddah, Saudi Arabia. A further reflection of the Big Neuroscience movement is the growing number of programs and centers around the world devoted to brain and mind studies in general and to research on the social and cultural aspects of brain and mind. Examples include the Mind Brain Behavior program at Harvard University; the Simons Center for the Social Brain at MIT; the Social Neuroscience Laboratory at the University of Chicago; and the fourteen major European Neuroscience Institutes that constitute the Network of European Neuroscience Institutes (ENINET) dedicated in 2005 to promote brain research by young investigators. While most of these programs reflect a Big Neuroscience perspective, some notable examples of more broadly interdisciplinary perspectives have emerged in recent

years, including the Brains in Dialogue (BID) project. Over a three-year period this project brought together scientists, patients, clinicians, lawyers, ethicists, journalists, and lay citizens at BID events organized around Europe. The final BID conference, “Dialogue to Dialogue,” reviewed three and a half years of BID activities and considered key challenges and potential approaches to improve the dialogue between neuroscience and society.

Another initiative that has facilitated more broadly interdisciplinary approaches to the issues and problems in brain and society is the European Neuroscience and Society Network hosted by Kings College, London. Its purpose is to foster interdisciplinary discussions of the social implications of the neurosciences. In the light of the influence of Big Neuroscience, countervailing interdisciplinary developments on brain and society and the emergence of the social brain paradigm, it is important that we reconsider reigning assumptions about the primacy of the brain in defining who and what we are as human beings and directing studies of the causes of our behavior.

There can be no question that the brain sciences narrowly conceived are important to addressing issues and problems in mental health and illness. The question is whether they are “the key” to unraveling the origins and nature of mental, emotional, and behavioral problems. Brain-centric science and policy is being driven by neuroscience and media hype in conjunction with certain prevailing cultural myths and ideologies.

The idea that neuroscience claims are more hype than science has given rise to a wave of neuro-criticism and neuro-skepticism. The idea that neuroscience claims go too far may be due as much to media coverage as to the actual claims of some neuroscientists. The assumption that we are our brains (or our genes) follows easily from cultural values, beliefs, and myths about individualism, notably in the United States. The myth of individualism is reinforced by and reinforces the tendency of students of brain and mind to rely on their own personal experiences for insights – thus falling victim to the fallacy of introspective transparency.

The brain has perennially been viewed as an object marked by mystery, magnificence, and intrigue. It was described in these terms in

Bush's 1990 proclamation. Furthermore, that proclamation claimed that the brain controls our activity, is the locus of our intelligence, interprets our senses, and controls our movements. In other words, the assumption behind the "decade of the brain" is that we are our brains (brain-centrism, or in psychiatrist and neuroscientist Leslie Brothers' terms, neuroism). Not incidentally, the Human Genome Project was initiated in the same year. The Project was in the Reagan Administration's 1987 budget, but the project was initiated in 1990 when the two major funding agencies, the Department of Energy and the National Institutes of Health, finally agreed on a coordinated plan of action. This project was motivated at least in part by the assumption that we are our genes (gene-centrism). Critics and skeptics of brain-centrism and gene-centrism have focused on the logical, philosophical, and scientific limits of the assumption that we are our brains or our genes. They haven't, however, given the scientists, the public, and the media adequate warrant to consider the social sciences as a powerful resource in the search for answers about brains and genes as factors in determining or otherwise influencing our behavior. Nonetheless, sociologists have in recent years been calling for and establishing a relationship with the neurosciences based on more than a century of developments in the sociology of mind and cognition.

The brain has become one of the iconic "boundary objects" in the twenty-first-century sciences, humanities, and arts, claimed as a key material and symbolic resource across the disciplines. Brain researchers have traditionally assumed that individuals and brains can be studied independently and in isolation from social, cultural, and historical contexts. In their extreme versions these assumptions have approximated the idea of the "brain in a vat." Theories about "theory of mind" have followed the same individualistic pathway.

Challenges to these ideas have been accumulating for at least the last thirty years and a subfield of brain and mind studies has been crystallizing under the umbrella of science and technology studies and collateral disciplines. More recently, there has been a turn to the social in the neuro- and life sciences driven in part by (1) pioneering research in neuroscience on the plasticity of the brain and neuronal regeneration, (2) the discovery of mirror neurons (still an area of some speculation and

controversy), and (3) a growing sensitivity to “society,” “culture,” “world,” and “environment” as contexts for and influences on the actions of the brain and mind. The more extreme isolationist ideas are increasingly yielding to sociological and anthropological perspectives and concepts. The idea of the brain as an aggregated system of social and biological subsystems crystallized in the early 1980s. Here we already have more than a hint of a solution to brain and mind problems and paradoxes that transcends classical nature and nurture assumptions. The most significant provocation for a new approach to brain and mind studies (one that has not to my knowledge directly influenced neuroscientists per se) showed up in the writings of the anthropologist Clifford Geertz. As early as 1973, Geertz was arguing for a perspective captured iconically in the title of Chapter 10 in his book, *Available Light* (2000), “Culture/Mind/Brain/Brain/Mind/Culture.” I introduce the details of this idea in the section on the social brain in [Chapter 4](#).

The ascendancy of social thinking in traditional philosophy of science, the life sciences, and neuroscience is illustrated in the works of philosopher of brain and mind John Searle and neuroscientist Antonio Damasio. Writing in the late 1990s, both men recognized that there must be something social and cultural about the brain, but they added that they don’t know how to mobilize social and cultural resources in their research. There is an intellectual vacuum here waiting for social scientists and their interdisciplinary colleagues to enter with their social and cultural toolkits. Neither Searle nor Damasio seem to be aware of the fact that there are already scientists “out there” who do know how to mobilize social and cultural resources in scientific research.

Alva Noé and Andy Clark are notable among those philosophers who have gone further than Searle and Damasio in exploring the significance of “the social” in brain and mind studies. They do this not so much by bringing in “the social” specifically but by drawing attention to “the world” and the “environment.” Noé is a little better on this score than Clark, but he claims the social domain for biology and ignores almost two hundred years of systematic cumulative research in the social sciences per se.

Sociology still suffers from the misconception that it is not a science, a view that is a function of the invisibility of sociology as a discovering

science and even more a function of not understanding science as a social, cultural, and historical process. Nonetheless, the idea of the “social” is increasingly evident in emerging hybrid sciences such as social neuroscience, social cognition, and neurosociology. Neuroscientists tend to focus on the brain as an independent organ, on single individuals, on cells, and on intracellular processes. Social neuroscience recognizes that social life is an emergent phenomenon, and that social structures co-evolved with biological mechanisms. Social neuroscience draws on the neurosciences in developing theories about how biological systems generate social life. This approach tends to favor the biological over the social as distinct, though linked, levels of reality. In some cases, it is hard to distinguish social neuroscience from sociology; but in general the approach tends to privilege biology. At the same time, the interdisciplinary imperative has generated neurosociology, neuroanthropology, neuroeconomics, and other hybrids at the intersection of the neuro- and social sciences. The first major collection of contributions in neurosociology appeared in 1999, but the term itself was introduced in the early 1970s by J. E. Bogen and others. From the 1970s on, a steady stream of social scientists has been contributing to this field that only seems to have arrived out of nowhere in the 1990s. All this notwithstanding, the idea of the brain as an entity that is independent of society, culture, and history continues to fuel the popular imagination, neuroscience research, and policy agendas.

The complexity of the brain *in situ* and in its social and cultural contexts requires the combined efforts of the classical students of brain and mind in philosophy, psychology, biology, neuroscience, artificial intelligence research and development, and cognitive science. My objective is not to challenge these fields for control over the domain of brain and mind studies but to make a case for adding the voices of sociology, anthropology, and science and technology studies to an already emerging interdisciplinary research matrix. The potential in STS to resolve some of the classic problems and paradoxes in brain and mind studies is demonstrated in the recent contributions to the social ecology of brain and mind I have made with my colleague Sabrina Weiss (Restivo et al. 2014: 37–70). The idea in a nutshell is that human behavioral repertoires emerge from the complex parallel and recursive interactions of

neurons, genes, organs, biomes, the brain and central nervous system, other elements of the body's systems and subsystems, and our social interactions in their ecological and umwelt contexts. The scaffolding that supports cultural predispositions to genetic and brain-centered explanations of human behavior is the myth of individualism.

Individualism is a belief system, a myth, an ideology in which the individual, private lives, and personal expressions, feelings, and experiences are privileged over the group, communities and social institutions, social structures and relationships, the public sphere, and social and cultural life in general. The key concepts used to define individualism are autonomy, independence, self-reliance, and self-determination. In the extreme free will model, people are believed to freely choose what to do and think independently of any outside influences other than their will, and perhaps their "destiny" or the character of their souls. Individualism figures prominently in any list of the core values of American society; for example, individual rights to pursue personal interests independently of outside and especially government interference (notice that a core component of "capitalism" is "laissez faire"); and individual initiative (often opposed to collective conformity when instead it might be contrasted with collective cooperation). The social level of reality had to be discovered just as we had to discover the physical and natural levels of reality. That discovery has crystallized and is slowly impeaching individualism.

Bibliographical Epilogue for Chapter 3

I include here the guiding references I relied on for the materials on genes. See the epilogue for [Chapter 4](#) for the relevant items on brain and mind. The foundational readings on the gene, genetics, and biological determinism that originally gave some direction to my thinking include the following:

R.C. Lewontin, Steven Rose, and Leon L. Kamin, *Not in Our Genes: Biology, Ideology, and Human Nature* (New York: Pantheon, 1984); Ruth Hubbard and Elijah Wald, *Exploding the Gene Myth* (Boston:

Beacon Press, 1999); on science and social activism, see Jon Beckwith, *Making Genes Making Waves* (Cambridge MA: Harvard University Press, 2002), which includes Beckwith's critique of the myth of the XYY male and of sociobiology. Beckwith was the American Cancer Society Research Professor at the Harvard Medical School; for a rhetorical history of the very idea of the gene, see Elizabeth P. Shea, *How the Gene Got its Groove* (Albany NY: SUNY Press, 2008). David Moore's *The Dependent Gene* (New York: Henry Holt and Company, 2001) is one of the best contributions I know of to the literature on the nature-nurture fallacy and a powerful antidote to gene-centrism; see also his *The Developing Genome: An Introduction to Behavioral Epigenetics* (New York: Oxford University Press, 2015). And see Steven Rose, *Lifelines: Biology Beyond Determinism* (New York: Oxford University Press, 1998), and Hilary Rose and Steven Rose, *Genes, Cells and Brains* (London: Verso, 2012) on "the Promethean Promises of the New Biology." On "culture sui generis," see P.J. Richerson and R. Boyd, *Not by Genes Alone: How Culture Transformed Human Evolution* (Chicago: University of Chicago Press, 2005). On variations in the DNA of identical twins, see C. Blumer, and T. Osborne (2011): <http://myinformatics.com/en-au/a/39376341-do-twins-feel-each-others-pain-or-have-esp/>; and see J. Craig and M. Wong (eds.), *Epigenetics, A Reference Manual* (Norfolk, UK: Caister Academic Press, 2011). E.O. Wilson's *The Social Conquest of the Earth* (New York: Liveright, 2012) is now in my view part of the bibliographical foundation for establishing that humans are uniquely social.

General Bibliography

- Barlow, Aaron, *The Cult of Individualism: A History of an Enduring American Myth* (Santa Barbara, CA: Praeger, 2013).
- Blumer, C., and T. Osborne, 2011, <http://myinformatics.com/en-au/a/39376341-do-twins-feel-each-others-pain-or-have-esp/>
- Callero, Peter, *The Myth of Individualism: How Social Forces Shape Our Lives*, 2nd edition (Lanham, MD: Rowman and Littlefield, 2013).

4

The Social Lives of Minds and Brains

Beginnings

I began to think about a sociology of mind and brain (though more about mind in the beginning) during some leisure moments with Randy Collins while attending a sociology workshop in Dubrovnik in 1990. Soon I was planning a book on “the social mind.” While I was thinking, reading, taking notes, filling up file folders, and lecturing my title was preempted by Valsiner and Van Der Leer in their book *The Social Mind*. Later, when my project had evolved into “the social brain,” I discovered that the neuroscientist Michael Gazzaniga had published a book with that title in 1985. Valsiner and Van Der Leer did some of my work for me, especially in terms of the history of the very idea of the mind as a social construction. The limitations of the book by comparison to what I had in mind were that it was a general survey and it treated social construction in a more social psychological and philosophical manner than my plan called for.

Gazzaniga is more interesting on a number of levels. He wants to explain social processes, including behaviors like beliefs and religion. He offers us an example of social blindness. He writes that he knows “that everybody has an effect on everybody else” (1985: 203) and yet he finds

the source of our behavior in the brain. “Social theorists,” he writes, “can argue *ad infinitum*” (1985:187). How does a scientist come to write something like this in the 1980s; how does he not know anything substantive about sociology? Sociology as a field is so damaged that some social scientists can read Gazzaniga as “pro-sociology” (see the discussion in the bibliographical epilogue for this chapter on “neurosociology” and the “sociology of neuroscience”).

In recent years public media have let out that neuroscientists have made us aware of the realm of the social. The philosopher Alva Noë argues that it is only in the last quarter century or so that the social has come into view in the unfolding of the embodiment movement. Does the invisibility of sociology in this picture matter? It is hardly visible in the field of social neuroscience, co-founded by John Cacioppo and Gary Berntson. This is the case even though Cacioppo is a social psychologist and could readily be embraced by sociology (as evidenced in a conversation I had with him some years ago); Berntson has a PhD in psychobiology and life sciences. As I pointed out earlier, social neuroscience is the science of the biological mechanisms that underlie the associations between the social and neural levels of organization. The “social” in social neuroscience is a biological social not a sociological social.

By setting up the agenda that is this book and drawing you into this forum, I have made you part of my resource pool, and also assistants in the mobilization process. Having started my project with the sociology of mind, and given a brief look into the social brain, I want to now consider what we should or can mean by a sociology of the brain. But first, some reflections on the nature of philosophy. Philosophy may be the single most hostile discipline to sociology in a culture generally hostile to sociological thinking.

Interlude on Philosophy

In 1979 Richard Rorty, writing in *Philosophy and the Mirror of Nature*, argued that philosophy as a grand enterprise in epistemology and ontology had come to end. It could no longer compete with the sciences to

give definitive answers about the nature of the human condition, free-will, truth, science, and rationality. Successor subjects, he suggested, to old-style unreconstructed philosophy, would continue to take part in the “conversation of mankind” – who are we; how ought we to live; what sort of large scale orientation to life should we adopt? However, this would not be a conversation contributed to in any significant way by philosophers.

In 1986 the M.I.T. Press published *After Philosophy: End or Transformation?* edited by Kenneth Baynes, James Bohman and Thomas McCarthy, in which leading Anglo-American analytic philosophers (Davidson, Dummett, MacIntyre, Putnam, Rorty, and Taylor) and European philosophers (Apel, Blumenberg, Derrida, Foucault, Gadamer, Habermas, and Lyotard) addressed the question of whether philosophy had ended. Some suggested it had ended, others that it needed to be transformed into a different kind of enterprise.

John Horgan’s 1996 book, *The End of Science*, included a section titled “The End of Philosophy,” in which various views about the end of philosophy were expressed, including the view of Colin McGinn (a former Oxford philosophy don) first expressed in his 1993 book *Problems in Philosophy* that philosophy was dead. McGinn claimed that philosophy deals with problems that are real and of great import but beyond our cognitive competence. We can pose the problems but we cannot solve them. We are like rats trying to solve differential equations (a transparently absurd analogy that could only be dreamed up in philosophy).

I have said more about the end of philosophy and new beginnings for philosophy, and the end of epistemology in earlier writings and lectures. It is at least clear that some very thoughtful thinkers, classical and contemporary, assume there are problems with philosophy. I ask my readers to keep this aspect of contemporary philosophy in mind as they feel the need to draw on philosophers in the current discourse. If they still have a role to play here it is not going to be their traditional role but one subsidiary to or collaborative with the social sciences (see Restivo and Weiss 2014: xii-xvii).

The Social Mind

We tend to take for granted that we “have” minds or that we are “mindful.” People who are autistic are said to be unable to “read” the minds of others; they suffer from what Simon-Baron Cohen has described as “mind-blindness,” an inability to attribute mental states to themselves and others. There are perennial debates and controversies about the relation between the mind and the brain. The terms themselves are often treated as synonyms and the concepts of brain and mind are often conflated. Amidst all this variety and conflict it is assumed that the very idea of mind is about something real, something useful for our discourses on mentality and behavior. One would hardly want to argue that there is no at-hand and ready referent for the term “brain” even while arguing that there may be good reasons for revising our notions of what the brain is and what it does. No one should have any doubts, for example, about where the brain is and how to reveal it so it can be seen and touched by all present. That sounds easy, but it depends on some version of the “psychic unity of ‘man’” fallacy. To assume, for example, as I have just done that “all present” will transparently and immediately be able to see and touch a universal object we call the brain is naïve. Some cultural and linguistic preparation is required for “all present” to be present in a way that allows for seeing and touching in comparable and communicative ways. Given that caveat we should still be able to agree that the brain is an *object* accessible by way of the five senses common to humanity at large.

In the case of “mind,” by contrast, we are using a term that does not have an at-hand and ready referent. We would be hard-pressed to carry on this discourse in the wake of denying that there are brains, but we could readily proceed by arguing that the mind is no more substantial materially than the soul or the ether (whatever their functions in our everyday discourse may be, where they may of course be substantial in a symbolic sense). To be clear, I mean “substantial” in the sense of “material,” measurable or accessible to the senses using physical measuring devices or knowable in some known or potential sensory manner that relies on our grounding in the world. I do not want to defend a

radically empiricist paradigm but rather one that is critically realistic and materialistic. My claim here is that we are no more likely to discover a “mind” substance than we are to discover a “god” that transcends what we have discovered about the sociology of god. In just the same way, we can be good critical scientists, skeptical of our most cherished results; but in the limit we do not for a moment think that our Earth, the oblate spheroid wobbling in precession and racing through the galaxy and across the universe, might one day be re-conquered scientifically by a flat Earth model. I want to be careful here not to be so radically empiricist or materialist that I foreclose new ways of engaging the universe. I do not want to be so careless that I leave any openings for transcendental or supernatural futures.

Imaging and scanning techniques will never reveal “the mind” at work in the way they can reveal “the brain” at work. At least this will be true unless we are able to materially ground “mind.” In spite of all the blood, sweat, tears, and speculations spent on the so-called theory of mind/theory of other minds, a reasonable but widely ignored theory of mind and consciousness has been around since the early decades of the twentieth century in the works of Charles Cooley (1864–1929), John Dewey (1859–1952), and especially George Herbert Mead (1863–1931). Later I will reference Gilbert Ryle’s contribution to grounding the concept of mind. Some of their work was anticipated by nineteenth century thinkers, notably Marx, Durkheim, and Nietzsche. In order to appreciate these earliest (ignoring ancient adumbrations) solutions to the problem of what the mind is and what it does we have to remember the central dogma of sociology. We humans are not merely social beings, but the most social animals evolution has brought forth. Humans are not individuals who become social; we emerge onto the evolutionary stage already, everywhere, and always social. And yet we are not well-prepared as a society to engage what it means to be social in the sense that this is understood by at least some sociologists and some sociologically inspired intellectuals across the disciplines.

The problem of mind is a matter of reference and definition. I could straightaway postulate it out of my frame of reference in something like the way Einstein got rid of the ether. Indeed, that was my first solution

once I recognized mind as a secular version of the soul. The soul was, origins aside, eventually mobilized as something peculiarly human that would establish a clear demarcation between humans and other animals (and with increasing provocations from AI and robots, between humans and machines). The mind plays this same function in contemporary secular arenas. However, I have in the end been persuaded by some colleagues that there is a way and a reason to salvage the concept of mind, and I have incorporated mind in the brain/mind/culture/environment model I developed with Sabrina Weiss. That model marks the conclusion for now of my efforts to break out of the classical dichotomies of brain/mind, brain/body, and mind/body. It is an effort to realize what is entailed in the concept “Culture/Mind/Brain /Brain/Mind/Culture” introduced by the anthropologist Clifford Geertz (see Appendix 2).

Thinking, as the manifestation of mind, is a networked and dialogic process, a series of social acts rather than something that goes on inside isolated, independent heads, brains, or individuals. Heads and brains are necessary parts of a system that is the locus of consciousness and thinking. And neuroscientists and psychologists can teach us something about these parts of the system. Without social relationships and social interaction, however, there is no consciousness and there is no thinking. One form of evidence for this claim comes from sensory deprivation experiments and the results of living in isolation or being coerced into solitary living or confinement. Without inputs from the material and social environments we very quickly begin to lose the veneer of civilization, community, and culture that is our humanity. And the brain begins to essentially starve. Students of scientific practice have also offered empirical evidence for the social locus of thinking. Aside from the variety of ways specific social and environmental factors impact the brain, I conjecture that the brain operates against a constant input of generalized social and environmental information flows that fuel its ground state.

The thoughts we have arise in the context of our social interactions and are manufactured out of cultural resources. Indeed, Randall Collins’ detailed comparative historical studies have demonstrated that the configuration and development of social networks of intellectuals cause

particular ideas and specific numbers of ideas to come into being and develop or die out. The locus of thoughts, ideas, and concepts – of consciousness itself – is the social network. Social networks are not superorganic entities that think and are aware; they generate consciousness and it is expressed in and through individuals. If social networks are the loci of consciousness, individuals are the loci for the expression of consciousness. Individuals are the vehicles that experience and express the thoughts generated in social networks. Thoughts are social structures. This implies that thoughts and thought complexes vary in relation to cultural configurations. All humans at the species level share similar potentials, abilities, and propensities but these are variously configured and expressed across histories, cultures, and personalities (or characters). They are activities, practices, discourses. Even vision is an activity and not a neurological or purely optical event. Thus we never just “see,” we always see “something” and we see from a perspective in a cultural context. Newborns experience signals from the outside world that register optically and neurologically. But they have to learn to see.

In order to grasp the idea that thinking is radically social, and to keep it from slipping into some spiritual or mystical realm, or becoming an empty philosophical or theological concept, one must keep firmly focused on and fully comprehend the idea that humans are social beings and that the self is a social structure. It is also crucial that we do not project our modern postliterate experiences of mentality, consciousness, mind, and body on all humans in all times and places. “Mind” is not a cultural or human universal. An awareness of the body from the inside to the outside is the *ur-mind*. Humans first become aware of inner body processes, then of their physical bodies in space and time coincident with their awareness of other humans and other things in the world. Again, these are not individual events or processes; they arise and crystallize out of social interactions over long periods of time. The process is not complete until *ur-awareness* is identified culturally in language. Mind is the crystallization of these levels of awareness in conjunction with the development of language, inner thoughts (initially more like “feelings”), and ultimately thoughts we can verbalize. Substantive “inner thoughts” are dependent on the emergence of language.

Merlin Donald has systematized this perspective in his concept of the three stages in the development of our symbolic capacity. His central

thesis, consistent with what I argue in this chapter, is that these stages are not functions of the independent evolution of the brain and in particular, for example, of a language module. Instead, he claims, these changes are stimulated by cultural changes, specifically the increase in the social complexity of the human nest (to return to Wilson's vocabulary). These cultural changes are reflected in changes to the prefrontal cortex affecting the executive function of the primate brain. Merlin identifies three cultural watersheds. With the emergence of mimetic culture, our ancestors reached new levels in the control and refinement of their body movements. This included the ability to rehearse and recall those movements. Ritual, dance, and crafts were constructed on these abilities. Mythic cultures followed on the development of speech and symbols. In the last (latest) stage, technology-supported culture emerges with the development of reading and writing and contemporary developments in external storage, retrieval, and transmission of information. Donald must be counted among those who appreciate the symbiotic relationship between brain and culture.

Theories of mind have traditionally come from philosophy and psychology. Such theories have tended to causally tie mental phenomena to or make them identical with brain processes. For centuries, it has seemed obvious that the study of mind should be under the jurisdiction of philosophers and psychologists (in their premodern as well as modern guises). As the matrix of mind studies has become increasingly interdisciplinary in the latter part of our own era, sociology and anthropology have been notably left out of the core discussions. I say this fully cognizant of the fact that at least some students of mind and brain have indeed incorporated social and cultural concepts into their theories and models, and that they have demonstrated some features of the sociological imagination. And the sociology of mind is indeed a specialty in sociology though heavily understaffed. My point is that contemporary students of the social and cultural aspects of mind have not been in touch with the full scope and depth of sociology and anthropology as scientific disciplines. It may be that these are the only modes of inquiry that give us any hope of making sense out of the chaos of claims about mind, consciousness, and even God and soul coming out of contemporary

physics, astronomy, cosmology, biology, artificial intelligence, and the neurosciences. There is no need to ignore, denigrate, or eliminate these inquiries in order to argue for a more central place for the social sciences in the study of mind. A critique of the traditional approaches and their limitations, however, is absolutely necessary.

The “problem of mind” is difficult to engage without embracing some form of dualistic thinking about “mind stuff” and “brain stuff.” Efforts by physical and natural scientists to avoid dualism have sent them searching for mind and consciousness in the wrong places; in the physics of the brain right down to the quantum level, for example, and as emergent brain phenomena. The physics and biology of mind and consciousness has not led to satisfactory solutions but only to the piling up of paradoxes. Brain-centrism has made a mystery out of how the brain creates mind and consciousness.

The alternative to brain-centrism is social relations and social networks as the roots of mind and consciousness. Nietzsche already had the insight that consciousness is a network of social relations. Nineteenth-century insights and speculations in the Nietzschean vein have been sustained in the sociological contributions of George Herbert Mead and his followers, including notably C. Wright Mills and Randall Collins. The literary theorist Mary Thomas Crane has argued that biology engages culture and produces mind on the material site of the brain. We are still left with problems at this point but we clearly have alternatives to the tortured efforts of the physical and natural scientists to locate mind and consciousness in the brain *per se*.

Why has Mead’s work on mind (alongside the contributions of John Dewey and other contemporaries), available since the early part of the twentieth century, been ignored? The answer is that this tradition is part of the invisible sociological revolution. Mead’s and Dewey’s pragmatism has compatibilities with the neuroscience of mirror neurons and other recent developments demonstrating that the brain is responsive to external influences. A sociological perspective makes it clear that Einstein’s brain was not Einstein, and if his brain did indeed have higher levels of connectivities as postmortem studies show, why assume that they were inherited causes of his behavior and thought rather than what is increasingly more plausible; that the higher levels of connectivities

were functions of his behavior? And of course there is always the unasked question about Einstein; why didn't his brain's connections make him as smart in politics, religion, and history as in physics?

By the early 1940s, the idea was abroad that logic was the key to understanding the brain. The counterpoint to this idea was Durkheim's rejection of Aristotelian and Kantian notions of *a priori* categories; and his rejection of the idea that categories (or thoughts in general) could be crafted by individuals (conceived as variously free-willed and outside the influence of society). By 1912, Durkheim had already rejected immanent along with transcendental referents for religious ideas. Without the rejection of immanence and transcendence in this Durkheimian sense the history of sociology is empty. Durkheim stands on the shoulders of giants such as Pythagoras and Cicero, and he and Marx adumbrate efforts from Spengler to the historian and mathematician Dirk Struik to ground "abstract," "transcendental" ideas in the everyday world of human labor and human culture. The history of sociology and anthropology can be viewed as a history of rejecting transcendence, immanence, and psychologism as explanatory grounds in the study of human behavior. The emergence of the idea of "the social" has impacted all of the disciplines concerned with human behavior and social action. Today, even within those disciplines most removed from social science thinking, we can find invitations to bring the social sciences into brain and mind studies. We are still a long way from transforming these invitations and insights into a recognition of the disciplinary contributions of sociology.

The crystallization of the rejection of immanence and transcendence is one of the great ongoing achievements in the history of the social sciences. The project is periodically adumbrated in the history of thought, for example when Pythagoras claims that "man is the measure of all things," or when Cicero (b. 106, d. 43; 1824: 227) says that Socrates "brought down philosophy from the heavens..." A more recent example of this imperative is Dirk Struik's (1986: 280) conception of the goal of the sociology of mathematics: to haul the lofty domains of mathematics "from the Olympian heights of pure mind to the common pastures where human beings toil and sweat."

As we entered the twenty-first century, the sociological imperative was already cleanly planted in the perspectives of some AI researchers.

A section of the AISB 2000 conference (Society for the Study of Artificial Intelligence and Simulation of Behavior) in Birmingham, England, was organized around the idea that AI researchers have underestimated the complexity and importance of societies and their role in the construction and functioning of intelligence. The conference call states that it is time AI researchers paid attention to sociology and social cognitive science and the study of social phenomena *sui generis*. This is a significant shift in the position of sociology within the physical science and engineering landscapes. It ratchets up the call for the participation of social scientists in studies of mind, brain, thinking, and consciousness.

The classical contributions of psychologist D.O. Hebb and his followers give us warrant to claim that thinking and emotions are dependent on and functions of access to a stream of externally generated stimuli. Stream of consciousness is co-terminus with stream of affordances. Assuming a model in which the various brain, body, mind, social, and cultural units of analysis are conceived in terms of information flows, we can say that mentalities are about the circulation of information.

All efforts in the post-*Phaedo* world to disassociate thoughts and minds and brains from bodies have failed. Today, what remains of the Platonic realm and its transcendental offshoots are all becoming victims of the embodiment movement. What is this but the triumph of some form of materialism. We need to mobilize to reject transcendence and to eradicate vulgar notions of materialism without rejecting materialism. Here we have one of the nails in the coffin of metaphysics, philosophy, and epistemology. Marx brought the calculus down to earth (not knowing that mathematicians of his time had already made advances in this direction), Spengler and Wittgenstein went further and anthropologized mathematics. Durkheim is the locus classicus in the social sciences for the rejection of transcendence. He is well-known for the argument that God is a collective formation and collective elaboration, in brief, a symbol of social life culturally constructed by human beings. What is not so well known is that in the closing pages of the study in which he argues that God is a symbol of society, he demonstrates that logical concepts are also collective constructions. With the coming of science studies and cultural studies, we disciplined mathematics and scientific

knowledge as social constructions. The next phase of this “rejection of transcendence” is now underway in the sociology and anthropology of mind and brain and most significantly in the sociology and anthropology of religion and the gods.

Information has classically been as recalcitrant as pure mathematics in resisting embodiment, but now it too is falling under the disciplining measures of materializing and embodying strategies. The Age of Information might easily displace The Age of the Body as the most appropriate representation for our era. From a higher elevation all of this is taking place in a period that I date from the 1840s, The Age of the Social. This is the age that gives birth not only to the social sciences but to an increasingly pervasive awareness of the facts of the social level of reality across the disciplines. The paradox is that this awareness is not always grounded in sociology *per se*.

Our understanding of mentalities has been obstructed by some deeply ingrained assumptions about human beings. One is that affect and cognition are separate and separated phenomena. This division is breaking down and will have to be eliminated as part of the process of reconstructing the sociology of mind. Another assumption is that learning and cognition can be decontextualized. In fact, contemporary research increasingly makes it clear that learning and cognition are linked to specific settings and contexts. Their long-term efficacies are in fact dependent on contextual recurrence, contextual continuity, and recursive contextualizing. The latter process helps explain the process of generalization without recourse to epistemological mysteries or philosophical conundrums. We live our lives by moving from home or school to home or school, from our home to our neighbor's home, from the schools we attended to the schools our children attend (contextual recurrence). Even when these movements occur across cultures and continents, and virtually in our experience with various media, contexts repeat, imitate, suggest, overlap, impose and re-impose themselves, shadow, mimic, and mirror each other, and are linked through simple and complex feedback loops (contextual continuity). This is the structural and informational basis for the continuities in our sense of self, our memories, and our thoughts (recursive contextualizing). Many of the mysteries of the paranormal and our everyday experiences of *déjà vu* can

be explained by attending to these features of context. Obviously they come into play in explaining illnesses of the self and mind. Contextual recurrence, contextual continuity, and recursive contextualizing are not easily separated analytically; they interpenetrate and operate inclusively as our lives unfold.

There are four basic paradigms in the psychology-dominated theory of mind literature: theory-theory, theory-formation theory, simulation theory, and modularity theory. The psychologism in these theories fits the individualist bias we find in work ranging from research on children's theories of mind to social and sociable robotics research and development; social robots in principle possess the positive and negative behaviors and emotions of humans; sociable robots are just cuddly and friendly. There is a fifth paradigm, enculturation theory, however, that goes with the sociological resources I have identified. Enculturation theory is the alternative, for example, to the theories that children (1) derive their theories of mind from their direct experiences of such states, (2) learn the way scientists are supposed to learn, or (3) give rise to them innately as they mature.

The prevailing theories of theory of mind emphasize development within the individual and/or the brain. From a sociological or anthropological perspective, theory of mind and mind itself are cultural inventions. Social construction of mind has not been ignored, but it has not been centrally represented in either mind studies or social robotics. The reason is a problem in the sociology of knowledge. In the case of social robotics, for example, it is easier to link psychology and engineering to problems of machine intelligence and consciousness because psychology appeals to the illusion or fallacy of introspective transparency. The problem with sociology, according to the robotics engineers I've interviewed, is that while it may hold unparalleled promise for social robots engineering, it is by comparison with the psychological sciences introspectively counter-intuitive and technologically and methodologically sterile. Psychology is science, sociology is not, for these engineers. These are not failures of sociology but rather failures of the sociological imagination in robot science and engineering. Similar problems accrue to educational theories in science, engineering, and mathematics to the extent that they are grounded in traditional psychology and philosophy.

The list of theories of mind that fall more or less within one of the four major paradigms listed above is a long one and each theory has a more or less illustrious history of philosophical and psychological combat. In spite of the range and variety of these theories they share the property of being generally asocial. I list the most prominent of these theories here simply to illustrate their range and variety: Hegelian mentalism, idealism, vulgar materialism, dualism, various forms of monism, and variations on these themes including Cartesian, bundle, interactionist, parallelist, behaviorist, logical behaviorist, functionalist, phenomenological, central state or identity theories, and various attribute theories. The intriguing thing about this list is that if we turn to the studies they are grounded in they demonstrate to different degrees the tendency of philosophers and psychologists to think about minds and brains by imaginings about brains in vats, armadillo minds, thinking bats, vampire and zombie brains, and Martian brains. Searle's Chinese Room (see [Box 4.1](#)) is a paradigm of this sort of asocial reasoning. No wonder we can't find social human beings anywhere in these theories! In a line of inquiry that includes The Leibniz Mill, Turing's paper machine, and Block's Chinese Nation, Searle's Chinese Room is inhabited by a "human" who is stripped down to an asocial impossibility, a mirror image of Searle's self-concept.

Box 4.1 The Chinese Room

This so-called thought experiment was designed to challenge the strong AI claim that a digital computer could be programmed with mind and consciousness. The strong AI claim is reduced to a question and answer sequence. The argument is then that if a computer can be told a story and then answer questions about the story, it would be simulating a human ability, and literally understand the story. Furthermore such a machine and the program would in fact explain how humans are able to understand a story and answer questions about it. Searle argues against this possibility by imagining himself locked in a room and that he is completely ignorant of Chinese. He has with him a set of rules written in English that allows him to correlate two sets of formal symbols, the Chinese characters. Given these rules, he can reply to questions written in Chinese that will convince his Chinese interlocutors that he understands Chinese. Searle concludes that a computer program that would allow the computer to engage in an intelligible conversation in written

Chinese would no more understand the conversation than he would in his locked room. Thus, no matter how intelligently a computer behaves it would not be behaving with understanding, mind, or consciousness. The reader should note that besides violating fundamental realities of human behavior (consider what would be involved in actually carrying out the experiment), the argument, labeled the “hollow shell argument” by John Haugeland, applies only to digital computers and not to machine intelligence in general. Thus the argument is transparently not an argument against the possibility of machine intelligence, mind, understanding, and consciousness. Searle’s Chinese Room argument first appeared in “Minds, Brains, and Programs,” *Behavioral and Brain Sciences*, 3 (3): 417–457, 1980 and has been widely discussed in the years since. A little sociology would have gone a long way toward dismissing this argument immediately and the years of wasted efforts by its interlocutors, or redirected the discourse in more productive directions. This is a paradigm of the wasted efforts that litter the landscape of philosophy. Perhaps this is too strong and one might want to argue that the lengthy dialogue has been somehow constructive. They have not in any case pointed us in the right directions to resolve the problems and paradoxes of mind and brain.

Cognitive psychologists tend to view the mind as a set of mental representations. These representations are then posited to be causes behind an individual’s ability to navigate his/her environment. Cognitivists also have a tendency to equate cognition and consciousness. But Nietzsche, as I pointed out earlier, long ago had the insight that consciousness is a social phenomenon. He was one of a number of classical social theorists who had pioneering insights into the social nature of mentality.

We can approach the history of discourse on mind in terms of (1) the conflict between rationalists (intellectual descendants of Descartes and Leibniz) and empiricists (followers of Locke, Berkeley, and Hume); (2) the behaviorist challenge to the radical empiricists by Watson and others, and the challenge in turn to the behaviorists by the ethologists (Lorenz, Tinbergen, and von Frisch); and (3) the Kantian counterpoint to empiricism, represented in our own time, for example, by Jerry Fodor’s conception of the mind as an entity possessing organizing capacities and an innate “language of thought.”

In one of the most important of the classical contributions to the philosophy of mind, Gilbert Ryle argued for the rejection of body-mind dualism. He had the critical insight that the mind at work is just the body at work. Talk about the mind is just another way of talking about behavior. "Ryle's regress" is a classic argument against cognitivist pre-suppositions about the ghost in the machine, the Two-Lives or Double-life Legend, and the Two-Worlds Story. Ryle thus argued against the idea, put in these terms by Emerson, that "The ancestor of every action is a thought." This approach leads to an infinite regress. In Ryle's view, the ancestor of every action is an action. Goethe's Faust voices this same idea when he says that in the beginning was the act, not the word. In consonance with what I claim as a sociologist, Ryle argued that we can interpret "higher level" behaviors without referencing a "soul."

Why is it we "locate" mind, thinking, and consciousness "inside" heads? Certainly in the West, mentalities and the emotions have been associated with the brain and the heart since at least the time of the ancient Greeks. More recently, localizationalist physicians and the brain image work by neuroscientists have reinforced the idea that mentalities are "in the head." On the other hand, in sociological perspective, mentalities are not produced out of or in states of consciousness; they are not products, certainly not simple products, of the evolution of the brain and brain states. Rather, they are by-products or correlates of social interactions and social situations. This implies that the "unconscious" and the "subconscious" are misnomers for the generative power of social life for our mentalities – and our emotions. There is no more an unconscious than there is a soul, but there are cultural mechanisms for translation and transference that point us to referents for mental states that do not refer materially. The thesis here is that social activities are translated into primitive thought "acts," and must meet some filter test in order to pass through into our awareness where they are experienced as independent of material referents. Mind as social, semiotic, mediated action, however, is as material as the brain.

The sociology of mind and thinking has a long and distinguished pedigree, yet it has until recently been virtually invisible in contemporary theories of mind. A renewed interest in mind, brain, consciousness, and thinking (along with the new life evident in the search for God; the

two quests are indeed related culturally and in sociology's program for the rejection of transcendence) is evident in the steady stream of books, articles, lectures, news stories, and television programs crossing today's public and intellectual landscapes. One of the main features of this stream is that one can see some evidence of a sociological orientation emerging, slowly for certain, out of the shadows.

An archaeology of these developments reveals a "journey to the social" across a large section of the landscape of intellectual labor. Those who undertake this journey and are not sociologists or anthropologists necessarily fall short of their mark or otherwise abort the trip. This is, indeed, a much more treacherous journey than the Westerners' journeys to the east which have captivated (and captured) so many Western spiritual seekers. But the very fact of the journey to the social reveals the emergence of a new discursive formation, a new episteme, a new epistemic regime. This episteme is new in the sense of a birth or an originating activity, but absolutely new in the scope of its impact. The Age of the Social, an era of worldview changes, will carry well into the twenty-first century and likely beyond before it begins to embody itself in the everyday ecologies and technologies of knowledge in new global cultures, professions, and schools.

To the extent that a society such as America values individualism it will be predisposed to psychological, biological, and genetic explanations of human behavior. These sorts of explanations have a volatile potential for supporting racist, classist, and sexist agendas. Explanations like this place responsibility for human behavior squarely on the shoulders of individuals. At the same time, such explanations undermine efforts to bring social forces such as education and social services and more generally science to bear on solving human and social problems. Another consequence of this way of thinking is that it looks to individuals for the springs of creativity, and not just to individual persons but to individual brains.

The cultural obsession with Einstein's brain is based on the assumption that Einstein and his brain are one and the same. Indeed, the Japanese mathematician Kenji Sugimoto, himself obsessed with Einstein and Einstein's brain, said that when he "met" Einstein's brain he met Einstein. In what sense is Einstein's brain Einstein? Elsewhere I have asked Einstein brainists to imagine various Frankenstein scenarios in which Einstein's brain, hypothetically recovered whole upon his death

and somehow kept “alive,” was transplanted into various men and women of different ages and from different eras and cultures. It soon becomes transparently clear that none of these men and women could possibly become Einstein. It is not a great leap to the conclusion that the idea of downloading his or any brain (or mind) into a computer in order to achieve machine immortality is equally absurd.

What about interrogating Einstein’s brain directly? The results of such an interrogation would be exactly like those presented in a comic context by David Letterman (show number 1256, aired July 21st, 1999). Audience members were invited to ask Einstein’s brain (a model brain in a beaker of a substance that looked like green Jello) questions. When they tried, the announcer told them that Einstein had died in 1956 and they were trying to communicate with dead tissue.

The basic problem with individualistic explanations of human behavior is that they start out by ignoring the most important thing about us: we are social animals in the most profound sense of social. If we can show that psychological explanations do not adequately account for creative discovery and invention in science, we can begin to understand the nature and limits of genetic, brain-centered, and broader biological explanations. For the moment, I am going to settle on the Rylean notion that the mind is just the body at work.

In order to properly introduce the concept of the social brain, two preludes are necessary. First, we need to revisit the concept of the social in its postmodern context, keeping in mind that “the social *sui generis*” is the key organizing idea in this book. Second, we need to develop a perspective on information, one that materializes information and that allows for the possibility of informaticizing each subsystem of the social brain model.

The Social Brain: A Prelude in the Postmodern Context

Life in the postmodern era has caused many scholars and intellectuals to lose their sociological innocence and to seek new modes and levels of inquiry, following a path to the End of the Social. But in the way

psychology was Freud's tyrant, sociology has been and is my tyrant. I am, to paraphrase Freud, tormented by the goal here and now of examining what shape mind, brain, consciousness, and thinking take if one considers them in sociological terms. This simply extends my research biography as a sociologist of the "hard cases" math, logic, and god. "Hard cases," recall, are subject matter that have classically been assumed to be immune to sociological analysis because they seem to be outside the causal influences of society, culture, and history.

My goal is to take you along with me on my journey to a solution of the mind/brain/body problems and paradoxes. The provocations for this journey include criticisms of classical dichotomies in brain and mind studies, the turn to some version of "the social" in the life- and neurosciences, and the growing literature critical of the obsession with brains, including the brains of famous dead people, notably Albert Einstein. In [Chapter 2](#), I provided a bird's-eye view of the emergence and crystallization of sociology, and pointed out how it revolutionizes our understanding of science. In this chapter, I began by entering the landscape of mind studies with my sociological lens. Here, I follow the sociological imperative and prepare the groundwork for a sociology of the brain. As you will see it is difficult to go after the brain without encountering the mind and equally difficult to go after the mind without encountering the brain. But where and when do we encounter human beings?

It seems to me that a sociologist, unlike a philosopher, a psychologist, or a cognitivist, has to offer some rationale or justification for taking on problems of the brain, mind, consciousness, and thought. There is an interesting if not exceptionally challenging problem for sociologists of knowledge in the phenomenon of neuroscientists and biologists claiming to be or being credited with being the scientists of society or the social. How is this possible in the wake of the history I unfolded in [Chapter 2](#)? Well, I did refer to that history as an invisible revolution. It explains in part why sociologists don't have more of a voice in mind and brain studies. More importantly, it explains why sociology is invisible to neuroscientists and biologists, some of whom are now claiming disciplinary jurisdiction over society and the social. I can share with you one perspective on this problem from a colleague in psychology. He affirms on the one hand that "the social" has found its way into his thinking

without announcing itself as sociology per se. Thus, where I see his defense of behavioral epigenetics hiding “the social,” he hopes that his readers will recognize that “the social” is not buried inside the concept but integral to it. He is a psychologist with a strong interest in biology and did not see a strong connection between sociology and biology and so more or less ignored the field. I was able to draw his attention to the significant amount of attention sociologists have given to biology sometimes to the detriment of their own field. While this case involves a psychologist and epigenetics it illustrates why sociology per se may fail to register in brain studies. Let us turn now to the brain and what we might say as sociologists about this crucial organ.

Each of us has a brain – or perhaps we all *are* brains. I don’t mean that we are brains in the sense of “I am a brain,” “I am brainy,” or “I am a big brain.” I mean rather that we are brains rather than creatures that have brains. More specifically, we are creatures who behave the way many thinkers have claimed brains behave and make us behave. Think again.

We are not in fact our brains. We are creatures with brains, and in particular we are social creatures with social brains. We could say that we are only bodies. But we are bodies born into, nourished by, and sustained in our species-specific humanity by families, communities, and societies. Our bodies are social things. The implication of being only bodies as social things is that there is no soul or spirit; there are no mysterious transcendental or supernatural substances, experiences, or levels of reality. All of the efforts to identify nonmaterial, spiritual, transcendental, or supernatural features of existence are the result of charlatanism, failures in scientific, and especially sociological, imagination, mistakes in reference, or distortions and misrepresentations of reality caused by mental illnesses or mistaking induced experiences under the influence of mind-altering drugs for real world experiences. I don’t want to underestimate the difficulty that can arise in negotiating the reality boundary. However, there is a reason that it is dangerous to drive a car under the influence of drugs or alcohol. Just as we failed (and for many still fail) to see God as our own social creation, we continue to be mystified by mental and “internal” experiences that have social origins – that *are* social.

I am reminded here of a story my friend psychiatrist Leslie Brothers, widely credited with introducing the contemporary idea of a social brain

into the neuroscience literature, told me when we first met. She was at a conference at the Vatican Academy of Science and someone was lecturing on the brain as if it were a freestanding independent entity. A friend sitting next to her nudged her, urging her to go to the blackboard and correct the isolated brain idea. She finally did and in place of the single brain pictured on the blackboard she drew a network of brains. I told her that that was a move in the right direction but that she should have drawn a network of persons.

The Social Brain: Second Prelude – on Bodies and Information

The late twentieth century could come to be known as The Age of the Body, the era in which echoes of Plato's complaints about the body finally faded away and thinking men and women began to rally around Nietzsche's insight that there is only body. Let us remember here that the Platonic desire to free us from body and sex, and its offshoot desire to machine children without women leads to a ruggedly masculine logic (see [Chapter 8](#)). This section on the materialization of information is important in the context of my efforts to informaticize my model of the social brain.

Robert Mitchell, an English professor, and Phillip Thurtle, a social psychologist, are among a group of researchers including digital artists and cyberculture critics (notably, for example, Eduardo Kac, Timothy Lenoir, and N. Katherine Hayles) who are demonstrating the embodied materiality of information. It is as much argumentative acuity as imaginative choice of sites and contexts that help in illuminating information as material poesis. The materiality of information has been revealed in case studies of medicine and semiotics in eighteenth-century France, horse breeding and horsemanship metaphors; machines; mind, brain, and consciousness; biotechnology and genes; performance art; cyborgs; women and digital bodies; virtual reality; and the self. Incidentally, this is another example of the movement associated with postmodernism that has seen literary theorists and professors of art, history, and

especially English professors joining and to some extent replacing philosophers as the arbiters of the standards of logic, theory, argument, and cultural critique.

The case studies in this field are accumulating into an impressive consiliency of evidences that incrementally builds the argument for the materiality and embodiment of information. In order to expand the range of modes of proof I have paired the concept of consiliency of evidences (or inductions) with the use of ensembles of probabilities in the weather sciences. Different initial conditions and model uncertainties are sampled in ensembles. Ensemble predictions can be verified over many weather and climatic cycles allowing for corrections and improvements. Pairing the two ideas allows us to view history as an unfolding of cycles of cumulative relevant evidences. This form of proof is very helpful in exploring the God question. Here, the mounting evidence on materiality and embodiment in information theory takes the embodiment of the body to another level. By materializing information, this movement helps to make an information theory of the body, the brain, and mind a reasonable goal and one that promises a coherent theory of brain/mind/culture – culture/mind/brain. This is part of the rationale for my goal of informaticizing the Restivo-Weiss model.

The body begins to materialize in eighteenth-century France where “the sensible body” was the core metaphor that guided thinking about body, mind, and society. Sensibility, aligned with medical semiotics, afforded the physician-as-philosopher and intellectuals from Diderot to de Sade ways of modeling the body. The body is a bridge concept, a contested object, across a variety of discourses – it is a boundary object. Information is also a boundary object, and it is where these two boundary objects meet that the rationale emerges for the model I propose as the first iteration of a solution to the puzzles and paradoxes of brain and mind studies.

On the command and control side of the equation, researchers have pointed out that equine metaphors of control are widespread in our car culture, that the horse-human system informs the discipline of the body, and that horse breeding is the basis for lessons on biology and society and especially on eugenics. It is worth remembering at this point that the goal of “breeding” a professional class alluded to in this research was a

practical alternative to a eugenics program that could not be ethically or scientifically realized. The concept of “profession” was in fact developed and promoted by eugenicists such as A.M. Carr-Saunders, and the defining ingredients of “professionalization” are isomorphic with the defining ingredients of the eugenics program. The former achieves the isolation and propagation of a special social class of people; the latter was conceived to isolate and propagate a genetically special population.

The body is a boundary object between information and control in an era of bioinformatics. We are witnessing a shift from a cryptographic to a pragmatic paradigm in biological discourse, and the emergence of hybrid bodies. Analyses in this arena are witness to the commodification of the body, something we should recognize in more general terms as part of the commodifying blitzkrieg of latter day “capitalism.” Consider, for example, Robert Mitchell’s work on body wastes, information, and commodification. We are living in a transitional (or post-?) “capitalist” society organized around an informational mode of production, with the social relations of production informaticized, and information-ed forces of production. As we informaticize objects, bodies, and relationships, everything becomes more readily commodified, including body parts and body wastes. “Capitalism” as discourse and information reaches its apex as a system of inclusion and exclusion in commodity imperialism, colonialism, and market expansionism. At the same time, information crystallizes as an organizing principle in theory work. I remind the reader that I use the term “capitalism” as a shorthand for modern industrial technological society especially as embodied in Western culture and imperialism. The term is ideological; “capitalism” as an economic term has no real world economy referent. The fact that I’ve chosen to work with information theory in the wake of what I have just written simply means that I must apply it with due vigilance and be ready to try something different, something new.

New forms of embodiment abound: virtual informatic surgeons, digibodies (a third space between mind and body), and informatic emotions. We come to the intersection of bioinformatics and the visual arts as we engage installations such as “Einstein’s Brain” (by Dunning, Woodrow, and their collaborators) and Kac’s “Genesis.” Here are the results of moving from conceptual criticisms of biotechnology to using it

in aesthetic formations. The Cult of Information arises out of a sea of media bodies, reality-transforming symbols, and the mindbody (as conceived by Mark Hansen) concept. The meaning of the human genome is not simply the province of the scientists, but a boundary object batted about, battered, sculpted, and narrated in the arenas of art and culture. As we move through this field, representation fades away and data is made flesh. Simultaneously, the flesh becomes more complicated.

Let us recognize that “life, the universe, and everything” (THE COSMOS) is machines all the way down. The distinction between organic life forms and machines is artificial. Life forms are just another type of network of machines, just like a robot is a different type of network of machines than a turbine. I have read Hélène Mialet’s *Hawking Incorporated* as demonstrating that Stephen Hawking is just like Einstein and Rodin and, eliminating the particulars, just like all the rest of us. The world and we are machines all the way down.

Nietzsche and certainly our own contemporary students of body have helped to make a place for new kinds of bodies with new kinds of lives. It is in our (will to) power to construct new bodies, new entities, and new forms of life. Bodies are systems of meaning organized around interpretive schemes, and this means that what counts as a body is a cultural decision. One could easily imagine that we are witnessing the end of the body. The anthropologist Claude Levi-Strauss argued that academics tend to focus their attention on things just at the point they are coming to an end. On closer inspection, however, endings are more likely to be transitions and transformations. Anthropologist Emily Martin contends that one sort of body is coming to an end and another kind of body is coming into being. Again, it is more accurate to think in terms of plurals rather than singles. Just as we are cautioned in science studies to think in terms of sciences rather than science (or Science), so more generally postmodern thought has pluralized our classifications and categories on the way to transforming them. The body, always in fact the focus of pluralizing disciplines if we think about it in historical cross-cultural terms, is arguably at the center of more intense disciplining actions than ever before. One reason is that the body is centrally linked to all the other entities now being subjected to pluralizing discipline. Philosopher Judith Butler expressed her frustration at how resistant the body was to

being disciplined. In order to get some control over her subject (and perhaps over her own body), she adopted a position based on Michel Foucault's philosophy and addressed the regulatory norms through which the body is materialized. She found herself at odds with constructivism and questions about agency, but she problematized these ideas contra constructivism in a way that was prohibitively narrow sociologically.

N. Katherine Hayles has analytically distinguished the body from embodiment. Like many of us who are struggling to escape dualistic thinking, Hayles too has found it difficult to stay the "holistic" course. She tries to complete her escape by adopting the strategy of positing "relation" rather than preexisting entities. One needs to remember here that relational thinking is a recurring themata or strategy in the history of ideas. She adopts Mark Hansen's term, *mindbody*, to denote the emergent unity of body and embodiment in a dynamic flux of biology, culture, and technoscience. The relational stance gives us mind, body, and world as constructions of our experience. Later I will show how this converges with the ideas of Noë and Clark and strengthens the rationale for my solution to the mind/body/brain problem.

The body as subject and object is a locus of tensions that emerge around new technologies. The powers behind these technologies announce them as gateways to utopias – it was atomic power in the mid-twentieth century, it's the human genome, neural networks, and bio- and nanotechnology today. These announcements call forth critics who create dystopic and doomsday scenarios. As the body technology, increasingly fluid and evasive, emerged in the twentieth century, Wells, Kafka, Orwell, and others imagined the dark futures that might be ahead of us. Today, authors such as Don DeLillo, Caleb Carr, Dan Brown, and Michael Crichton oppose the utopias of the nanotechnologists and information engineers with visions of bodies and cultures transformed in near future dystopias.

Experiments and industrial and everyday developments in robotics and artificial intelligence are blurring the boundary between "the machines and us," the organic and the inorganic, and the living and the dead. This may be one source of the zombiefication of modern popular culture. In this arena of social, sociable, and

emotional robots we are encouraged to show a renewed respect for the material lifeworld that increasingly mirrors our actions. The Kasparov vs. Deep Blue chess match, billed as a “man versus machine” event, was accompanied by predictions about the emergence of machines with intelligence and emotions. Here we find our most literal example of a Latourian world of machines with voices. It is important to remember that Bruno Latour is at best ambivalent and at worst maddeningly obscure on the issue of what he means when he claims that machines can speak for themselves.

The rhetoric of “man-versus-machine” masked the fact that Kasparov and Deep Blue were stand-ins for or nodes in two networks of humans (including experts of various kinds) and machines. “Man” is already a cog in a cyborged network. As for machines with emotions and consciousness, the problem resolves itself differently if we proceed from the idea of “robots ‘r’ us,” that is, robots as a new life form in our own image, or if we think of robots as robots *per se*, that is, as machines (perhaps hybrid bio-machines) representing a new species. The term “robosapiens” has already been introduced in the robotics literature. The robots “r” us position leads to skepticism about whether robots could ever be conscious or have emotions in the way that we do. If we adopt the robots as robots *per se* position, however, then it becomes possible in principle to think in terms of robot (machine) emotions, and robot (machine) consciousness. The differences between robots “r” us and robots *per se* does not imply that both forms will mirror their human creators. In the midst of the emergence of the robosapiens, we are witnessing a sympathetic development in the representations of nonhuman animals as entities with minds, entities that are conscious and think, and entities with civil rights.

The work on social, sociable robots, and affective computing has created a social space of border tensions between minds, brains, and bodies, machines and humans, and scientific and theologico-religious authority. Not only are we reinventing bodies, we are reinventing science and posing new challenges to religion and ethics. As a species, we are working globally on so many different planes of action that we are faced with the unintended, unpredictable, and unknowable consequences of a multiplicity of multiplier effects. This is more than anything else a scenario for doomsday.

Information technologies are ready targets for social criticism, critical theory, and ethical analysis. Information itself has until recently escaped these critical and analytical tools. The Critical Art Ensemble collective has drawn attention to the theological rhetoric that surrounds the human genome project and how it masks the eugenic origins of this discourse. Genesis creator Eduardo Kac explains that he has tried to represent the continuity between imperialist ideology and reductionist genetics. He accomplishes this artistically by translating a passage from the King James Bible into Morse code and then translating the Morse code into a gene.

What is at stake here? Transgenic artists such as Eduardo Kac may be creating early warning systems to alert us to the consequences of the world(s) we are fashioning for self, species, culture, and “nature.” The quotes around “nature” signal an increasing awareness that the idea of Nature is not as transparent, unified, or universal as we once thought. We need to become comfortable with the idea of natures, just as we are learning to become comfortable (more or less) with sciences instead of Science, and bodies instead of Body. When Oswald Spengler wrote that there is no Mathematik, only mathematics, he was helping to usher in a world of multicultural pluralities. In this (brave?) new world of pluralities, even the bodies and identities of children are at stake. What sorts of children will come from a world in which the forms of family life are multiplying side by side with novel child-machine images? The future holds new ways of inscribing the body with desire, and the uncertainty of what lies ahead means the end of thinking in terms of Oedipal and Electra complexes, and of how maturational stages in different cultures are manifested. Childhood, adolescence, and adulthood in Western culture will be reinvented once again. Perhaps we are harvesting lessons about children and humanity we have been taught by history (e.g., in the work of Phillipe Aries) and imagined in science fiction (notably in Arthur Clarke’s *Childhood’s End*).

Suppose we ask with literary theorist Richard Doyle if Timothy Leary and Francis Crick were speaking the same language. The language of information becomes a locus of the organic and the machinic enfolding each other helically, and the result is that sometimes replication explodes. Doyle perceptively infers a Nietzschean joyous science

(or science of joy) from life as information. He comes very close to embracing my claim that the best science is practiced as and within anarchistic social formations. And if life emerges at the edge of chaos, we may as well say that it emerges at the edge of information, that life is informatic and that bodies are at once and already bodies of information. It is a relatively short step to recognizing where the “feeling” for the cyborg comes from; embodiment is necessary for learning emotions. The possibility of “peaceful collaboration” between humans and “artificial entities” is dependent on the cross-species communication of the “caring emotions” (especially compassion, empathy, and sympathy). We are at the threshold not simply of understanding the conditions for relating to machines but to other humans and to the Other (whether fellow human, robot, alien, or animal).

There is another contender besides the body and information as we consider how to describe our era: The Age of the Social. Researchers across the full spectrum of intellectual life are haunted by the shadow of the social. They must turn around and face this terror squarely (as all of us must do) to ground embodiment and body in social discourse and social practice. We and everything we invent and discover are socially constituted, for there is no other way to make our worlds than through our interactions with each other as socially constructed selves on planet Earth. Here is where we will find the re-solution of the mind/body and mind/brain problems. The turn to the body is a significant reply to the mistaken focus on brains and genes as the seats of our humanity, our creativity, our consciousness. It is not brains and genes that learn and act, but an integrated informatic entity that erases the boundaries between brain and body. We socialize this informatic entity, not selves or persons or individuals in the classical senses of these terms. We “inform” this entity. Some move in this general direction is necessary if we are going to overcome the cults of the brain, the body, and the gene. The trick is to do this without inventing a cult of the social. The following chapters will provide a foundation for materializing these ideas in the Restivo-Weiss model. For this iteration I will in the end do more pointing than actually achieving this goal in full.

Globalization, as a practical expansion of the ecumene, is a function primarily of the pragmatics of expanding markets through economic

intimidation and warfare. This movement is also grounded in the mutual interpenetrations of east, west, north, and south by links of communication, exchange, and transportation. This is a narrative about the construction of new world orders but also about the construction of new bodies, new selves, new worldviews, new ways of classifying and categorizing who, what, and where we are. The informed body – the body information – is one of many informational vectors along which the world's cultures are moving in a multicultural dialectic of people and things in motion. It should not be surprising then that “circulation” has become one of the key ways of dealing with the fact that the logic of flows apparently trumps the logic of structure. We may, however, be dealing with a flow/structure duality that it is dangerously tempting to think of as loosely analogous to the wave/particle duality. This may be a useful heuristic but we must be careful not to reify flows and circulations as something more than themata, schemas, or paradigms. In any event, the dynamics of bodies and information, the movement of our most fundamental systems of classification, and the fluidity of cultural boundaries will continue to place challenge after challenge into our public and private agendas. The arena of science, technology, and public policy is challenged to change its dimensions and rules of engagement.

The Social Brain

Brothers (1990) introduced the concept of the social brain as a neural region of the brain. This is a significant shift in the history of brain studies away from an individualistic biology-centered view of the brain (apparent also in theories about “theory of mind”). Brothers proposed the idea of the social brain in the wake of nonhuman primate studies from as early as the 1950s that demonstrated a relationship between social complexity, social intelligence, and brain size. One of the earliest statements on this link was made by Chance and Mead (1953). The social intelligence hypothesis, an early version of the social brain hypothesis, was formulated by Jolly (1966) and Humphrey (1976). The first prominent appearance of the term “social brain” appears to

be as the title of M.S. Gazzaniga's 1985 book, *The Social Brain*. His view of the social brain has prevailed into our own time and it is the view criticized by Geertz. Gazzaniga conceived of a serial causal nexus in which biological and cultural parameters are linked. On this view, causal forces arise at the biological level and progress through the social and cultural levels to become manifested in behavior. The first use of the term "social brain" to my knowledge occurs in an unpublished and undated manuscript by the psychologist B.I. DeVore, "Primate Behavior and Social Evolution" (Geertz 1973: 68). Geertz anticipates the network model of the social brain, arguing that biological, social, and cultural parameters are reciprocally interrelated and conjointly networked. More recent concepts are more wholistic than Brothers' original regional view (e.g., Dunbar 1998; Dunbar and Shultz 2007). The "nexus" version of the social brain treats biological, social, and environmental factors serially, with biological ones having causal priority. In the "network" model suggested by Geertz (1973: 73; cf. Restivo and Weiss 2014: 69; and see the appendix for the latest version of that model), these factors are considered to be interrelated and to function conjointly with environmental factors (Jakob von Uexküll 1957; and see Thomas A. Sebeok 1976).

The perspective I develop on brain and mind in this book reflects my commitment to the positions defended by anthropologist Clifford Geertz and literature professor Mary Thomas Crane. Geertz has argued for the synchronic emergence of an expanded forebrain among the primates, complex social organizations, and at least among the post-Australopithecines tool savvy humans, institutional cultural patterns. This recommends against treating biological, social, and cultural parameters as serially related in a causal nexus. Rather, these levels should be viewed as reciprocally intertwined and conjointly causal. Crane's position is that biology engages culture and produces mind on the material site of the brain. These two positions are consistent with ideas about the social brain that have been in ascendance since as early as the middle of the twentieth century in the life and social sciences, and in philosophy. Those adumbrations began to crystallize into a social brain hypothesis in the 1990s and there is enough support for this hypothesis to now speak in terms of a social brain paradigm.

In order to talk about the brain, I am going to rely on what brain specialists, students of the brain, especially neuroscientists, know about how the brain works. This is a field driven to a large extent by statistical successes and technological fireworks that should not be easily dismissed or reduced to insignificance. There are, however, serious explanatory gaps in the efforts to understand the brain and especially in efforts to understand the relationships between brains and behaviors. I will draw on what I have reason to believe is the best of the research in brain studies. Mind is at issue too, of course, as are thinking, consciousness, and mentalities in general. The brain industry has already provoked the emergence of neuroscience skeptics sensitive to precisely the kinds of issues and problems I draw attention to here.

In order, then, to increase the probability *here* that I might find something interesting and useful to say sociologically about the brain, I am going to focus on social life as interaction rituals (IRs) and interaction ritual chains (IRCs). It is important to pause for a moment here in order to stress what this approach means for the taken-for-granted ideas about and experiences of the individual self. Nietzsche called the “I” a grammatical illusion. Durkheim located individual consciousness in the collective consciousness. The implication here cannot be stressed strongly enough: the individual (or better, the individuated person) is socialized from the outside in by society (a set of social experiences). Actually, the Restivo-Weiss model is interactive to such an extent that it erases the inside-outside distinction. In practice, however, social inputs prevail and are the easiest to access. This is why education and social work trump genes as social change agents. We carry these experiences within; indeed, we *are* these social experiences. IR theory implies that socialization is ever ongoing throughout our lives. Socialization has a distinct programming aspect. It is more or less approximately unidirectional and homogeneous as a function of the complexity and diversity of the given society and culture. The greater the complexity and diversity of the society and culture (in general terms, the more open the sociocultural system), the more multidimensional and heterogeneous the socialization process. The more multidimensional and heterogeneous the socialization process, the greater will be the individual

person's sense of free will. This doesn't mean that one's behavior escapes lawfulness, only that it escapes (like any open system) determinism.

IRC theory draws us into our motives moment by moment, situation to situation, and proposes to explain in the limit what any individual person will do, think, and say at any given moment. This is no more ambitious, nor differently limited, than what the physical and natural scientist expects when s/he goes searching for predictions and laws in complex open systems.

Let's pause briefly to examine in nontechnical terms the significance of ritual, IRs, and IRCs in our everyday lives. Belonging and connection in social groups are essential features of the human condition. Rituals are repeated patterns of social behavior that are the machinery behind sustaining our attachments to social life. Habits are individual routines that may or may not reflect cultural patterns; they can be idiosyncratic; and they can play a role in self-solidarity rituals. IRs are patterns of behavior between human beings that contribute to sustaining social life in ways that are so ubiquitous and ordinary that we are barely aware of their functions. Examples are a good night kiss, a nod to someone you pass on the street, and saying hello and goodbye. IRCs are the linked sequences of IRs that glue the everyday into the social realities of family, village, community, and society.

Bringing sociology into the already interdisciplinary field of brain and mind studies promises to change the nature of theories about how the brain works and what the mind is as well as impact the applied mind and brain sciences. That change may not be as great as it would be if sociological (or more often "social") thinking had not already infiltrated the other disciplines. And it is already the case that sociologists have begun in increasing numbers to take on the challenging problem of the brain in the wake of a traditional concern with the sociology of mind.

We cannot meet our objectives in this era of hybridizing disciplines, categories, and classifications without exploring the possibility of mutually grounding social and biological mechanisms. We need to put ourselves on a new pathway to a new understanding of the brain as a social-biological hybrid and to reconstruct mind as embedded and extended (building on the recent contributions of Noë and Clark as

well as the classical contributions of Durkheim and G.H. Mead). We will in the end have to leave sociology, biology, and philosophy behind and remake the landscape of sociocultural theory in terms of a theory of social ecologies. The result will be something like natural philosophy but relevant to the twentieth-first-century knowledge base. The physical sciences have a role here but it is more limited than its ideological power would lead one to believe.

To the extent that I have helped uncover at least a pathway to a solution of the perennial mind/brain/body problems and paradoxes, it is because I have identified the appropriate resources and properly mobilized them. Like many or most innovations mine are enmeshed in a network of multiples; the ideas I champion here are “in the air.” In another era, I might have made reference to an emerging zeitgeist. The results are graphically illustrated in the Restivo-Weiss model, which appears later in this book in a second iteration (see Appendix 2).

All life forms are associated with and co-evolve in distinct ecological habitats; their worlds are structured around different degrees of freedom. The animals who are our closest living primate “relatives” on the evolutionary stage, chimpanzees, along with other primates, live in highly structured communities; they occupy social worlds. Monkey social worlds are less complex than chimpanzee social worlds; and many other animals live in more or less tightly coupled, more or less complex social groups. The great apes, or the Hominidae, form a taxonomic family of primates, including four extant genera: the chimpanzees with two species; gorillas with two species; humans with one species; and orangutans with two species. But the degree of structure and social organization increases to higher and higher levels as we move across the evolutionary landscape to the worlds of the Hominidae. Human societies possess the most sophisticated and complex social and cultural systems.

Consider what is involved in assigning a piece of paper a monetary or exchange value. The value assigned to the paper is not intrinsic but imposed on or assigned to the paper in the context of social practices and discourse communities; social institutions are charged with assigning meaning to objects. Think about what happens when you get off a plane from New York and you land in, for example,

Belgium. Your US dollars no longer carry intrinsic value or meaning. They do retain an exchange value to other currencies but not to everyday goods and services. The symbolic change is less apparent when US citizens go to Canada. If the exchange rate is at par, the US dollar will be widely accepted in lieu of the Canadian dollar. The paper doesn't change in any material way but the symbolic change is just as real as – indeed *is* – a material change. This is the sort of thing Durkheim had in mind when he argued that social facts are real. When you exchange dollars for euros you move from one social world into another social world. This move is material in two senses, one physical and one sociocultural (including movement from one symbolic reality into another symbolic reality).

Toward a Sociology of the Brain

Let's look now against the background of the previous sections of this chapter at the foundations for a sociology of the brain. The provocation for a sociology of mind is transparent; it is the fact of a tradition in the sociology of mind. The provocation for a sociology of the brain is less robust. Immediately I look to DeVore on the "social brains" of primates, Geertz's remarks on the brain, mind, and culture (and especially on the brain as a cultural construction), and Brothers' sociologically inspired perspective on mind and brain. I will be writing in a space where the distinction between mind and brain can be readily conflated but my long-term objective is to make clear the need for a clean demarcation and clean meanings.

The 1990 song "The Emperor's New Clothes" by recording artist Sinéad O'Connor has the same general message as the original fairy tale. The song ends with the lines "through their own words /they will be exposed /they've got a severe case of /the emperor's new clothes." We have seen that many if not most philosophers and neuroscientists who invoke the social do not know how to mobilize it theoretically and so tend to argue that consciousness is caused by brain processes. There is a great deal of evidence that counters this brainist, neuroist conclusion if

we look at neuroscience research through the lens of sociological research and theory. Approaches to mind and mentality in general center on the brain. Mentality is viewed as either caused by or identical with brain processes. Searle is one of the most prominent philosophers who has consistently argued that consciousness is caused by brain processes. We will see as we proceed why this claim that has seemed so reasonable for so long must be reconsidered in light of what we know about the relationship between social life and consciousness, and what we are learning about social life and the brain.

Just as one can internally differentiate subsystems within systems, creating a new, self-encompassed “system-within-environment,” so too can one expand out from a designated system to embrace part of the environment into a new “super-system.” This expandability is key to the model I am leading up to, where after looking at subsystems of a nervous system within the larger system of an individual body, one can expand the scope of analysis to the interconnections between multiple bodies/people delineated as a social supersystem. This represents both complexity and emergence.

It is now more than twenty years since President G.H.W. Bush’s announcement of the “Decade of the Brain.” The brain and the neurosciences have been engaging the public since that time with popularizations of brain research often reported using colorful results of brain scans. Why are scientists and the public so mindful of the brain?

Our contemporary neuroculture was foreshadowed and perhaps to some extent provoked by the publication of Patricia Churchland’s *Neurophilosophy* in 1986, credited by some observers with contributing to the generation of a host of disciplines carrying the “neuro” prefix. Let us not forget that this foreshadowing is itself foreshadowed in the ancient efforts to divorce mind from flesh, in the cybernetics revolution of the early twentieth century (adumbrated in Plato’s *The Alciabades* and Ampere’s use of the term “cybernétique” in 1834), and in research on artificial intelligence.

Emboldened by colorful images of the brain produced by scanning technologies, neuroscientists and their ideologues in philosophy and the media have established themselves as the latest arbiters of the nature of mind, brain, self, society, and culture. They have added a new voice to

the chorus of philosophers and social scientists who have been engaged in an endless combat over whether “free will” is real or not. There are many respects in which the industrialized West is still burdened by concepts of the self that are more medieval than modern or postmodern. In general the most pervasive view of the world we see is that it is populated by single persons. These atomistic individuals and in particular their brains are the source and the objects of our words, our thoughts, our emotions, our perceptions. Each of these individuals is, in the same way we ourselves are assumed to be, centers of self-consciousness whose activities are governed by reasons, and freely willed decision making. These individuals have souls or core identities that are the center of a coherent and continuous self-narrative. Some observers, unaware of the challenges to self-identity, free will, and individually centered minds, thought, and consciousness already mounted in the social sciences and in some corners of philosophy (consider Nietzsche here), see the neurosciences as a new challenge to our “folk psychologies” and “folk sociologies.” Among the many curiosities about this neuro-culture is the idea that this is the first time that conventional ideas about morality, responsibility, and free will have been challenged. It may have been easy to ignore the challenges coming from the “soft” social sciences but it is impossible to ignore the “real scientific” challenges of the neurosciences embodied in their brain scans.

Culture is not merely an influence on the brain, cultural resources constitute mentalities. We don’t willfully think; what we think is given to us in what we say (or write) and in our postures. The cultural constitution of mentalities is ethnographically revealed in what we actually do when we reason or think. In the most general sense, mentalities are about information searches and *informed acts*. Anthropologists have long abandoned the theory that mentality is genetically prior to culture. As evolution unfolded, social activities, symbols, and technologies emerged and crystallized into social institutions that molded humanity, enhancing the survival of the species and constructing its actualization at the level of the self. The human nervous system has always been a function of its inextricable connection to culture. Thus, when we view brain scans, we are not viewing the autonomous internally generated workings of “the” brain but rather of

a system responsive to and in co-evolution with culture. When we “read” brain scans, we are reading the body/brain’s participation, in that moment, in its world – that is, its participation in the collective actions and with the various cultural artifacts in its surround. The mind is inescapably embedded in and thus coextensive with its world. What we should be seeing in brain scans is a body’s participation in public structures. What neuroscientists tend to see is documentary evidence for a wider cultural belief that the individual is essentially autonomous and the brain is the sacred vessel of autonomy. I review some of the reasons to be suspicious of brain scan research in the bibliographical epilogue.

Can a postmortem study of Einstein’s brain provide clues to the cerebral processes underlying genius? What such studies eventually revealed was that there was significant enlargement of the gyri comprising the parietal association cortices, suggesting variation at some early stage of cerebral ontogeny. The neuroist conclusion is that this may reflect an extraordinarily large expanse of highly integrated cortex within a functional network – a notion consistent with the idea that variations in axonal connectivity may be a neuronal correlate of intelligence. Einstein’s brain, researchers report, exhibits greater complexity and convolution than “normal” brains. First of all, the “normal” brain in this case is a construction from fewer than one hundred brains. More importantly, why isn’t it obvious to the Einstein brainers that these connectivities and complexities were – or could have been – produced in Einstein’s lifetime by his actions and were not there at birth predetermining his intelligence? It should be obvious that such complexity and convolutions could not in fact have been there at birth, so the neuroist assumption must be that they were bio-genetically preprogrammed. And how intelligent does Einstein appear to be when we examine his views outside the arenas of math and physics? Here, in his views on politics he is romantically humanistic, in his views on religion he is naively humanistic, and in his views on the history of science he simply often goes awry on the big questions (such as why modern science emerged in the West and not in China). How do all those complexities and convolutions come into play in these arenas?

Is there a more constructive way to think about brains and intelligence? Consider, for example, Mary Thomas Crane’s approach

to Shakespeare's brain. Crane, of course, does not have (or need as it turns out) a physical postmortem brain to work with. On page 1 of her book, *Shakespeare's Brain*, Crane begins by posing the question, "Did Shakespeare have a brain?" She explains this admittedly odd question by pointing the reader to Foucault's "What Is an Author?" In this essay, Foucault redefined the author as a function of discourse, variable, and complex. That question seemed odd when first posed, now the brain question is the one that seems odd. Keeping in mind (or in brain, or in body!) that traditionally it has been assumed that Shakespeare had a mind, we now want to focus on his brain. Crane, in fact, proposes to look at the brain as a material site for producing in this case dramatic works. And of course, as Crane writes fourteen pages into her text, Shakespeare "must have had a brain."

If, as some students of brain and mind have assumed, mental phenomena are features of the brain and central nervous system certain ideas about how we experience the world follow. Consider the example of pain. The sociological analysis of different degrees of social solidarity and the social construction of individuality suggests a culturological conjecture on pain: the extent to which a person feels pain depends in part on culture and in particular on the nature and levels of social solidarity in the person's social groups and contexts. The symbolic meaning of the pain experience is a significant factor in determining "felt" pain. Pain has a context of use and a grammar. Related conjectures are found already in Nietzsche in *The Genealogy of Morals*, and notably in Wittgenstein's *Philosophical Investigations* (1953). For the contemporary social science behind these claims see Narayan (2010), Callister (2003), and Incayawar and Todd (2012).

Scarring ceremonies are features of many cultural traditions around the world. In traditional cultures they tend to be associated with rites of passage and solidarity rituals. The person being scarred shows clear evidence of experiencing pain but the pain is moderated by its cultural significance. For the outsider, such pain would not be tolerable. For the outsider, there is no cultural buffer between the instruments of pain and the nervous system. Scars signify for the insider but they do not signify for the outsider and that makes all the difference in the intensity of the

felt pain. Walsh et al. (2008) give an example of how culture written small can impact felt pain.

Imagine two small children fall down while playing in a park. Each child turns to his/her mother. One mother glances at her child and nods giving the child the message, "You're fine, get up and keep playing." The second mother runs to the child, fusses over him /her and removes the child from the play area. Two different lessons about pain have been learned. For one child, the dominant affective response to pain involves an adult fussing over him/her and withdrawal. For one child, pain is a momentary interruption of activity and does not involve being fussed over by an adult. The amount of discomfort and felt pain will be different for each child given the same level of pain registered by the nervous system (assuming it is possible to measure that independently of the mothers' actions).

Some philosophers have in recent decades been coming around to the realization that human beings and culture need to be taken into account in brain and mind studies. More generally, we have seen more and more brain students recognizing the potential relevance and value of the social sciences in brain and mind studies. This recognition is spreading very slowly within the neurosciences and even more slowly into the public arena.

Headlines assigning agency to the brain have been a prominent feature of our media landscape for almost three decades, with the brain being credited for everything from creating God and generating our personalities and emotions to making moral decisions and playing chess. Consider the following newspaper headlines:

NEUROIMAGING OF BRAIN SHOWS WHO SPOKE TO A
PERSON AND WHAT WAS SAID
BULLYING TENDENCY WIRED IN BRAIN
MILKSHAKE STUDY REVEALS BRAIN'S ROLE IN OBESITY
BRAIN CELL THAT MAKES YOU LAUGH – FOUND
BRAIN'S COUNTING SKILL "BUILT-IN"
HOW DOES YOUR BRAIN TELL TIME?
FEWER BRAIN "TANGLES" MAY MEAN SMARTER OLD AGE
SCIENTISTS IDENTIFY BRAIN'S "HATE CIRCUIT"

OLD ACCIDENT POINTS TO BRAIN'S MORAL CENTER
HOW THE BRAIN "CREATES" GOD
PARTNERSHIP [BETWEEN THE UNIVERSITY OF WESTERN
ONTARIO AND YORK UNIVERSITY] EXPLORES HOW
BRAIN "SEES" WORLD

The brain frenzy has been fueled by brain imaging technologies such as PET and fMRIs. Neuroscientists are – or should be – cautious about linking laboratory correlations to the possible neuronal causes of complex human behaviors outside the laboratory. Not only that but the process of constructing these images is not at all straightforward and engages potential flaws at many points. Lay ignorance, popular ideology, and media hype nourish the idea that we are our brains. And this idea is behind the cottage industry of analyzing the brains of celebrated personalities from Lenin to Einstein for clues to political and scientific genius. These facts are grounded to one degree or another on the metaphor of the brain in a vat. That this idea could ever be taken seriously is a testament to the capacity that philosophers, theologians, and their company have for embracing the implausible, the impossible, and the incoherent.

The implausible can only prevail for so long in a world of more or less free inquiry, that is, sustained inquiry unfettered by direct political or ecclesiastical control. Philosophers and neuroscientists have begun to acknowledge that "the other" and "culture" must play roles in what the brain "does." The prevailing view, reflected in professional research, journal articles, and public lectures, is still that the brain is logically and genetically prior to society and culture. If we adopt that position, we will be prompted to focus our attention on genes and neurons in accounting for human behavior. I showed earlier why genes cannot carry the full burden of explaining what we do and think. Neither can neurons. What is required is a social brain.

It is easy to see the difference between a social neuroscience and a sociology of mind (and brain) by looking at the works of sociologists of mind. But neither classical nor contemporary sociologists are close to the center to the emerging social study of mind and brain. Certainly the brain has not yet attracted a substantial core of sociologists.

A sociology of brain, a more general social theory of brain constructed outside of sociology per se, and ultimately an interdisciplinary hybrid socio-neuro-biological theory of brain promises dramatic changes in how we understand the brain. It is not only a new understanding of the brain that is at issue here. There are dramatic practical implications of a social understanding of the brain for dealing with mental illnesses and strokes, and with the brain in health and illness more generally. The approach I adopt in this book also leads to a new theory of socialization. Socialization is causally linked to all the systems and subsystems of the body in society. The very idea of a sociology of the brain is a radical departure within sociology even given the era of science studies that has given us sociologies of mathematics, logic, and god.

What is it with the Brain These Days?

I take the subheading here from the title of a conference held at Oxford University in December 2010. The theme of the conference was “the rise of the brain and the emergence of the brain industry or ‘neuro markets.’” The organizers’ aim was “to explore how, why and in what ways the figure of the brain has come to permeate so many different areas of thinking and practice in academic and commercial life.” Their concerns were broad, embracing the consequences of the brain industry for the academy, business, commerce, and policy. This conference suggests the significance of attending to questions of the brain in the context of society and culture. And yet my interventions were taken to be “too sociological” even by the sociologists in the audience. A more recent conference demonstrates why it is important for sociologists to put the brain on their agenda.

A panel at the October 2012 joint meeting of the Society for Social Studies of Science and the European Association for the Study of Science and Technology was given the title: “Neuroscience as a Science of the Social?” The very idea that we have to ask if neuroscience is becoming or is a science of the social should give sociologists pause. Can you imagine posing the question “Is neuroscience becoming the

new science of the physical or more plausibly the new science of the biological, of life?” Of course not. The reason is that we already have sciences of the physical and biological with robust profiles in the science landscape: physics and biology. While some of us work within a discipline, sociology, that we know should have a robust profile in the landscape of the sciences as the science of the social, that is not yet the case. I am not claiming that sociology has the same level of scientific robustness as physics or biology, only that it has a sufficiently robust profile to warrant greater attention from the scientific, lay, and policy communities.

It is becoming increasingly clear that the brain depends on cultural resources to operate, and that the brain is constitutively a cultural object. Primatologists have been talking about their subjects as literally having social brains at least since the early 1970s and less explicitly since the 1950s. Now we can say that this is characteristic of the human primate.

The brain in a vat metaphor that burdens the brain sciences is part of a rejection of the flesh that motivates the “pure” sciences, and in particular the pure science in extremist, logic. Parmenides is a good place to root the genealogy of that specific intellectual misadventure that seeks to escape the world (see Nye 1990 and the discussion in [Chapter 8](#)). Parmenides speaks for a world without women, sexual generation, fertility, change, emotions, and flesh. Parmenides still stands astride the worlds of logic and poetry even as he strives to release logic into the heavens. Aristotle and Plato speak for a masculine culture divorced from the life of the household. By the Middle Ages, a patristic Church had become committed to the absolute authority of a transcendent male god, an exclusively male priesthood, and a theology that equated women with sin and evil (see Armstrong 1986 on Christianity’s creation of the West’s sex war; and Stone 1976 on the patriarchal re-imaging of the Goddess as wanton and depraved). And in early modern Europe, the German university emerged as a male sanctuary where men engage in symbolic mortal combat to achieve status, power, and privilege. The history of logic and the history of the brain sciences are linked to the extent that they aspire to a mode of inquiry that escapes the gravity of flesh and world. If we understand the cognitivist approach in the brain sciences as a form of brains in a vat thinking, we can start to see that they share in the logicians’ lifeless innovations in theory and modeling.

Turing, one of the primary progenitors of the modern Parmenidean vision, created and then recreated the Turing test in a way that furthers the de-fleshing of a world out of time, space, history, women, and culture. The Turing test was originally designed to compare the minds of men and women. In the end, the test pits man against machine.

I can now offer a heuristic strong programme in, or a paradigm for, the sociology of the brain. The tenets of the strong programme in the sociology of the brain are the following:

The brain is a subsystem of the body;

The body is a social structure always, everywhere, and already embedded in a social ecology/umwelt;

It is the body ("the social body") that expresses thoughts in words and accompanying postures;

It is the body that is aware;

The originating locus of thinking is the social network;

The social network expresses itself through the voices of its members;

The body is the vessel through which thoughts are expressed;

The body is socially programmed for thought, emotions, and consciousness.

The programming process involves the following sets of input systems:

social inputs from IRs and IRCs;

environmental inputs from the surrounding world;

systemic inputs from within the system;

These three systems are interpenetrating and reciprocally coupled;

Inputs and outputs in the complex body/mind/culture/social ecology/umwelt system can in principle be described in terms of information flows;

The body is a receiver and a transmitter;

IRs and IRCs are transmitters and receivers.

Operating Principles:

- a. when faced with explanatory and causal options always privilege the material alternative;

- b. *cherchez le chair et l'erotique*;
- c. eschew the pursuit of secure locations.

It is important to reiterate what I wrote earlier. Culture is not merely an influence on the brain, cultural resources constitute mentalities. Thinking and emotions are dependent on and functions of access to a stream of externally generated stimuli. To reiterate, stream of consciousness is co-terminus with stream of affordances.

Thinking is a public matter. I have drawn the further implication that thinking is not “willed,” but automatic (cf. Geertz 1973: 77; and see the literature on automaticity, e.g., Bargh and Ferguson 2000; philosophical and literary defenses of this view can be found in Paul Feyerabend and Mark Twain among others; and see Crane 2000: 18–19). The “stream of environness” (affordances) is the fuel for the stream of consciousness, and provides the resources that generate thought activity. What we think at any moment – what thoughts we become aware of and then which ones we utter – depends on the social context we are locked into at that moment. This is complicated by the way current social contexts are related to prior social contexts and how those social contexts intersect and interpenetrate at the level of our memories. Social contexts open and close editorial valves that allow thoughts to percolate up into our awareness and additional culturally manufactured filters determine what we actually say or write.

Neuroscientists are identifying neurons that “make us social” and discovering the social from the inside out. How are social neurons – mirror and von Economo neurons – linked to social life? The trick here is not to fall back on a co-evolution model of brain and society but rather to understand the complexly evolving unit as the brainCNS-bodilyorgans-socialbody-IRCs in the context of a social ecology-umwelt; this unit evolves as a multi-part system. Each part of the system is independent to varying degrees and subject to progressive changes and endo-pathologies, pathologies generated from the inside out dialectically. And just like different parts of the brain evolve at different rates, so all parts of the unit can evolve at different rates.

The Social Brain: Implications for Understanding and Treating Brain and Mind in Health and Illness

Based on the “enriched environment theorem” (cf. Jacobs and Scheibel 1993; Jacobs et al. 1993), professions dealing with mental health can be defined as enriching environments. The implication of the social brain model and the enriched environment theorem is that the social sciences have greater relevance for the brain and mind sciences in theory and practice than is generally recognized. To the extent that the social sciences are already an integral part of these sciences they tend to be intuitive and not connected to the most robust social science research and theory. Notable social factors at work in the social brain that are not widely understood outside of sociology and anthropology include IRs and IRCs. When psychiatrists, psychologists, and neuroscientists speak of “social factors” they normally have in mind social categories such as class, sex and gender, ethnicity, age, and so forth.

The social brain hypothesis has already been identified as an important consideration in the mental health professions (for psychiatry see Kandel 1998; Charlton 2003; for psychotherapy, see Orlinsky and Howard 1986; for autism spectrum disorder, see; Pelphrey et al. 2011). This literature viewed through a sociological lens can help us to clarify the distinction between brain and mind and if it doesn’t solve the “mystery” of consciousness it puts us on the path to a solution (Whitehead 2008).

Thinking in Networks

Today almost every aspect of life for which data exists can be rendered as a network. Financial data, social interactions, biological ecologies, weather systems, electrical systems, all are visualized as links and nodes, as lines connecting dots and boxes. A network visualization of a corporate infrastructure could look remarkably similar to that of a

terrorist organization. In *An Aesthesia of Networks*, Anna Munster (2013) argues that this uniformity has flattened our experience of networks as active and relational processes and assemblages. She counters the “network anaesthesia” that results from this pervasive mimesis by reinserting the question of experience, or aesthesia, into networked culture and aesthetics.

Rather than asking how humans experience computers and networks, Munster asks how networks experience – what operations they perform and undergo to change and produce new forms of experience. Drawing on William James’s radical empiricism, she asserts that networked experience is assembled first and foremost through relations, which make up its most immediately sensed and perceived aspect. Munster critically considers a range of contemporary artistic and cultural practices that engage with network technologies and techniques, including databases and data mining, the domination of search in online activity, and the proliferation of viral media through YouTube. These practices – from artists who “undermine” data to musicians and DJs who use intra-networked audio and video software environments – are concerned with the relationality at the core of today’s network experiences.

Informing the Brain/Mind/Body/ Culture System

Let us remember here that the Platonic desire to free us from body and sex, and its offshoot desire to machine children without women is a ruggedly masculine logic. The challenges to traditional ways of thinking about nature and society, humans and machines, and data and flesh threaten the very idea of science and therefore the meaning of “science and public policy.” It is tempting to seek meta-political solutions to our “science and society” dilemmas such as those proposed by the French philosopher Bruno Latour. The lessons Latour draws from science studies about the nature of science, especially that we need to think in terms of sciences and not science or Science, are ignored at our peril. To imagine, however, that it is still possible to think philosophically and

metaphysically about democratic institutions and to seek solutions in constitutional and parliamentary metaphors that violate the realities and complexities of our social and cultural moments and movements cannot be sustained in a new world of flows and circulations. Latour's work (and the scope of his influence) demonstrates that we have not yet pushed past the limits of philosophy and metaphysics as modes of inquiry and action. Our more immediate concerns must be with a world at war. While we were waiting for nuclear bombs to announce World War III, it engulfed us without mushroom clouds and radiation catastrophes but rather through explosions of terror, ecological catastrophes, and economic collapses. There is no guarantee we won't annihilate ourselves in the variety of warfares that signal worldwide changes in political economy and ecology. But with some sort of future awaiting us for the moment, we are starting to construct the latest creation myth, and this one begins as follows: "In the beginning was INFORMATION."

The writing is already on the wall; we are not going to get at the nature of the brain or mind without a collaborative effort across the full spectrum of the sciences. But this collaboration will fall short of a full-fledged understanding of brain and mind to the extent that the social sciences are left off the spectrum or relegated to its peripheries. Sociologists and other social scientists should be more assertive about their achievements and about the importance of adding their voices to the emerging interdisciplinary matrix in brain and mind studies. The claim in a nutshell is that human behavioral repertoires emerge from the complex parallel and recursive interactions of genes, neurons, neural nets, organs, biomes, the brain and central nervous system, other elements of the body's systems and subsystems down to the molecular level, and our social interactions in their ecological and umwelt contexts. This implies that we need to re-think socialization. It is a process that simultaneously informs and variably integrates the biological self, the neurological self, and the social self to construct personality and character.

The special tools and theories of sociology and anthropology already include ideas about the origin of consciousness and add an important voice to the network of proponents of the social brain hypothesis/paradigm. One does not have to defend a disciplinary imperialism to

realize that sociology in particular brings to the table empirically grounded theories and hypotheses that are more robust and scientifically viable than the procrustean efforts of physical and natural scientists to reinvent the wheel at the inappropriate levels of neurons, neural nets, ephemeral distributive phenomena, and quantum physics. Let there be no misunderstanding. I am an advocate and agent provocateur for sociology; but the imperative I champion is to pursue all avenues of research from the disciplinary narrow to the interdisciplinary broad in the face of one of the greatest set of problems humans have faced in the unfolding of our collective inquiries – from genes and brains to local ecologies and the global bio-ecosphere.

The brain is at the center of key questions in today's humanities, arts, and sciences. Anthropologists such as Joe Dumit and Robin Dunbar, an evolutionary psychologist and anthropologist, have already made significant social science contributions to brain studies. There have been some contributions to the sociology of mind and brain and to the field of culture and cognition (by Nikolas Rose, Karen Cerulo, Eviatar Zerubavel and others); earlier pioneering efforts in cognitive sociology were made by Aaron Cicourel. Many of these efforts are carried out in the shadow of biological imperatives and perspectives. The late Susan Leigh Star studied localization in the neurosciences in the context of a classically sociological perspective. Her work presaged the emergence of the hybrid neurosciences. A prominent scholar in science and technology studies, Star's work adumbrated STS brain studies that began to crystallize in the late 1990s. What can we say about STS, social science, and the future of brain and mind studies? The problems that loom for STS scholars are to figure out what is at stake in pronouncements about the brain, and what the consequences are of dragging "the brain" to one side or the other of the nature/culture and biology/society divides. The potential contributions of STS are being undermined due to the perennially porous boundaries of the discipline. As typical STS problems and perspectives migrate to other interdisciplinary fields of study (most generally the interdisciplinary humanities), the sociological content of STS, always weakly integrated, weakens further. The inter-migrations between STS and other fields tend to weaken sociology and strengthen philosophy.

The Social Brain in Evolution

Generally speaking, the social brain claim is that the brain is not an independently evolving organ but rather that it is influenced by biological, social, cultural, and environmental factors. In the prevailing model, represented prominently in classical neuroscience but still alive in social neuroscience, these influences act serially on each other beginning with the biological factors. I pointed out earlier the distinction between this “nexus” paradigm and the “network” paradigm I advocate. Dunbar (1998) complicates the social brain picture by identifying four alternative social brain hypotheses: epiphenomenal, developmental, ecological, and social. The issue here is what accounts for the evolution of the brain. A common assumption in the cognitive and neurosciences has been that the brain evolved in relation to the human need to solve ecological problems and process information. The epiphenomenal hypothesis is that the brain evolves in synchrony with the evolution of body size and the evolution of the brain as a whole accounts for the evolution of the size of brain parts. The developmental hypothesis is similar in general but more specific in identifying metabolic inputs as the crucial factor in brain development. The problem with these two hypotheses is that they identify constraints on brain growth but do not explain the evolution of the brain *per se*. Dietary considerations such as ease of processing and energy-richness may be necessary conditions for increases in brain or brain part size, but ecological and social challenges are the proximal forces behind those increases. Thus, ecological and social “social brain” hypotheses should be the focus of our attention. In this context, dietary, mental maps, and extractive foraging hypotheses have been put forth.

To summarize, then: a primate species will need a larger brain if it is frugivorous, has large foraging ranges, and has to work to extract resources (extract fruit pulp, or hunt evasive species). Social group size can be used as a rough measure of social complexity and we can then show a relationship between brain size and social complexity. The unit of brain evolution is not the whole brain. Brain evolution has been, as Dunbar reports, “mosaic in character;” the various parts of the brain

evolve at different rates and to different extents. In addition, the “spare brain capacity” hypothesis is that brain size evolves beyond that necessary for managing the body’s mechanisms. All of this leads to a refinement of the social brain hypothesis or paradigm. We are moving in the direction of a more wholistic but diversified view of the social brain, a view that looks at the evolution of the whole brain and its parts as functions of social and ecological pressures (Dunbar 1998; Restivo and Weiss 2014: 69). Furthermore, we are probably justified in assuming that the evolution of all systems from molecules to social systems are “mosaic in character” and (following a suggestion by David Moore in a personal communication) follow nonsynchronized temporal pathways.

Summation: The Brain and Human Behavior

My approach to brain and mind emerged during the course of my research on the sociology of mathematics. Traditionally, the locus of mathematical production was assumed (by historians, mathematicians, and philosophers) to be a Platonic realm of ideas, the individual mathematician, the mathematician’s brain, or in some cases the mind of God. These assumptions have been challenged by sociologists of science who since the late 1960s have been drawing attention to the social production and the social contexts of scientific knowledge.

In the case of mathematics, my objective was to offer a sociological alternative to Platonist and transcendentalist ideas by demonstrating the social and cultural grounds of mathematical production and products. Mind and brain are not produced out of or in states of consciousness. The mind is not a product of the evolution of the brain; and the brain is not a simple product of biological evolution. Mind and brain are produced out of cultural resources and in the context of social interactions. A sociological or enculturation theory will not replace but rather enrich contemporary neuroscience’s march to the social.

The fundamental questions we face at the nexus of the brain and social sciences are (1) how does the brain work and what role does it play in human behavior, and (2) what is the nature of the brain in relation to

mind and body? The dominant researchers in brain studies – psychologists, philosophers, neuroscientists, life scientists, cognitive scientists, and literary theorists – have traditionally assumed that individuals, brains, learning, cognition, and affect can be studied independently and in isolation from social, cultural, and historical contexts. Theories about “theory of mind” have also followed the same individualistic pathway. The classical mind/brain, mind/body, brain/body dichotomies have come under increasing critical scrutiny in recent decades but they continue to display significant if diminishing influences on research and theory in the brain and mind sciences. Criticisms and challenges are beginning to pay dividends based on developments in epigenetics, the social brain paradigm, and improvements in our understanding of the evolution of social complexity.

My objective in this chapter has been to add a sociological voice to a literature dominated by asocial disciplinary and interdisciplinary voices. My goal has not been to simply add a sociological voice – this has already been achieved in some small ways – but to add a strong sociological voice that represents sociology as a robust discovering science. Our understanding of the brain and mind as sociocultural productions has been hampered by deeply ingrained mythologies and uninterrogated assumptions about human beings. My contribution to the interdisciplinary conversation on brain and mind is based in part on analyzing the ways in which the generation and interpretations of data in neuroscience are guided by cultural ideologies and presuppositions that mask the influence of social and cultural life on how the brain works, what we mean by “mind,” and what we should mean by “the social.” The latter problem is the greatest obstacle to cross-disciplinary communication concerning the nature, the structure, and the dynamics of sociocultural evolution and the actions of the brain.

A sociological perspective brings these issues and problems into sharper focus than is possible in other social and behavioral sciences or in the life- and neurosciences. The very idea of “the social,” with its stress on how cultural production flows from our social interactions needs to be used with more care and technical sophistication than is the case in contemporary neuroscience and philosophy of mind and brain. I have encountered many social and life scientists who contend that I’m

exaggerating the facts of the matter; they tell me that in fact command of “the social” is widespread and used fruitfully in brain studies. The literature sends me a different message and it is because I have a much more robust conception of the social and a much more positive view of what sociology is and what it has achieved.

I readily admit that the more extreme isolationist ideas are increasingly yielding to more sophisticated relational, interactionist, and context-dependent models and theories about brain, mind, and culture. However, they are still manifested in efforts to locate genetic and brain modules for everything from God and morals to sexual orientation and criminality. I have sought an alternative way to think about brain and mind that emphasizes the crucial role of cooperation and solidarity rituals in creativity, in treating mental illness and brain traumas, and indeed in sustaining our everyday lives.

Research on brain plasticity, neuronal regeneration, and mirror neurons already tends to demonstrate social and environmental influences, especially where one approaches the data with a sociological eye. These developments have increasingly led neuroscientists to treat the brain more like a person – acting, subjective, and embodied. But our goal should be to put actual valuing persons and social networks around and into that brain. Contemporary research demonstrates biological and social influences on mind and brain such as the sculpting of the architecture of the cerebral cortex by social inputs. Socialization in general shapes the essential human attributes of our species; with all of our differences we share certain propensities and abilities. As early as 1980, Maturana and Varela were suggesting an appropriate model in this context that treated the brain as an aggregated system of social and biological systems.

Some traditional students of mind and brain have recognized that we need to acknowledge that brain and mind are social and cultural phenomena without knowing how to realize this in practice or theory. Philosophers and neuroscientists are beginning to recognize that there is something social going on but they don’t know how to access it. Anthropology has already made significant inroads into brain studies. There have been some contributions to the sociology of mind and brain and to the field of culture and cognition, but they still tend to favor and

focus on bio-social and evolutionary psychology paradigms. Though these approaches fail to fully and robustly address issues in society and culture, they are all important to and motivations for my work.

Conclusion: Critique and Renewal

Criticisms of the inward focus of the brain sciences have arisen within the neurosciences themselves. Leslie Brothers labeled this inward focus “neuroism.” Neuroscientists such as Steven Rose have argued that we need to go beyond traditional mind, body, and brain categories in order to avoid obstacles to understanding the brain. Rose has an advantage over many of his colleagues since he is driven in part by Marxist and more generally sociological perspectives. Criticisms of traditions in brain studies have nourished the development of a social neuroscience, neuroanthropology, neurosociology, neuroeconomics, neuroscience and society programs, and social brain projects within the neurosciences. There is no doubt, however, that these hybrid sciences play off the sexiness of the brain in today’s culture and the hype around neuroscience. The social brain paradigm in neuroscience is “social” in a narrow sense. It has not prevented seeking explanations of social behavior in terms of “inside-out” models, explanations that move from brain modules, regions, or neurons and neural nets to particular behaviors. Nonetheless, the positive result of these criticisms is the construction of social paradigms grounded in neuroscience research. These approaches to the social are in the right direction. The prominence of neuroscience in the media and the way it stretches into all corners of human life has provoked a new breed of “neuro skeptic.” However, none of the critics or skeptics draws upon the most advanced ideas in studies of social interaction. First we need to substitute a network of humans with brains for the isolated brain or networks of brains. This is not the same as the idea of a distributed mind. This is a network of fleshy living entities interacting with one another. A network of brains is not just a set of linked brains in a vat. We need to think in terms of interconnected networks of human beings. Some neuroscientists make the disciplinary mistake of treating the study of the social as a biological science. My argument is

that social brain and mind studies needs to be guided by a more robust and technically sophisticated conception of social construction. IR analysis (Erving Goffman) and the IRCs model (Randall Collins) offer brain and mind scientists important keys to understanding human consciousness, and our capacities for thought, emotions, and creativity. My initial working conception of the social brain is “outside-in,” that is, from behavior to the brain, or a correlated co-evolving brain and behavior system. This oversimplifies things in the interest of developing a sociological approach. The argument has to move away from inside-out/outside-in thinking toward the idea of brain, culture, and social life acting in concert and co-evolving but in a mosaic or even kaleidoscopic dynamic. The anthropologist Clifford Geertz was an early champion of the idea that the operation of the brain depends on cultural resources and that therefore mentality is constitutive of those resources.

Critics and skeptics are and should be drawing attention to some of the more problematic aspects of neurotechnologies. Neurotechnologies have become a promising but at the same time sinister part of the emerging neurosociety. The medically promising, though more and less controversial, aspects of neurotechnology (e.g., deep brain stimulation, neuromodulation, brain machine neurotechnologies, neuromorphic chips, and brain mapping) stand side by side with neurotechnologies that are being pursued with primarily military interests in mind (e.g., narrative networks, augmented cognition, and autonomous robots; see notably DARPA’s Grand Challenge prize competition). This is an area of research and development that we would be prudent to monitor in relationship to the precautionary principle and ethical paradigms.

In [Chapter 5](#), I continue the sociology of mind and brain narrative in the context of the rise of the robosapiens.

Bibliographical Epilogue for Chapter 4

The literature in this area has been growing rapidly since the last decades of the twentieth century and is large and diverse. I have been systematically and selectively following developments in the neurosciences

since the early 1990s. Even if it were possible for me to include everything I've read in this field (including neuroscience per se, philosophy and history of the neurosciences, and the variety of neuro-hybrids such as social neuroscience and neurosociology), I couldn't come close to giving the reader a fair representation of the literature. I have been drawn to studies that reveal the social and cultural dimensions of the brain and in particular to research and theory on the social brain. The references in this section are also the foundation for my approach to mentality in social and sociable robots, the topic of [Chapter 5](#). The primary material that drives my perspective on the mind as positive influence and as foil includes D.M. Armstrong, *A Materialist Theory of the Mind* (London: Routledge & Kegan Paul, 1968); J. Astington, "What Is Theoretical about the Child's Theory of Mind?: A Vygotskian View of Its Development," pp. 184–199, and S. Gopkin, "Theories and Modules: Creation Myths, Developmental Realities, and Neurath's Boat," pp. 169–183, both in P. Carruthers and P.K. Smith (eds.), *Theories of Theories of Mind*. Cambridge: Cambridge University Press, 1996. Stephen Priest's *Theories of Mind*, reissue ed. (New York: Houghton Mifflin Co, 1992) is still a good guide to some of the major paradigms in the literature from Plato to Descartes and Brentano. The book has the advantage of unfolding as a narrative with an argument that seeks to dissolve mind-body dualism. Maureen Eckert's edited volume *Theories of Mind: An Introductory Reader* (Lanham, MD: Rowman & Littlefield, 2006) is more recent and includes the writings of major contemporary figures engaged in contextualizing the brain such as Andy Clark, major philosophers such as Dennett and the Churchlands, and readings from classical contributors such as Ryle and Turing. Mikhail M Bakhtin's writings are important philosophical provocations: *The Dialogic Imagination: Four Essays* (Austin, TX: University of Texas Press, 1981); and *Speech Genres and Other Late Essays* (Austin, TX: University of Texas Press, 1986).

The single most important book I read that put me on the road to studying the brain from a sociological perspective was Leslie Brothers' *Friday's Footprint: How Society Shapes the Human Mind* (New York: Oxford University Press, 1997). I wrote to Leslie after reading the book and we exchanged hundreds of emails and had many face-to-face

conversations in Santa Monica on the social brain. On her critique of “neuroism” see Leslie Brothers, *Mistaken Identity: The Mind-Brain Problem Reconsidered* (Albany, NY: SUNY Press, 2001). Equally important was Randall Collins’ “Toward a Neo-Meadian Sociology of Mind,” *Symbolic Interaction* (1989) 12: 1–32. Additional references that have played into my work include the following: M. Cole and Barbara Means, *Comparative Studies of How People Think* (Cambridge, MA: Harvard University Press, 1981); Antonio Damasio, 1994. *Descartes’ Error* (New York: Grosset/Putnam, 1994); J. Goody, *The Domestication of the Savage Mind* (Cambridge: Cambridge University Press. 1977); S. Gordon, “Micro-Sociological Theories of Emotion,” pp. 133–147 in H.J. Helle and S.N. Eisenstadt (eds.), *Micro-Sociological Theory: Perspectives in Sociological Theory* (Beverly Hills: Sage. 1985); L. Levy-Bruhl, *How Natives Think* (Princeton: Princeton University Press, 1985/1926. This book is often misinterpreted; do not depend on others to inform you on what this book is about; C. Levi-Strauss, *The Savage Mind* (Chicago: University of Chicago Press, 1966); Candace Pert, *Molecules of Emotion* (New York: Scribners, 1997); F. Nietzsche, *The Birth of Tragedy and The Genealogy of Morals*. (New York: Anchor Press, 1954/1887); J. Searle, *Minds, Brains, and Science* (Cambridge, MA: Harvard University Press, 1984) and *The Rediscovery of the Mind* (Cambridge, MA: MIT Press, 1992); S.L. Star, *Regions of the Brain: Brain Research and the Quest for Scientific Certainty* (Stanford: Stanford University Press, 1989; Susan Leigh Star was one of the shining lights in sociology and science studies, and a good friend; her untimely death in 2010 was an unbearable loss to all who knew her); J. Valsiner, and R. van der Veer, *The Social Mind: Construction of the Idea* (Cambridge: Cambridge University Press, 2000); L.S. Vygotsky is a major figure in the social psychology of thinking, learning, and consciousness; he is more psychological in this thinking by comparison to G.H. Mead and more popular and better known to researchers interested in the social aspects of the brain: see *Mind in Society* (Cambridge, MA: Harvard University Press, 1978) and *Thought and Language* (Cambridge, MA: MIT Press. 1986); and see Vygotskian J. Wertsch, *Voices of the Mind: A Sociocultural Approach to Mediated Action* (Cambridge, MA: Harvard University Press, 1991); L. Wittgenstein is notable for his anthropologically

inspired philosophy of mind, mathematics, thinking, and emotions: see, for example, his *Philosophical Investigations* (New York: Macmillan, 1953) and especially the sections on experiencing pain. One of the earliest pieces I read that alerted me to the support for my sociologically inspired intuition that feeling and thinking were intimately linked was R.B. Zajonc's "Feeling and Thinking: Preferences Need No Inferences," *American Psychologist*, 1980 35: 151–175; and see his "On the Primacy of Affect," *American Psychologist* (1984) 39: 151–175.

Brain scans have perhaps been the most powerful fuel for the public imagination on brains beginning in the latter part of the twentieth century. The public and media editors have not exhibited appropriate skepticism or basic understanding about brain scans. The increasing caution being exhibited by researchers is not showing up in public arenas. The process of constructing brain scans is complex and allows for a great deal of flexibility. The fact that some neuroscientists may be "torturing" their data and that they use a discarding methodology in order to base their conclusions on selective results will come as no surprise to sociologists of science. There is no relationship between the enchanting nature of brain scans and the information they convey. The general view of these problems has been called "Voodoo fMRI" (see Edward Vul, Christine Harris, Piotr Winkielman, & Harold Pashler, "Puzzlingly High Correlations in fMRI Studies of Emotion, Personality, and Social Cognition," *Perspectives on Psychological Science* 4,3, 2009: 274–290; originally titled "Voodoo Correlations in Social Neuroscience").

I have found Michael Taussig's writings filled with ideas that are at once brilliant, unorthodox, radical, and often unnerving. Taken as a whole his corpus weaves a tapestry that backgrounds my thinking across the "hard cases"; see his Amazon author's page for an introduction to his stunning contributions in the anthropology of everything: http://www.amazon.com/Michael-T.-Taussig/e/B001IR3J02/ref=ntt_dp_epwbk_0.

Finally, if instead of writing about the brain in the context of grounding the "hard cases" in the context of the rejection of transcendence my goal had been to write a book on the sociology of the brain, I would have had to write in the imposing shadow of Roger Bartra's *Anthropology of the Brain* (Cambridge: Cambridge University Press,

2014). Whereas my chapter is programmatic and outlines a perspective, Bartra's book is a full-fledged work in anthropological theory and a brilliant sign that we are moving in the direction of escaping neuroism. However, Bartra's efforts to save free will are forced. He fails to clearly discriminate between freedom and free will; and he opposes determinism and freedom. The key ideas I discuss in the text fix these problems: first, it is crucial to distinguish terms like freedom and liberty from free will; and second, introducing the concept of open systems which operate lawfully but not deterministically solves the problem of opposing determinism to freedom (see David Bohm, *Causality and Chance in Modern Physics*, reissue ed. (Philadelphia: University of Pennsylvania Press, 1971). One of the major neuroscience challenges to free will showed up in the research by Benjamin Libet (see B. Libet, A. Freeman and K. Sutherland, eds., *The Volitional Brain: Toward a Neuroscience of Free Will* (Exeter: Imprint Academic, 1999). The basic result of Libet's experiments was that an unconscious buildup of electrical activity in the subjects' secondary motor cortex preceded the subjects' conscious decisions to act. The average buildup occurred approximately five hundred milliseconds (on average) before the initiation of the action. This change in EEG signals is referred to as Bereitschaftspotential (readiness potential). Unconscious processes precede what appear to us to be voluntary (free willed) decisions to act. A 2008 study found prefrontal and parietal cortex activity up to seven seconds before subjects were aware of their decisions to act: see Brandon Keim, "Brain Scanners Can See Your Decisions Before You Make Them," *Wired News (CondéNet)*, 4/13/2008; and Chun Siong Soon, Marcel Brass, Hans-Jochen Heinze, and John-Dylan Haynes "Unconscious determinants of free decisions in the human brain," *Nature Neuroscience* 11, 5 (April 13, 2008): 543–5. For a philosophical critique of Libet's research, see Daniel Dennett, *Freedom Evolves* (New York: Viking Press, 2003: 231), and "The Self as a Responding – and Responsible – Artifact," *Annals of the New York Academy of Sciences: The Self: From Soul To Brain* Volume 1001 (October 2003): 39–50,

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What I have described as The Age of the Social (the title of my 2017 book published by Routledge), the very idea of society *sui generis* – of social life *sui generis* relative to the physical and natural levels of reality – crystallizes in sociology but at the same time begins to enter the consciousness of a wider population of scientists, intellectuals, and the lay public. It is already entering the intellectual landscape in a definable way in the 1700s. The emergence of sociology and the more general development of an awareness of "the social" is a function of the growth of the industrial technological society, the spread of educational institutions, and the emergence of a cross-cultural, cross-national network of communication, exchange, and transportation from the 1800s on. Today we see evidence of the ascendance of social thinking in traditional philosophy, philosophy of science, the life sciences, and neuroscience. Prominent examples include the works of philosopher of brain and

mind John Searle *The Rediscovery of the Mind* (Cambridge, MA: MIT Press, 1992), and neuroscientist Antonio Damasio, *Descartes' Error* (New York: Grosset/Putnam, (1994). Writing in the late 1990s, both men recognized that there must be something social and cultural about the brain, but they added that they don't know how to mobilize social and cultural resources in their research. Neither Searle nor Damasio seems to be aware of the fact that there are already scientists "out there" (*social* scientists) who do know how to mobilize social and cultural resources. Alva Noë, *Out of Our Heads* (New York: Hill & Wang, 2009) and Andy Clark, *Being There: Putting Brain, Body, and World Together Again* (Cambridge: MA: MIT Press, 1996)) are notable among those philosophers who have gone further than Searle and Damasio in exploring the significance of "the social" in brain and mind studies. They do this not so much by bringing in "the social" explicitly but by drawing attention to "the world" and the "environment." It is more or less clear that "the social" is enfolded into "world" and "environment." Noë is a little better on this score than Clark, that is, he a little more "sociological;" but he claims the social domain for biology and ignores almost two hundred years of systematic cumulative research in the social sciences per se. For example, Noë recognizes that consciousness is a function of exchanges between organisms and the world. We are, he claims, made by our collective practices (2009: 67). Several paragraphs later, instead of seizing this sociological moment, he writes that consciousness and mind belong to our biological nature. He doesn't want to draw an impermeable boundary around the brain. This entails jettisoning, as I urge in this book, brainist and neuroist assumptions and perspectives. But Noë does draw such a boundary around the individual (person, organism). Noë's concept of the environment of the organism includes the physical environment but also "the habitat, including, *sometimes* [my emphasis], the cultural habitat of the organism." Given the stress throughout his book on "social worlds," we can ask: when wouldn't the cultural habitat be included?

In his book *The Developing Genome* (2015), David Moore, a psychologist, enfolds social behavior into behavioral genetics. Thus on the one hand his work is an example of my "age of the social" thesis and on the other hand illustrates the invisibility of the Copernican sociological

revolution. I raise these issues not to trumpet the claims of an imperialist sociology but as a sociologist of knowledge curious about the invisible revolution and to draw attention to a reservoir of robust findings about social life that are being ignored.

The authors in the section on embodying and materializing information are all contributors to *Data Made Flesh: Embodying Information*, edited by Robert Mitchell and Phillip Thurtle (New York, Routledge, 2003); and see Emily Martin “The End of the Body.” *Distinguished Lecture, American Ethnological Society*, Atlanta, Georgia, 1990); Claude Levi-Strauss, *Tristes Tropiques* (New York: Atheneum, 1967: 3) is the source for his remark on academics.

Arthur C. Clarke, *Childhood's End* (New York; Del Rey, 1987); and Philippe Aries, *Centuries of Childhood: A Social History of Family Life* (New York; Vintage, 1965) is perhaps the most significant contribution in this field.

Brain Culture: Neuroscience and Popular Media, by Davi J. Thornton (Brunswick, NJ: Rutgers University Press, 2011) lays out the cultural context for the willingness of many Americans, scientists, and laypersons alike to cede their “selves” to the brain. There is something essentially American in the frontier rhetoric that characterizes brain discourse in the public arena, a rhetoric found even in President Bill Clinton’s remarks on brain science. It is not too much of a stretch to see in the frontier rhetoric the potential for colonizing and domesticating a population based on the premise that once we conquer that frontier we will know all there is to know about being human; see Rita Carter, *Mapping the Mind* (Berkeley: University of California Press, 1998: 8); and see Robyn Bluhm, Anne Jaap Jacobson, and Heidi Lene Maibom, eds., *Neurofeminism: Issues at the Intersection of Feminist Theory and Cognitive Science* (New York: Palgrave Macmillan, 2012). The contributors to Bluhm et al. are critical of the conclusion some people are drawing from neuroscience research about neuro-differences between men and women. Grounded evidence for the conclusion is lacking and the contributors to this volume stress neuro-similarities.

Brain Renaissance: From Vesalius to Modern Neuroscience, by Marco Catani and Stefano Sandrone (Oxford: Oxford University Press, 2015) includes a translation of the eighteen chapters of Vesalius’ *De Humani*

Corporis Fabrica (1543) dedicated to the brain. The brain has been interpreted using metaphors appropriate to its historical context. Vesalius understood the brain in terms of hydraulic and mechanical models. The dominant model emerging in contemporary neuroscience is a network or increasingly a social network. The ultimate goal of neuroscience in today's world is to completely map the human brain's connections; see O. Sporne. *Networks of the Brain* (Cambridge, MA: MIT Press, 2011); on the concept of the "connectome;" see Sebastian Seung, *Connectome* (New York: Houghton Mifflin Harcourt, 2012). Seung is able to assume that on the one hand, our life experiences – living in the world – contributes to making us who we are (and in particular we are not our genes); on the other hand, his thesis, boldly stated as the subtitle of his book is that "... the brain's wiring makes us who we are." The connectome will be a map of all the neural connections within an organism's nervous system. The parallel to the Human Genome Project is transparent both in terms of the goal and the hopes and hypes about how it might give us the answer to who and what we are.

We have seen a great deal of evidence that the social is showing some signs of ascendance at the nexus of the social, biological, and neurosciences. In a recent collection of the writings of "the world's leading neuroscientists" (subtitle of *The Future of the Brain*, edited by Gary Marcus and Jeremy Freeman (Princeton: Princeton University Press, 2015), however, the views expressed do not hold much promise for a radically social paradigm of brain/mind/culture such as the one Sabrina Weiss and I proposed in Restivo, Weiss, and Stingl (2014: 69). The trend, if we rely on this particular set of experts, seems to be in the direction of studying the brain as a free-standing entity and the seat of mentality and the self. The editors argue that the most promising approach to bridging the gap between data and insight is to focus on computation. They assume that the brain must be an information processor but one that is much more complicated than a laptop. My model of the brain/mind/culture is based on the same assumption; but information processing does not necessarily entail a computation model. The editors' hope is that computation can be "a universal language for describing the action of the brain..." (p. viii). This is essentially the

same approach championed by W.S. McCulloch and W.H. Pitts in their influential 1943 paper, "A Logical Calculus of the Ideas Immanent in Nervous Activity," *Bulletin of Mathematical Biophysics*, 5, 115–133; and see G. Piccinini, "The First Computational Theory of Mind and Brain: A Close Look at McCulloch and Pitts's 'Logical Calculus of Ideas Immanent in Nervous Activity,'" *Synthese* 141 (2004): 175–215.

There is some relief from the computational paradigm in the section of the book devoted to "Skeptics." Leah Kubitzer is included in this section and she is not so much a skeptic as someone with an alternative paradigm ("Lessons from Evolution," 186–193), one that follows my own thinking as reflected in the Restivo-Weiss model. Bluhm argues that we are not going to make much progress if we rely on discovering technologies to help us understand consciousness; we need to focus on clarifying what we mean by consciousness. He is still, however, stuck on the idea that we are going to find consciousness *in* the brain. Carandini continues the computational mantra by urging that neural computation will prove to be the bridge between neural circuits and behavior. The distinguished bioethicist Arthur Caplan is represented and his focus is very different than that of the other contributors. He is concerned to alert scientists and the public at large to approach brain maps, studies, and scans skeptically and with caution. Finally, Marcus is back championing the computational brain but in a chapter that approaches the topic more critically and in greater detail than elsewhere in the volume.

In the final chapter, Christof Koch and Marcus engage in some literary gymnastics with a report from a traveler named Lem who has come from the year 2064. Lem reflects on three eras in neuroscience: the romantic era signified by the year 1964; the big science era, 2014; and the modern era, 2064. He reports that the living brain has finally been conquered using nanobotic neural implants (brainbots). The contest in this period is between bottom-up stimulators, "extreme biological chauvinists," and top-down stimulators; the latter stress a purely algorithmic approach to replicating the mind starting with behavior or with computation; the former argue the need to take into account every ionic channel, synapse, and action potential. It appears that in 2064 brain research is still bedeviled by the baroque

complexity of the brain. The Big Problem continues to be how the physical brain generates subjectivity and consciousness. Dualism lives on in 2064 with neural activity being a matter of physics, space, time, energy, and mass; and the mind being a matter of “a still poorly understood magisterium of experience” (p. 269). For these “leading neuroscientists in the world,” none of the social brain studies or research at the neuroscience-social science nexus is going to impact the brain sciences for the next fifty years.

There is activity at the neuroscience-social science nexus that is both promising (and I have stressed the promise in this chapter) and frustrating. I have provided a rationale in this chapter for assuming that neuroscience alone is not going to solve the problems and paradoxes of mentality. Furthermore, if the solution is going to come from an interdisciplinary collaborative network of classical and hybrid disciplines, sociology is going to have to play a key role. The frustration comes from the lack of consensus within sociology concerning the power of sociology as an explanatory science in its own right. We should on the one hand applaud the biological turn in social theory as part of the interdisciplinary expansion of the sociological imagination; see, for example, *Mind, Brain and Society: Toward a Neurosociology of Emotion* edited by David D. Frank and Thomas S. Smith (Stamford, CT: JAI Press, 1999); and *Rethinking Interdisciplinarity Across the Social Sciences and Neurosciences* by Felicity Callard and Des Fitzgerald (New York: Palgrave Macmillan, 2015).

The problem with the biological turn in sociology is that it tends to prioritize biology (a clearly robust science) over sociology which many sociologists themselves still undervalue. In his “Preface” to *The Handbook of Neurosociology*, edited by David D. Frank and Jonathan Turner (New York: Springer, 2013), Douglas Massey (p. v) remarks that in 2000 he wrote that “I have come to the reluctant conclusion that sociologists have gone too far in privileging the social over the biological” (D. Massey, “What I Don’t Know About My Field But Wish I Did,” *Annual Review of Sociology* 26 (2000): 699–701). The *Handbook* is focused on the neurological basis of human society. Massey is right to object to the historical resistance to the idea that social behavior has biological roots. There has been a rationale for this resistance and that

has been to help sociologists establish foundations, directions, and theories about the social *per se*.

The term “neurosociology” was first used in the article “The Other Side of the Brain IV. The A/P Ratio,” *Bulletin of the Los Angeles Neurological Society* 37 (1972): 49–61, co-authored by J.E. Bogin, R. DeZure, W.D. TenHouten, and J.F. Marsh (according to Frank and Thomas, 1999: 19). It is one of the curious problems in the sociology of knowledge that social scientists like David Franks can refer to someone like the psychologist Michael Gazzaniga (*The Social Brain*, 1985) as nonreductionist and pro-sociological when he locates the sources of human behavior in the brain (as I pointed out earlier). These sorts of mistakes are not accidental. They reflect a predisposition in many sociologists to undervalue the special contributions of their own field and to prefer contributions from the physical and natural sciences, especially biology, and philosophy. Some, like Franks and Jonathan Turner, are stuck in the mindset of sociologists like George Homans who criticized sociology for not having a set of clear explanations for the operation of social interactions and social organization. In spite of alluding to Homans criticism, Turner argues that we know a great deal about the social dynamics of interaction and social organization. If this is so, we should be less concerned about biological reductionism than we apparently are. Those sociologists who support the biological turn now see neuroscience as the key to understanding more fully the relationships between brain systems and social life; see pp. 4–9 in Franks and Turner. George Lakoff, in his contribution to the Franks and Turner *Handbook*, “Neural Social Science,” argues that the brain shapes human reason; this, he says, makes all social science neural social science. The perspective I defend in this chapter is radically opposed to such neuroism.

Whereas neurosociology is driven by reductionist biases in the turn to the biological in social theory, the sociology of the neurosciences is more sociologically enlightening. *Sociological Reflections on the Neurosciences*, edited by Martyn Pickersgill and Ira Van Keulen (Bingsley, UK: Emerald Group Publishing, 2012) is driven by a concern for and not a celebration of the fact that “the brain appears to be everywhere.” Once upon a time we heard pervasive promethean promises of genetics that

grounded “a new style of enchantment with nature” (C. Rosenberg, *Our Present Complaints: American Medicine, Then and Now* (Baltimore, MD: Johns Hopkins University Press, 2007: 97) and see H. and S. Rose, *Genes, Cells and Brains* (New York: Verso, 2012). Some scientists once believed that if we could crack the DNA code, we would have the key to revealing all of life’s secrets. Today, neuroscience offers the latest promethean promise of the key to understanding the complexities of humanity. For the Rose’s most recent effort to expose the nature, roots, and dangers of neuromania, see their accessible and concise *Can Neuroscience Change Our Minds* (Cambridge: Polity Press, 2016), H. and S. Rose.

If, as Pickersgill and Van Keulen urge, the brain is everywhere, sociologists should be taking a closer look at it and using their sociological tools to analyze it; their book demonstrates that a sociology that does not genuflect to the life- and neurosciences can indeed make valuable contributions to helping us understand why the brain is everywhere. The fact that I warn against sociologists becoming cult worshippers of the neuro- does not mean that I do not urge seeking reasoned relationships with the life- and neurosciences. That is what my objective has been in this chapter, to travel with my fellow sociologists into interdisciplinary territory without losing our sense of identity. The trick is to do this in brain studies without becoming sociological essentialists or kowtowing to neuroessentialism.

My remarks on pain reflect the writings of anthropologists of the body. Enid Schildkrout, “Inscribing the Body,” *Annual Review of Anthropology* 33 (2004): 320; “Scarification and Cicatrisation Among African Cultures”. *Rand African Art* (2012); A. Van Gennep, *Les Rites De Passage* (Paris: E. Nourry, 1909); C. Levi-Strauss, *Structural Anthropology* (New York: Basic Books, 1963); T.S. Turner, *Not Work Alone: A Cross-Cultural View of Activities Superfluous to Survival* (Beverly Hills, CA: Sage, 1980): 112–140; Kurland Ludvico; “Symbolic or Not-so-Symbolic Wounds: The Behavioral Ecology of Human Scarification,” *Ethology and Sociobiology* 16, 2 (1995): 155–172; Sharon Guynup, “Scarification: Ancient Body Art Leaving New Marks”. *National Geographic Channel* July 28, 2004; http://news.nationalgeographic.com/news/2004/07/0728_040728_tvtabooscars.html

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5

Thinking Machines: Flesh and Metal, Metal and Flesh

Introduction: Technology, the Very Idea

Robots are an alien presence in our minds and midst. Like all new technologies they are reservoirs of promises and threats. President Obama, for example, has said, “As president, I believe that robotics can inspire young people to pursue science and engineering. And I also want to keep an eye on those robots in case they try anything.” He may have been joking, but Jaan Talinn, one of the founders of Skype, spearheaded an effort to create the Centre for the Study of Existential Risk (CSER) at Cambridge University. The Centre, which commenced operation in the summer of 2013, focuses on possible extinction-level threats posed by present or future technologies, especially in the fields of artificial intelligence and robotics. The cofounders of the Centre are Huw Price (a Cambridge philosopher) and Martin Rees (a cosmologist and former President of the Royal Society). CSER’s advisors include philosopher Peter Singer, computer scientist Stuart J. Russell, statistician David Spiegelhalter, and cosmologists Stephen Hawking and Max Tegmark. These scientists and philosophers have taken on the responsibility of ensuring that humanity has a long future to look forward to.

Advocates promote emerging technologies in general because they promise significant progressive impacts on human lives and human ecologies; at the same time, critics worry about negative impacts that vary from disruptive and disastrous to calamitous and catastrophic. Emerging technologies, defined as new in terms of materials, functions, and impacts, historically bring with them tensions between progress and promise and doom and danger. Among the salient emerging technologies on the contemporary global ecological stage are bio- and nano-technologies, information technologies, and artificial intelligence technologies (including social and sociable robots, and artificial creatures). One of the problems with trying to assess the short- and long-term impacts of emerging technologies is that they are often embedded in networks of old and new converging technologies, creating short- and long-term multiplier effects that are virtually impossible to sort out and assess. Even some advocates of emerging and converging technologies, including transhumanist philosophers, worry about their existential threats. The transhumanists advocate technology as a means for enhancing human performance (performance-enhancing technologies, PETs). This philosophy carries with it a vision of a post-human humanity (H+). The ethical debates emerging technologies provoke focus on distributive justice issues and environmental and ecological rights and equalities. The progress or doom technology dual narrative is not new.

In Plato's *Phaedrus*, Theuth promises that great things will come from the emerging technology of writing. He tells Thamus, the king of Egypt, that this new technology will make people wiser and improve their memories. The king has a different view and he implies that he is in a better position to assess the value and potential impacts of the new technology than is its inventor. The king concludes that writing will have the opposite of the effects Theuth promises.

The cultural meaning of science has fared no better even with its cloak of purity. From Rousseau to T. Roszak there have been science watchers who saw danger and alienation where others, from F. Bacon to J. Bronowski, saw civilization and progress. In 1923, the biochemist J.B.S. Haldane published an essay titled *Daedalus, or Science and the Future*. Haldane painted a glowing portrait of a future society created by applying science to promoting human happiness. A year later Bertrand

Russell replied to Haldane in an essay titled *Icarus, or the Future of Science*. Russell wrote that much as he would like to agree with Haldane's forecast, his experience in politics forced him to predict that science would be used to promote power and privilege rather than to improve the human condition. Daedalus taught his son Icarus to fly, but warned him not to stray too close to the sun. Icarus ignored the warning and plunged to his death. Russell warned that a similar fate awaited those whom modern scientists had taught to fly.

Saint Augustine worried over the variety of poisons, weapons, and machines of destruction that had been invented to harm humans. Oswald Spengler predicted that machines will drag Faustian man to his death. It is not only machines that we should be worried about but science itself. In what is generally recognized as the first modern secular treatise on the theory of progress, *Digression on the Ancients and the Moderns* (1688), Fontenelle argued that scientific growth represented the clearest, most reliable mark of progress. This relationship between science and progress was expressed in the works of Comte and Spencer. Rousseau, by contrast, argued that the human mind has become more and more corrupted as the arts and sciences have progressed.

Progress in our time has come to mean putting men on the moon, splitting atoms, and promising the prolific flow of commodities through the lives of the privileged to the struggling masses of the earth. It is difficult to sustain the idea of progress in the face of the wide range of problems we are burdened with. The essence of the crisis is that the very forces and products we depend on to mark progress are interlocked with the very problems that make us doubt whether there has been any progress. Treating drug and alcohol abuse, emotional difficulties, violence, and mental illness are the ways we try to tune up, service, and put back into efficient operation humans whose lives are constantly taking them, ourselves, and our planet to the brink of a complete breakdown of the social and ecological order. We are also faced with problems that arise for humans and ecological systems when corporations give profits priority over people and ecologies, and when greed feeds short term thinking that has destructive long term consequences. One should not fear being called a "moralist" for pointing out that a culture of cigarettes,

alcohol, and drugs is not a culture in which the “care of the self” and “the care of others” are primary values. This kind of culture cannot sustain a planet that requires attention and balance.

In 1957 a panel of distinguished scientists gathered to celebrate – of all things – the centennial of Joseph E. Seagram & Sons, Inc. They were asked to speculate on “The Next Hundred Years.” The idea – or better, the ideology – of science and progress required that the scientists speculate optimistically. What is interesting is the way many of them introduced their speculations. The geneticist and Nobel Laureate Herman J. Muller said that the future would be rosy *if* we could avoid war, dictatorship, overpopulation, or fanaticism. The geochemist Harrison Brown, who worked on the atom bomb project, prefaced his remarks with the words, “*if* we survive the next century”; psychologist John Weir began, “*If* man survives.” The most bizarre opening remark was Wernher von Braun’s “I believe the intercontinental ballistic missile is actually merely a humble beginning of much greater things to come.”

The idea of scientific and technological progress was fueled by the seventeenth century advances in science and literature by such cultural giants as Galileo, Newton, Descartes, Moliere, and Racine. The idea of social progress was added later. Early in the eighteenth century, the Abbé de Saint Pierre advocated establishing political and ethical academies to promote social progress. Saint Pierre and Turgot influenced the Encyclopedists. It was at this point that social progress became mated to the values of industrialization and incorporated into the ideology of the bourgeoisie. Scientific, technological, and social progress were all aspects of the ideology of industrial civilization. Veblen, for example, argued that the various sciences could be distinguished in terms of their proximity to the domain of technology. Thus, the physical sciences were closest to that domain, even integral with it, whereas such areas as political theory and economics were farther afield. We have entered an era of machine discipline unlike any in human history. And now we stand on the threshold of machines that will discipline us with conscious awareness and values, the robosapiens.

Progress, then, can be viewed in terms of “amelioration” or “improvement” in a social or ethical sense. Are we more advanced than cultures that are less dominated by machines and machine ideology? How do we

measure the primacy of humans and ecologies and how do we sustain them in any given culture? Can we bring them to fruition and nourish them in any culture, or are some more friendly to the primacy of humans and ecologies than others? These issues are really matters of degree associated with the degree to which individuation has progressed in any given society. Editorials in key science and technology magazines such as *Technology Review* and *Science* have expressed the professional concerns of engineers and scientists directly. Scientists and engineers are urged to step down from their pedestals, and the so-called “postmodern movement” is attacked by many critics as a relativist and antiscience movement.

The relationship between technology and progress has been addressed deterministically, with ambivalence, with exuberance, romantically, and from the perspectives of realism, materialism, and idealism. Our mediations with technology have been described by political philosopher Langdon Winner as “technological somnambulism.” And Sabrina Weiss and I captured our discussions about the myopia and euphoria that can characterize reactions to technology in the term “technomyo-phoria.” If we approach technologies by way of critical and ethical pathways, we are faced with questions about how much critical reflection, how much precautionary criticism and moratoria, how much technology assessment and regulation? Subjecting technology to these perspectives and analyses underscores the fact that the very idea of “progress” is problematic.

There is, nonetheless, a way to define progress that takes it out of the realm of hopes, wishes, and dreams and plants it more firmly on a meaningful (and even perhaps measureable) foundation. For example, progress can be defined as the process by which human beings raise the upper limit of their capacities for perceiving, conceptualizing, accumulating, processing, mobilizing, and utilizing information and energy in the adaptive-evolutionary process. The relationship between adaptation and evolution is a paradoxical one. On the one hand, survival depends on the capacity to adapt to surroundings; on the other hand, adaptation involves increasing specialization and decreasing evolutionary potential. Adaptation is a dead end. As a given entity adapts to a given set of conditions, it specializes to the point that it begins to lose any capacity

for adapting to significant changes in those conditions. The destiny of every species is extinction.

Perhaps the most important and insidious aspect of science is that it is (in its allegedly pure form) completely independent of technology; this serves among other things to deflect social criticism from science and to justify the separation of science from concerns about ethics and values. Interestingly, this idea seems to be more readily appreciated in general by third world intellectuals than by the Brahmin scholars of the West and their emulators. Careful study of the history of contemporary Western science has shown both the intimate connection between what we often distinguish as science and technology and also the intimate connection between technoscience research and development and the production, maintenance, and use of the means (and the most advanced means) of violence in society. This is true in general for the most advanced systems of knowledge in at least every society that has reached a level of complexity that gives rise to a system of social stratification.

Let us remember that contradiction and ambivalence about science, technology, and progress may be built into the very core of our cultural machinery. Agricultural activities in the ancient Near East reduced vast forests to open plains, and wind erosion and overgrazing turned those areas into arid deserts. Deforestation in ancient China led to the development of the Loess Plateau. Loess sediment gives the Yellow River (nicknamed "China's Sorrow") its signature color and flooding pattern. Was deforestation necessary for building China into the greatest civilizational area on earth between the first and sixteenth centuries of the Common Era? Or were there conservation principles that the ancient Chinese could have relied on without detracting from their cultural development? There is some evidence that at least some of the deforestation they caused could have been avoided. The deforestation experiences of China, Rome, and other civilizational areas of the ancient world are being repeated today and offer cautionary tales for an era of multiple emerging and converging technologies. The ancient civilizations were faced with local and regional limitations; we are in an end game as we face the limitations of the planet itself.

Given the historical evidence that new technologies generate social and environmental problems in conjunction with some form of

progress, it might be useful to consider new technologies as mutations. If we think analogically of new technologies as cultural mutations, most will be “neutral” or “harmful.” Most mutations are neutral. Nachman and Crowell (2000) estimate around three deleterious mutations out of one-hundred seventy-five per generation in humans. Of those that have significant effect, most are harmful, but the fraction that is beneficial is higher than usually thought. An experiment with *E. coli* found that about one in one-hundred fifty newly arising mutations and one in ten functional mutations are beneficial (Perfeito et al. 2007). This adds another level of argumentation to the case for the precautionary principle. The case for the precautionary principle, however, does not depend on this analogy but has a powerful rationale grounded in human experience over the history of its development and evolution.

We need to be alert to the utopian and dystopian narratives that accompany new technologies, prepared to apply the precautionary principle (recognizing the type-one error of applying it too soon and the type-two error of applying it too late; the zeroth-type error would be not applying it at all), and be aware of the very idea of unintended consequences. Unintended consequences can’t be known or predicted in advance, but we are more likely to avoid the most harmful ones if (1) we are aware of the very idea, and (2) we do everything we can to model possible consequences. How do we appropriately harness technology to create a Smarter Planet? There will be no “smarter planet” without smarter people, people who live in the twenty-first century’s core networks of information, knowledge, and understanding.

The Coming of the Robosapiens

The term “social robot” (or “sociable robot”) is used in at least two ways. It can refer to robots designed to interact with humans, and it can mean robots designed to behave in the collective modes of the social animals. A “social robot” is a robot designed for social interaction with humans and in principle – in the short or long run – capable of expressing emotions, demonstrating consciousness, and thinking and moving about autonomously. More than this, such a robot would be able to move and

speak rhythmically in conversations. Such robots could be used in experiments testing fundamental ideas in the social theory of mind. One is immediately reminded, however, that there are already robots rights movements abroad. The more “social” the robot, the more humanoid it would be. In this regard, then, the term “sociable robot” is not appropriate. “Sociable” in ordinary usage means “fond of company,” or “characterized by friendly companionship.” Sociable robots in principle are able to interact, communicate, and understand us. They are self-aware. Humans and sociable robots are as transparent to one another as humans can be with one another. Humans and sociable robots could, eventually, become friends and even lovers in some scenarios. Briefly, social robots are machine versions of humans, capable of conflict as well as cooperation, peaceful as well as contrary and capable of violence. Sociable robots are friendly, loving, cuddly, cute, and warm.

There are many science fiction novels that depict robotic technologies benefitting society. There are also science fiction novels that are more cautionary. Philip K. Dick’s 1968 novel, *Do Androids Dream of Electric Sheep*, the basis for the 1982 film *Bladerunner*, raises issues about approaching dreams of robots (sociable or otherwise) responsibly and ethically. Cute and adorable robots like MIT’s Kismet, interestingly enough, have already provoked worried reactions. Their very cuteness can lower critical sensibilities and obscure their potential threats. I also have some evidence from a pilot study of reactions to the My Real Baby robot by children and adults. My Real Baby, the creation of a collaboration between iRobot and Hasbro, was discontinued shortly after its introduction in the late 1990s. In my exploratory pilot study, approximately twenty boys and girls between the ages of two and four were given the robot to play with. The robot could make baby-like sounds and move many mechanical facial muscles. It could respond to petting, get upset, frown and smile. Other possible features were left out in order to market the doll at just under one hundred dollars. Like Kismet, the emotional head robot created by Cynthia Breazeal at MIT, the doll was programmed to show emotion or search for attention until someone began playing with it. The marketed version would become calm if it was ignored. Hasbro discontinued production due to poor sales. Hasbro’s collaborator on My Real Baby, iRobot, was cofounded by

Rodney Brooks, director of MIT's Artificial Intelligence Lab and Breazeal's Ph.D. advisor on the Kismet project.

Most of the children in my pilot study didn't seem to fear the robot but they kept their distance and did not want to play with it. The one child who embraced the robot was on the high end of the autistic spectrum disorder scale. This pilot study suggests that integrating robots into everyday social life may not be as straightforward as some robo-philosophers believe. Brooks considered the robot a milestone which allowed thousands of ordinary people to interact with a robot; most of the relatively small number of people interacting with robots at the time were graduate students interested in the complexities of human psychology.

Social Robots

When I (as a social scientist) say that humans are social, I mean that they are constructed out of social interactions, that they *are* social structures. I also mean that their social nature must be constantly reinforced through social interactions. What we experience as and conceive of as individuals are from this perspective networks of social relationships. This is a given, whether we are sociable or sociopaths, likeable or not, introverts or extraverts, loners or social butterflies, normal or deviant. To be human means to have potentials for conflictful as well as companionable relationships, and the potential to make mistakes and to deceive. In constructing sociable robots, especially based on the more psychologically grounded social theories, robotics engineers seem to be driven to program out aspects of being human that for one reason or another they don't like or that make them personally uncomfortable. Such robots might eventually have a place in our society, but they will not be *social* robots. Cynthia Breazeal's MIT robot Kismet could become the cohost of a children's show hosted by Mr. Rogers or Shari Lewis, but Kismet could never become Nietzsche or Virginia Woolf – or Charles Manson. It is a short step to recognizing that not much – or perhaps not enough – is being done that acknowledges potential unintended consequences in this field. We should be working up models and scenarios that explore potential consequences. Articulating unintended consequences in a sense

violates the principle of unintended consequences, but once we bring the principle into our sights, it will not be too difficult to play out some hypothetical stories. In this way, we may be able to lower the probabilities for the more disastrous unintended outcomes, even if we cannot in principle avoid all such outcomes. To put it in mid-twentieth-century terms, I am calling for technology assessments.

Technology assessment was incorporated into the U.S. Congress in 1972. The Office of Technology Assessment was governed by twelve members of Congress, six from each party and drawn equally from the Senate and the House. It operated for twenty-four years, producing almost eight hundred studies on the major science and technology issues of the day from pollution and health care to climate change. The 104th Congress, prompted in part by criticism of the agency in Donald Lambro's *Fat City: How Washington Wastes Your Taxes* (1980) and by opponents within the Reagan administration, de-funded the OTA.

Technology assessment survives today as a unit within the US Government Accountability Office (GAO), and has an important presence in Europe in the European Parliamentary Technology Assessment network that coordinates the work of the TA units of the European governments. Efforts are abroad in the U.S. to restore the OTA. Hilary Clinton has pledged to work for its restoration. STS scholar Dick Sclove authored a report issued by the Woodrow Wilson Center in 2010 that argued for reinventing technology assessment.

Social robots should be distinguished from other socially interactive systems (e.g., software agents, swarms, distributed and collective intelligences). The mark of a social robot is its capacity for rhythmic entrainment with the humans (and robots) it is interacting with. It should be capable of embodied discourse, and ultimately it must be able to participate in interaction rituals and ritual chains. Without the possibility of building robots capable of participating in the rituals of everyday life robotics engineers will fall short of their most ambitious visions in this field. Their robots will be little more than coded complexes of mimicry, little more than toys with chips.

What can we do to get some analytical purchase on robots that goes beyond viewing them in terms of promises and threats? First, considered

as technologies, robots are not free standing context free, autonomous objects and processes. Second, robots embody the social relations (including the values) of their design, manufacture, production, distribution, and use. Social and sociable robots, thinking, self-aware, and emotional robots, and cyborgs, are emerging technologies. Technologies are not simply material artifacts. They are social constructions and social institutions. Technologies embody tools, machines, techniques, and configurations of knowledge, each of which in turn embodies the social relationships of their design, production, distribution, and use. A world in which robots and cyborgs are parts of our everyday lives appears to be inevitable. This makes the application of precautionary principles and technology assessments urgent. And then consider that social and sociable robots are only one set of the multitude of emerging technologies that surround us.

We have seen that engaging technologies critically forces us to ask how we can sustain the idea of progress in the face of the widespread ecological, environmental, and human destruction that has characterized the industrial age. The destruction and danger we see all around us is integrally connected to the very things we use to mark the progress of humanity. For example, robotic and cyborg technologies force us to question our ideas about what it means to be human. What are our electric and organic dreams and nightmares? Imagine robots assisting “us,” watching over us, being sympathetic, empathic, cleaning up for and after us, making our daily lives safer and more efficient, leaving us with more free time. They will do all of this more and less unobtrusively like our friends, the police, firefighters, and our pets. On the other hand, imagine that robots will at best end up ignoring us and at worst eliminating us. More generally, are “our” robots going to be appliances, companions, or neutral human-like parts of our homes and environments? Will we have more to fear from robots than from each other? And as far as robots eliminating us (on the assumption that they will be simply more powerful, simply more intelligent, or simply both), consider whether we humans eliminated the Neanderthals, or are going to eliminate chimps. The news today is reporting concerns about autonomous armed forces robots that might kill on their own. How is a robot killing “on its own” different from a human killing “on h/er own”?

Social robotics is still tied to psychologistic and cognitivist assumptions, even in the midst of a veritable revolution that has replaced hard-wiring and brute force paradigms with social interaction and cultural paradigms. All too often, social robots are single robots tended to by single humans (even though there may be “supporting teams” in the wings). Embodiment, for example, is not about embodied single organisms or entities but about social embodiment. Bodies are social, and embodiments are constructed in social settings with many opportunities for interactions.

Common sense is not a set of statements that can be programmed into a computer, an AI, or a robot; it is an embodied function of collective experiences. Behaving in “common sense ways,” and conversing in general are not in the end about rules and words and grammar but about a sense of community, collective sentiments, the very idea of a public sphere. The fact that social roboticists have not yet addressed this point to any significant degree is not an obstacle to the project of creating AIs and social robots. To the extent that it is not addressed, AIs and social robots will be severely limited social partners, although not necessarily uninteresting ones. I see no inherent barriers to getting beyond these limits and constructing more socially viable intelligent machines. If there is only body, and if bodies are interpretations, then what counts as a body is an interpretative matter. The Nietzschean conception of body seems then to make a place for new kinds of bodies with new kinds of inner lives, a place in fact that it is in our (will to) power to construct.

By the very nature of what they do as scientists, sociologists and anthropologists are necessarily always in the midst of other people. They are in the midst of other people the way physicists are in the midst of electrons and detectors, the way chemists are in the midst of chemicals and test tubes, the way biologists are in the midst of cells and frogs and dissection tools. Very often now, on account of developments in social studies of science since the late 1960s, sociologists and anthropologists find – or rather plant – themselves in the midst of other researchers. Sometimes, and sometimes annoyingly, they plant themselves in the midst of other researchers while they are engaged in their research or related professional activities. Sometimes

the sociologists and anthropologists are participants who contribute to the research agenda of their subjects; sometimes they observe and interview as non-participants. Given this reality of their work, sociologists and anthropologists can or must appear to be at least on occasion intruders, pricks of conscience, or moral entrepreneurs, and obstacles rather than facilitators of or neutral observers of research. This role of ethnographer of science, however, has proven itself over and over to be a source of important new insights and understandings about the nature of scientific practice. They can, of course, at the same time serve as the consciousness as well as the conscience of the research group. On-site studies of robotics laboratories should be on our research agenda as sociologists of scientific practice and as concerned citizens.

Social Robots Redux

Since the modern beginnings of AI research, biology has been a major source of inspiration for AI and robotics engineers. Behavioral sciences, and especially psychology, were added to the mix in significant ways on the threshold of the “robosapiens revolution” that emerged in the latter part of the twentieth century. Engineers have increasingly come to realize that biology and psychology are not enough to help them understand, predict, and control interacting groups of artificial agents. They are by necessity turning to the social sciences often by first becoming amateur social scientists themselves. In this context, they are beginning to recognize that individual intelligence is grounded in, reflects, and is constitutively the social life of communities and more generally social networks. Social simulations combine social and cultural paradigms with computational technologies. All of this is motivating interdisciplinary efforts that increasingly answer the implicit invitations by philosophers and neuroscientists to social and cultural scientists to enter this research matrix.

Some robotics engineers and their critics consider robots in “just like us” terms, robots that have human forms of mentalities and emotions. We could, on the other hand, look forward to robots in “robots as robots” terms, robots that have machine mentalities and emotions.

In either case, humans are going to be the “likeness” against which we will measure the qualities and achievements of social or sociable robots. Social robots in our midst will confront us with questions of what alternative forms of embodiment and semio-materiality mean for us as humans; as men, women, and children; as people of culture, ethnicity, class, sex, race, gender, and age. Who are social and sociable robots for? Are they for all of us individually and collectively, or some of us? Are they for all of us as individual bodies or certain parts of us? What and who are they good for? There are invidious implications in these sorts of questions. But I have no doubt on the positive side that social and sociable robots will help us understand our dynamic and social selves and bodies. They will problematize our embodiment, our senses, our sensuo-erotics. And as these robots come into the world, we will come to be in the world differently, and we will matter differently. This is true, to different degrees, of all new technologies.

Social and sociable robots should be understood in the context of specific and overlapping social locations, and not simply in terms of the ideas and practices of individual scientists and engineers. Attention to social locations means more broadly attention to historical locations and contemporary processes of glocalization. In the end, the limits of social and sociable robots are not in the limits of silicon and steel but in the limits of our interpretative courage, imagination, and recklessness. We really have no more and nothing different to fear from these robots than we do from our fellow humans. When we meet these robots, we will meet ourselves.

Social robotics is an important vector in the movement of science and technology across the world. This movement is a multilinear, multicultural dialectic that heralds the creative emergence of a new form(s) of social order. This becomes a critical part of the genesis narrative I introduced earlier: “In the beginning was information . . .”

It was inevitable that talk about robots with feelings and thoughts would raise the question for the more theologically inclined among us about whether robots could develop souls. Believers are faced with the question: What is there to prevent God from giving souls to machines? The theologian Anne Foerst has helped to bring theology into the interdisciplinary matrix of robotics research.

Robots and Theology

Dr. Anne Foerst's ideas on robots and theology pose interesting questions for a sociologist-anthropologist guided by critical realistic and materialistic assumptions about and approaches to social life and human consciousness. This worldview, which I associate with C. Wright Mills' sociological imagination and Randall Collins' sociological cogito, is compatible with Dr. Foerst's view that humans are fundamentally social animals, but at odds with her views on theology, religion, and God.

Dr. Foerst tries to sustain a viable notion of Christian anthropology alongside a positive view of scientific anthropology. This is a paradoxical relationship that cannot stand as the foundation for a science of human behavior. As a sociologist and anthropologist of religion, I cannot admit theology to serious scientific discourse. The fact of the matter is that beginning with Durkheim, sociology and anthropology begin to unfold as a history of the rejection of transcendence and immanence and of all things metaphysical, supernatural, and spiritual. All of these classical notions become objects of inquiry, explicable as products of cultural evolution, rather than realities *sui generis*, super- or supra-realities.

To be more accurate, I do not wish to deny the experiences that people describe in these terms; rather, I want to question their notion of reference. How do these experiences refer? On my view, they refer to social, cultural, and material things, the social facts Durkheim identified with society *sui generis*. From the very beginning, then, Dr. Foerst and I represent not just alternative worldviews but radically opposing ones. What does one do in the face of an incommensurable cogito, paradigm, or worldview in the context of scholarly discourse? Is the very idea of a fruitful dialogue doomed from the start? Is there some point to starting and sustaining a conversation in the spirit of a collegial dialogue, to "keep the conversation going" as philosopher Richard Rorty might put it? This dialogue, like the one Dr. Foerst addresses between artificial intelligence (and more specifically, Artificial Life) and theology, raises issues of tolerance of different cultures, syncretism, prejudice, and the rejection of others.

By affirming my adherence to a sociological cogito, I do not want to arrogantly announce the superiority of my "system of truths" to

whatever truths Dr. Foerst embraces within her and her community's cogito. If we are agreed that our worldviews are profoundly opposed, why should we make an effort to dialogue? Are there any reasonable rules of engagement for such a dialogue? And what might we imagine the possible outcome of such an effort might be? My comments here are based on the assumption of incommensurability alongside the assumption that there is some value in bringing our alternative views face to face – placing them side by side – so that we and interested parties can explore, examine, and evaluate their differences. The fact is that putting Dr. Foerst's and my views on display in dialogue or simply in juxtaposition is crucial not only for understanding the particulars of the topic at hand – robots and theology – but indeed for understanding the nature of the historico-cultural juncture we find ourselves at in this moment as humans and as critical thinkers. Dr. Foerst asserts that a new and enriched understanding of humans can be expected to arise at the interface between theology and Artificial Life. She focuses on robots as “thinking tools” in order to reflect on the human capacity to bond and the limits of that capacity.

Consider, before we continue, that the ultimate arbiter of our differences is not logic, rules of debate, or science per se but how our worldviews – as species – engage the material problems of our evolutionary, biological, social, and planetary contexts.

As an overall objective, one might seize on Dr. Foerst's interest in redefining the concept of personhood so that it is more inclusive. I have no problem subscribing to the ideas of tolerance and social justice that pervade Dr. Foerst's thinking, implicitly, and explicitly. I don't, however, subscribe to the idea that science gives us a view of humans as “meat machines.” One can only reach such a conclusion if one conceives of science as confined to the physical and natural sciences. Judging from Dr. Foerst's citation circle, she shares a cognitive, philosophical, and psychological worldview with most of the scientists and engineers working with social robots (robots that have the attributes of humans as social animals) and sociable robots (robots designed to interact peacefully, cooperatively, and in comforting ways with humans). This worldview tends to eliminate social science (and sociology in particular) from the arena of science all together or otherwise ignores its perspectives,

theories, and research findings. If, on the other hand, we adopt the view that sociology is a science, then some rather interesting and troubling consequences follow.

Before I continue, let me be clear that my position is not shared by all social scientists or all sociologists. As a sociological materialist and social constructionist, I am sometimes lumped together with positivists or relativists. Neither sociological materialism nor social constructionism entails relativism, antiscience, or positivism. The sociological cogito, and indeed science in general, is incompatible with the idea that there could be a Christian (or a Jewish, or Islamic, or Hindu) anthropology any more than there could be a Christian or a Jewish physics. This doesn't mean that sciences cannot have an ethnic stamp of some kind. We have some reason to refer to Western science as an ethnoscience, not universal because "the West" is not universal. And we know that Japanese physicists work and think differently than American physicists even though there is a great deal of overlap in their education and training, and in their methods, theories, and technologies; and mathematics is approached differently in different cultures. What we should refer to as the ethnosciences converge on the "sciences" to the extent that cultures converge on an ecumene or a world culture. Given the facts that the earth is a heterogeneous plane and that humans are highly adaptable, a world culture will never erase all signs of locality. This might at best be accomplished in a "for all practical purposes" sense.

Insofar as the issue of tolerance in intellectual life arises here, my position is that tolerance must have limits. One must ask if tolerance of ideas, concepts, and perspectives is available to us in the same degree in every context and at every historico-cultural juncture. In the present moment, we must be very careful about tolerating points of view, claims, and logics that interfere with our individual and collective abilities to solve the problems of survival, and survival with quality of life as we reach the limits of our planet and engage the ultimate boundaries of our species and the finite reservoir of resources for our problem solving.

Any form of critical realism in our era must embrace the idea of a social reality *sui generis*. Once we do this, the rules of the game of inquiry change. Religion then becomes just another social institution, just another human creation, just another social construction. God

becomes nothing more than a symbol. The words “just” and “nothing more than” must be used cautiously; I don’t want them to mask the significance of God and religion as symbols and forms of moral order in the history of human cultures. Religion is only one of many possible ways humans have available for organizing moral orders. And we must recognize that there is no Religion only religions; and there is no God only gods. One of the most articulate exemplars of a political basis for a moral order is Michael Harrington’s (1983) essay on “the spiritual crisis of western civilization.” Harrington described himself as, in Max Weber’s phrase, “religiously musical” but a non-believer. I take his notion of being religiously musical as a version of what Durkheim referred to as religious sentiment. In order to understand religion, then, the nonbeliever has to be religiously musical or have a religious sentiment. Harrington’s goal was to fashion a coalition of believers and nonbelievers to challenge the wasteland of nihilism, hedonism, and consumerism spreading across the Western cultural landscape. Furthermore, we have made a mistake in reference by attributing some sort of existence to God. Once God and religion become the stuff of sociological study, following Durkheim and others, there is no longer any need for theology. I pursue these ideas more fully in the chapter on religion and god that follows. But let me remind the reader that religious liberty gives us the freedom to be deluded and wrong. We need a different kind of liberty to engage each other communally as critical realists engaged in the pragmatic exercise of free inquiry.

It is not at all clear to me why we need robots for the task that Dr. Foerst undertakes. We have been studying human society and culture systematically and cumulatively – dare I say scientifically – for almost two centuries. Contemporary robots – social, sociable, and industrial – are machines, and sociologists of science and technology have long known that machines are embodiments of the social relations and contexts of their production and use. To put it colloquially, “robots ‘r’ us.”

Let us look more closely at Dr. Foerst’s approach to this problem. Dr. Foerst begins by bringing theology and artificial intelligence into a dialogue that she claims can enrich our understanding of ourselves. I find this doubly problematic. Theology is not a social science, is itself subject to social and cultural analysis and deconstruction, and therefore

has no credibility as a source for ideas about what it means to be human in a world that has already produced social and behavioral sciences. Even philosophy has more credibility and legitimacy in this arena than theology. Critics will readily point out that social science and science in general are subject to analysis and deconstruction. This is true but doesn't impact the relative value of the knowledges produced by theology as opposed to social science. The fact that the sociology of knowledge is itself a subject in the sociology of knowledge doesn't undermine its competitive advantages over other ways of knowing.

Artificial intelligence has no more credibility than theology since it bases its views of personhood and cognition on the psychological and biological sciences and has for most of its history (there are notable recent exceptions) ignored the fact that humans are profoundly social animals. In short, we know a lot about humans as the most social of the animals, and there is an enormous literature on social interaction and social solidarity, the social role of ritual in sustaining solidarity, and the nature and function of interaction ritual chains.

The general theories that flow from this research stream can in fact inform our efforts to construct social and sociable robots. It is interesting to note that the idea of the social tends to enter research and development in social and sociable robotics by way of psychologically inclined social theorists such as Lev Vygotsky and does not tend to draw on the more radically social theories of scholars such as George Herbert Mead.

Robots can be reasonably expected to help us to test sociological and psychological theories and perhaps refine and reformulate them; it is very unlikely that they will teach us anything new about ourselves and why we behave the way we do. The caveat might be that should we produce highly sophisticated social robots we might be able to conduct experiments ethically impossible with persons or social groups. But then this is just where Dr. Foerst's article achieves its most important moment. Animals are not humans and are not granted personhood in general. Yet, we approach experiments with animals by constructing a boundary between those we can manipulate any way we like with moral impunity (mosquitoes, for example) and those we privilege, perhaps because they suggest personhood (notably the higher apes). It is not implausible to imagine that the time will come when we will lawfully

and in good conscience experiment on certain humanoid robots – those that are the most appliance-like – and privilege those who give off some aura of personhood.

An interesting puzzle arises out of Dr. Foerst's discussion of scientific anthropology and the idea of personhood. The sociological cogito is fully compatible with her description of "the human animal as body in community." Furthermore, she writes that we humans are "embodied beings and entirely embedded in [our] social and physical environment." The puzzle is that she doesn't apply this perspective reflexively to her Christian anthropology, to her theology. More generally, if we are embodied in communities, entirely embedded in our social and physical environments, why aren't our religions and our gods entirely a product of that embodiment and embeddedness? This is indeed what follows from the sociological cogito. This may be the discursive juncture, then, where we might engage our competing cogitos in a fruitful dialogue and debate.

Earlier I introduced the idea of sociology and anthropology as movements that led to the rejection of transcendence, mystery, metaphysics, and the supernatural by anthropologizing God and Logic. The science studies movement from the late 1960s onwards has anthropologized scientific and mathematical knowledge. The next phase in the rejection of transcendence is now underway in social and cultural studies of mind and brain, consciousness, the soul, and God. Even information itself is falling under the disciplining measures of materializing and embodying strategies. The end of Platonism is at one with the end of God. And if the robosapiens are awaiting us on the horizons of evolution, perhaps we are about to come face-to-face with ourselves.

Robots, AI, and Sociology

Let's assume it's a good idea to build thinking, self-aware, emotional robots: why should social scientists get involved? AI projects and the goals of humanoid robotics engineers have necessarily had to be grounded in ideas about intelligence, thinking, and consciousness. Such ideas have classically been centered on theories of mind and

brain. These theories have been based on assumptions about the primacy of the individual, the mind, and the brain as free-standing context free entities that could be studied, explained, modeled, designed, built, and used based on the notion of individuality and the sciences of neuroscience, psychology, and biology. In spite of severe criticisms of the idea that we might be brains-in-vats, brain-in-a-vat and context-free brain ideas continue to drive current brain studies (with significant recent exceptions). The idea that sociology will have to play a major part in making the AI quest successful was first argued in strong sociological terms by Randall Collins. His argument is carried out as a thought experiment. Before we look at the details of SOCIO and my update of SOCIO, IMEGO, let me rehearse a little background.

The case Randall Collins and I have been arguing since the early 1990s has without much direct effort on our part finally begun to emerge in the ranks of the social agent, social robotics, and social AI researchers themselves. The next step is to take seriously the problem of understanding human social life and the social life of the person in terms familiar to sociologists and anthropologists. The advantage of this goes beyond the simple disciplinary transparency of the imperative. It moves us beyond social analogies to serious sociological theory. This strong social turn would instantly eliminate certain types of unintended consequences and dead ends. Of course, it will generate its own unintended consequences and dead ends, but they are more likely to lead to constructive and productive outcomes. Once this strategy begins to be followed, it will be easier for social and sociable robot engineers and scientists to figure out how to build mechanisms related to specific sociological constructs than it apparently is now. In particular, I want to encourage thinking about mechanisms to implement interaction rituals and interaction ritual chains. This has become easier with the publication of Randall Collins' books on interaction rituals and ritual chains. Technical problems have social, cultural, ethical, and historical contexts and consequences (immediate, long term, intended, and unintended) that are not always available to the engineer or designer focused on solving those problems.

Those who walk in the footsteps of the Francis Bacons and René Descartes continue to promise riches for all "mankind" that will flow

from our laboratories and workshops in science and technology. We have been dealt many harsh and in some cases perhaps irreversible lessons as the promises of one technology after another have turned into human, environmental, and ecological disasters. The promises of social or sociable robots certainly have some of the flavor of the classic progressive claims for technologies of the past. The problem here is that the potential targets of unintended consequences are no longer merely environmental ones but more significantly than ever before human ones. I mean “human ones” in a more profound sense than might be understood at first glance. For surely, humans have suffered from the unintended (and intended!) consequences of technologies before. Now, however, the specter is raised of new kinds of impacts on human cognitive and emotional, as well as social and cultural, states and processes. I am not worried as some are about “post-human” futures, about humans being “replaced” by machines. Sooner or later we are going to be replaced by something (or nothingness); that shouldn’t be the issue. The more immediate issue is what will happen to us if more and more of us spend increasing amounts of time with robots capable of becoming Mr. Rogers or Kate Smith and incapable of becoming Prof. Nietzsche or Virginia Woolf? And to what extent are we in danger of overriding our species-specific face-to-face and becoming “more autistic” each time we return to the face-to-face world from our interactions with technologies? This has been the experience of one of my friends who is a developmental psychologist and noticed this form of behavioral switch in his research.

SOCIO is a “thought experiment” AI created by Randall Collins (1992: 155–184). SOCIO’s “toolkit” consists of rhythmic turn-taking in conversations that are understood to be interaction rituals. Viewed as a “hard case,” the problem in creating SOCIO is developing a machine with an internal voice. The solution to this problem is based on understanding thinking as internal conversation, and internal conversation as self-talk. Self-talk is the way humans practice or rehearse when preparing to converse with others. It is also an important self-solidarity ritual, a way of sustaining our dynamic selves (see R. Collins 2004: 183–220). The Creativity Problem is solved by viewing even isolated individuals as adopting the goals and methods of a collective. In brief, Collins has argued that if we

want to create an AI, we need only look at the already existing AIs, the organic machines known as humans. We need to follow the same rules and processes used to make AI humans in making inorganic machines. SOCIO's goals are: to be mobile; converse with people; think about things; think when alone; think creatively. Thinking, following Collins, is assumed to be internal conversation; conversation is part of an interaction ritual; conversational rhythm is significant for communication and consciousness; and the ebb and flow of emotional energy is the root of emotional expression. Motivations are grounded in seeking "footings" as social interactions unfold, and they are matters of social context and social construction. There are nonetheless some limits to SOCIO. I have addressed those limits with a follow-up thought experiment, IMEGO. The name is taken from Mead's notion of the I, the Me, and Generalized Other. IMEGO would be specifically designed to take advantage of the I, Me, and GO, especially in instances of talking to other IMEGOs. IMEGO makes use of the triad as the fundamental social unit. The late John Schumacher and I argued in an unpublished paper that one could draw sociological conclusions from Einstein's clock synchronization. It is possible to imagine observers A and B next to clocks that require synchronization; a third observer C midway between the two clocks is required to effect the synchronization. Another way to approach this (suggested in a personal communication by Jean Paul Van Bendegem) is that even if we carry out the synchronization without a third observer present, it still is a triad. In the case of the three-observers-triad, all observers involved only need to recognize a signal to synchronize their clocks; they do not need to know anything about relativity theory. But in the case of two observers, if they observe each other's clocks, in order to synchronize their clocks, they need to take into account the time retardation, and for that they have to calculate according to the rules of relativity theory. The presence of a theory, necessary to be able to perform the act of synchronization, makes it a triad again. The theory in fact is a surrogate third person. This can be grounded in Mead's theory of the I/Me/Generalized Other; the presence of a theory implies the generalized other. This then becomes a special case of the sociological hypothesis that in order to establish (synchronize) meaning, three persons are required. Thus, the basic unit of sociology is not the

dyad but the triad (cf. Wiley, on the semiotic triad, 1994: 13, 27, 81–82). Embodied IMEGO allows for comaking to occur between IMEGOs and humans. Where SOCIO is a social computer, IMEGO is a full-scale mobile sensing humanoid robot “raised” (socialized, or programmed) in social settings with other IMEGOs and humans. The caretaker model of “mother” and “child” used for SOCIO (and for the real life robot Kismet) is transformed into a community model for IMEGO. IMEGO is engineered for rhythmic bodily and speech movements, rhythmic synchronization and entrainment, imitation (compare mimesis), and the micro-coordination of movements. IMEGO is thus prepared for and programmed through the flow of interaction rituals and interaction ritual chains, and the unfolding of a social life that gives rise to consciousness (awareness and self-awareness) and thinking. IMEGO would thus be a social as opposed to a sociable robot. It would be sensitive to social rhythms and engage in interaction ritual chains, allowing it to recognize and participate in thought collectives; its database would be driven by data arrays representing rituals of reference (culturally generated knowledge through the crucial link to language and thought). It would reflect the theory that embodiment, as opposed to “just” software, is necessary to achieve personhood.

Bibliographical Epilogue for Chapter 5

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6

God and Society: Emile Durkheim and the Rejection of Transcendence

In this chapter, I enter a world in which understanding our being and becoming depends on understanding something that stretches our capacity to comprehend – eternity. Entire books have been written exploring the varieties of religions and gods, the complexities of lived religions and beliefs, and the philosophical discourses that reveal and critically analyze these varieties and complexities. In order to focus on what is at stake for me amidst all these discourses I am going to draw attention to religions and gods as those points in the networks of cultures across time and space that generate a distinction between a natural world and a spiritual, supernatural, or transcendental world. I am going to treat religion as one of several institutional spheres that appear in more and less specific forms in all societies.

Every society has to solve certain basic problems and put regulations in place to sustain those solutions. These invariants include providing food, air, and water; regulating sex, reproduction, procreation, gender, and socialization; regulating work, play, rest, and sleep; temperature and general meteorological controls; providing ways of dealing with excretions, dealing with the realities of individual health and illness; identifying and protecting various social and material boundaries from the

individual to the family and the society; and developing means for sustaining group identities. Solving these problems leads to the development of institutional spheres that when they become specific give us economies, kinship systems, militaries, governments, educational systems, and the sciences and arts, which are the creative and conserving forces of culture.

To the extent that religion is an invariant it is as the sphere of systematizing and institutionalizing the rules of good and bad and right and wrong behavior. Rituals are critical activities that provide continuity in the wake of the variety and complexities that take individuals temporarily away from the campsite in pursuit of the necessities of life. The simpler the society the more these spheres interpenetrate and can only be separated out analytically. As societies become more complex, institutional spheres become more clearly separated out organizationally. The core rituals of a society are a form of collective worship that sustains the group's identity and boundaries. These rituals can also generate various forms of supernatural beliefs about extra-societal and extra-terrestrial entities manifested as more and less personal forces, including gods. This simplified version of the sociology of society will ground my understanding of religions and gods in this chapter. I will not follow sociologists like Peter Berger (1967) in adopting a form of "methodological atheism" in the study of religions. The sociology of religions and the gods includes the study of faith and belief and their referents. Such studies can reveal the nature of those referents: the ways in which they refer are criteria for deciding scientifically whether they refer materially or whether they are illusions, delusions, mental aberrations, or efforts in charlatanism. We can say whether gods are real or not just as we can say in physics whether molecules or meteorites are real or not. Stephen Prothero (2010), a religious studies scholar who describes himself as "religiously confused, is justifiably critical of the fundamentalist atheism of the New Atheists (notably Sam Harris, Daniel Dennett, Richard Dawkins, and the late Christopher Hitchens). However, his argument that Dawkins is speaking as a theologian and not as an objective reporter when he calls religion delusion is a case of social blindness. Dawkins' claim that religion is delusional is neither theological nor objective, but rather follows from the logic of anger that drives

the New Atheists. It displays neither a general sociological viewpoint nor a religious sentiment. Prothero has at least this in common with the new atheists: he suffers from social blindness.

The iconic classical locus for the sociological perspective on religion and god is Emile Durkheim (1858–1917). In this era of New Atheist criticism, it is significant that Durkheim's goal was to shine the light of secular sociology on religion and god without making them disappear. It was not Durkheim's goal or his achievement to "reduce" religion or god to society. Reductionism, a widely used label by critics of sociology's scientific "pretensions," can mean simplifying a complex phenomenon to the point of distorting it, or re-imagining phenomena in different but allegedly equivalent terms. More generally, critics of the sociology of religion and god as reductionist are often unwilling to acknowledge the reality of the social level of reality or the scientific nature of sociology. But if the social level is as much a reality as the physical and natural levels of reality then explaining social things sociologically is no more reductionist than explaining physical things in terms of the physical sciences. Reductionism is the default critique for physical and natural scientists who (1) do not recognize a social level of reality that stands analytically apart from physical and natural realities, and at the same time refuse to grant sociology status as a science; and (2) suffer from social blindness.

In a more strictly philosophical framework, methodological reductionism is the strategy of reducing explanations in the direction of the atomic level of reality. Explaining the boiling point of water would involve explanation in terms of molecules and atoms and ultimately perhaps quarks; this would be preferred over and against chemical explanations. Theoretical reductionism looks toward a super unifying theory of theories or in contemporary terms a theory of everything. Ontological reductionism assumes a minimum number of kinds of things (entities or substances) and explanations are sought that ground themselves in these substances (one in monism, for example, two in dualism). The reductionism problem arises in its most serious challenge to social and cultural explanations when it becomes what philosopher Daniel Dennett calls "greedy reductionism." Greedy reductionists ignore, underestimate, or otherwise fail to acknowledge the complexity

of the phenomena they are zealous to explain, phenomena that fall outside their areas of expertise. Greedy reductionists are likely to skip levels and layers of reality. Such reductionists are especially likely to assume that social phenomena are reducible to physics or biology especially since they do not recognize a social level of reality that stands apart from physical and natural realities. Physical and natural scientists of this type are the most likely to propose reductionist explanations of social and cultural phenomena, and greedy reductionist physical scientists are prone to reducing thought and consciousness to neural nets, neurons, and quantum phenomena. Greedy reductionists are the most critical opponents of social science explanations and theories and the most naïve about the nature of social and cultural realities. They are simply unaware of the scientific achievements of sociology and more likely than their fellow humans to have advanced social blindness. Ironically, Dennett himself is a greedy philosophical reductionist when it comes to sociology and science studies.

To begin this effort in hard-case explanation, we must recognize first that religion and god are not always, everywhere, and necessarily found together; and second that the terms religion and god should not be assumed to travel well across cultures and especially not from Western to non-Western cultures. There is a way to construct a transportable concept of religion. First, we should recognize that it refers to the symbolic and institutionalized representation of a moral order and is in this sense a manifestation of an essential ingredient of every society. Second, we can transport religion insofar as it represents the compassion endemic to social groups. Shortly I will point out the conflicts that arise because compassion is a centrifugal force. The degree to which religion is a functionally institutionalized part of any given society, with symbolic structures, social roles, organizations, and specialized vocabularies will vary; but it will always be at least analytically distinguishable from other human activities.

God is not understood in the same way in all of those societies that embrace a belief in some form of “supreme” being, entity, or creator. The God of the West is a very particular God rooted in what the anthropologist Rik Pinxten refers to as the “Mediterranean religions.” This God is not an inherent or necessary ingredient of all mono- or near

monotheistic societies. All Gods are connected, however, to the extent that they are related to the human capacity for constructing “transcendental” and “supernatural” realms and entities. Given my understanding of sociology and anthropology as driven by the rejection of transcendence and immanence (as well as psychologism), it is critically important for lay readers as well as professionals across the intellectual spectra to understand what social science has achieved through the efforts in theory and research by Emile Durkheim, Karl Marx, Friedrich Nietzsche, and a host of other nineteenth-century thinkers, their predecessors, and their followers.

Critical Tools for Thinking about Religions and Gods

The sociological approach to religion is grounded in some fundamental ways of critical thinking. I have tried to capture the specifics of the kind of critical thinking needed if one is going to think realistically about religions and the gods. These are not the normal modes of critical thinking taught in school courses; it more or less takes those for granted. What I aim to achieve here is the identification of common fallacies that obstruct our ability to see through to the true nature and causes of faith, belief, worship, and religious ritual. Except for some of the classical fallacies the ones I have identified are not logical in the traditional sense but more a condensation of research traditions that ground the research that leads to the claims and arguments in this book. I have presented these fallacies in earlier publications in the form of a list. I present them below in a narrative format.

Reflective Interlude

The general claim of this part of my *Requiem* is that religions are eminently social. We are born into religions and religious rituals, beliefs, and faiths that express the collective myths of our cultures. These myths

are important to the extent that they reflect and reinforce the moral pathways extant in any given society. These function to fuel the social solidarity of families, friendships, communities, and organizations. Faith is of a piece with these collective realities and the collective representations that form the symbolic edifice of the religions we are born into. Nietzsche recommended that we take a quick walk through a “mad-house” if we needed to be persuaded that faith does not move mountains but rather puts make believe mountains where there are no mountains at all. Faith is not a substitute for science or truth and it does not stand outside the jurisdiction of scientific analysis. To say some belief is a matter of faith and therefore not subject to interrogation is to commit the fallacy of misplaced privilege. Faith is a form of behavior and therefore proper subject matter for the social and behavioral sciences.

There are certain fallacies that follow from a comprehensive interdisciplinary knowledge of and understanding of how the world and human beings work. It is relatively easy to transform these fallacies into laws of the world and humans, and I daresay that these are virtually truisms in the world of thinkers with whom I reside. The reader will notice that some of these fallacies refer back to earlier material on sociology and brain and mind.

The most important fallacy obstructing and obscuring human understanding in general is that there is a nonmaterial realm of existence beyond our own material world and outside the physical universe. The transcendental fallacy, or theologian’s fallacy, is that there are transcendental worlds, supernatural worlds, worlds, or realms of reality filled with souls, spirits, ghosts, gods, devils, angels, heavens, and hells. There are no such worlds. The obvious question that will occur to the learned intellectual and the layperson is how I can possibly know this. They will claim that it is impossible to prove or disprove this claim, that there is no evidence to bring to bear on this claim. Their expectation is that if there were such an evidentiary basis for the claim it would be located in the corpus of knowledge established by the physical and natural sciences. But what if the evidentiary basis for the claim is found in the social sciences? For indeed, that is where we need to focus our attention.

What we have learned from the social sciences is that ideas about other worlds are symbolic representations of social categories and

classifications in our earthbound societies and cultures. There is nothing beyond our material, organic, and social realities on this planet in this universe. Death is the end of life. There is nothing of us that continues to live on and no place for it to live on. One could of course have a notion about all of our atoms coming from the stars and that in some sense when we die we eventually return to the stars; we call this scientific romanticism. It is also possible that the so-called “many worlds interpretation” in quantum mechanics is contaminated by this fallacy as a result of mathegrammatical illusions. What I mean by mathegrammatical illusions is that symbolic realities of the grammar of mathematics are mistaken for realities in the world at large. The world, the universe is doubtlessly more complex than we can know or imagine, but that complexity does not include transcendental or supernatural features. This is the conclusion I have reached based on my immersion and mastery of the robust findings and knowledge base of the social sciences as well as the physical and natural sciences. The reader is free of course to accept or reject my conclusion, interpret it as opinion, conjecture, hypothesis, or a theoretically and empirically grounded or un-grounded generalization. What cannot be denied is that this is the worldview of a significant subset of the social science and broader intellectual communities that I am a voice of and for. That is not what should claim your attention. What should claim your attention is the scientific perspective that drives these communities, and that perspective is not about absolutes but about unfettered and continuous explorations. This may be the appropriate place to ground the “theory of everything” that is part of the toolkit of physicists and cosmologists. Their theory of everything does not include the social level of reality. It is doubtful any of them think about the social while they are hunting for this holy grail of reductionist science on the grand scale.

There is a tendency in traditional approaches to explaining human behavior that come from outside the social sciences to look to “deep” or “immanent structures.” This is especially popular in the search for explanations of language and thought. If one needs a label for this fallacy, I suggest calling it the logician’s fallacy or eponymously the Chomsky fallacy (a more updated version might be labeled the Pinker fallacy). The linguist Noam Chomsky’s theory of a universal grammar is

a classic example of this fallacy. I have called this the “subscendental fallacy, using “sub” to create an opposition to “trans”(cendental). Such “structures,” insofar as they are considered to be the locus of explanations for human behavior, are as ephemeral as transcendental and supernatural worlds. Looking to these ephemera leads to conceptions of logic, mathematics, and language as “freestanding,” “independent,” “history, culture, and value free” statements and sets of statements. And they can support misguided sociobiological, genetic, and brain-centered explanatory strategies.

It is very easy based solely on our introspective culturally induced experiences to assume that human beings harbor intrinsically private experiences. The profoundly social nature of humans, of symbols, and of language argues against intrinsically private experiences. To my satisfaction, this has been amply demonstrated by philosophers (notably Wittgenstein) and social scientists (notably Erving Goffman). This is not to deny that at the level of our individual behaviors we can have experiences (including thoughts and dreams) that no one else knows about. More often than not – and maybe never – such experiences are not idiosyncratic. You might trip and fall while jogging where no one sees you and never mention this to anyone. But this is an experience many other humans will have had and it is in that sense a shared social possibility and not an intrinsically private experience. Truly “private” worlds could not be shared, not even with oneself. Remember that we can only be aware of our experiences in terms of a language that our culture programs us with. So our awareness is always socially constructed. Even our dreams (certainly as we remember them) are socially constructed. The idea that we can have experiences that are literally outside of society is the private worlds fallacy.

The private worlds fallacy is linked with the internal life fallacy. When we engage in discourses about surrogate counters, imitations, and artificial creatures that mimic, we need to remind ourselves that we are working in an arena of symbolic and materialized analogies and metaphors. Such efforts carry a high emotional charge because they take place at the boundaries of our skins. Analogy and generalization, if they can be shown to have constructive scientific outcomes, need not obligate us to embrace identity in, for example, building robots. Robots will not have

to have “gut feelings” in the identical sense humans have gut feelings because they are organic machines. Nor will robots have to be self-aware in the same way we are. We must imagine that robots might develop machine (in- or non-organic) feelings and a machine self-awareness. What we “feel” is given to us by our language, our conversations, our forms of talking, our fleshiness. At the end of the day, feelings are not at all straightforward matters of internal bio-electro-chemical processes. Electro-mechanical creatures will turn out to be just as susceptible to an internal life (fallacy) as humans once they have developed language, conversation, and forms of talk. This implies a social life and awareness. Roboticians may already have made some moves in this direction with the development of signal schemas and subsumption-based hormonal control. The development of cyborgs and cybrids may make this issue moot.

Another family member of the private lives and internal life fallacies is the psychologistic fallacy. The fallacy here is that the human being and/or the human brain is/are free standing and independent, that they can be studied on their own terms independent of social and cultural contexts, influences, and forces. I also call this, following Leslie Brothers’ usage, the neuroistic error. The fallacy applies to the idea that mind and consciousness are brain phenomena. Human beings and human brains are constitutively social. This is the most radical formulation of the response to this fallacy. A more charitable formulation would give disciplinary credibility to neuroscience, biological, psychological and cognitive approaches in brain studies. These approaches might produce relevant results in certain contexts. Then there might be fruitful ways to pursue interdisciplinary studies linking the social sciences to the neurosciences. It may indeed be possible to construct a neurosocial model of the self. This would entail, as I suggested earlier, that socialization operates on a brain-central nervous system-body (signifying an integrated entity that eliminates conventional brain/mind-body and brain-mind dichotomies) and not on a “person” per se. This idea is represented in the original Restivo-Weiss model of the brain/mind/body/culture system.

I have already explained the title of this book, and it is reflected in what I call the eternal relevance fallacy. I have explained why we need to

follow Whitehead in forgetting our founders. This requires a certain amount of courage and perhaps a touch of foolhardiness in a world where so much continues to be written on and about the ancient Greeks. It is interesting that our ancestor worship in the West does not extend to the philosophers of the East. The point is that for the most part the ancients are no longer relevant to our practices and discourses. I noted earlier that this does not seem to be a problem for physicists, chemists, and biologists in the way it is for social scientists and humanities scholars. The reason is that physicists, chemists, and biologists have established a robust professional identity in their own minds, in the public mind and in educational and policy circles. Where the social sciences are still developing and demonstrating their robustness, they still owe much to their founders. The caveat here is that some ancient and some modern thinkers (departed ones, as well as some who are still with us) who can be claimed for philosophy are still extremely valuable for us. Marx, Nietzsche, and Wittgenstein come immediately to mind. This move might also go a long way toward eliminating the worshipful attitude intellectuals often adopt to the more productive and visible members of their discourse communities. The corollary intellectual's fallacy is that philosophers as philosophers (and psychologists as psychologists) have anything at all to tell us anymore about the social world. In the wake of the work of sociologists and anthropologists from Emile Durkheim to Mary Douglas all the central problems of traditional and contemporary philosophy resolve into (not "reduce to") problems in sociology and anthropology.

One of the most significant fallacies we are burdened with in the sociology of religion is what I have somewhat awkwardly not to say presumptuously named *the neque demonstra neque redargue fallacy*. The fallacy here is that some claim, proposition, theorem, or statement is neither provable nor unprovable. The exemplary instance of this fallacy is that one can neither prove nor disprove the existence of God. This has not kept theologians, philosophers, scientists, and mathematicians from Anselm to Gödel and Euripides and Aristophanes to Michael Shermer and Victor Stenger from proposing proofs or arguments for the existence or nonexistence of God. While all proofs build conclusions into premises, God proofs are transparently contaminated by this self-defeating

strategy (self-defeating unless we understand that the objective of a proof is not to prove per se but to witness). The fallacy has, on the other hand, kept social thinkers and social critics from proposing proofs for their theories about God as a delusion, a myth, a symbol and fundamentally a mistake in reference. In fact, proofs are situated, contingent, contextualized, community matters, and indeed, social constructions and social institutions. Therefore, within the world of Durkheim's *Elementary Forms* and what follows a proof that God does not exist is clearly possible. Remember that proofs can be "forced on us" by ensembles of probabilities and consiliencies of evidences. That is, the sheer size and weight of facts, the accumulation of interpreted experiences, and pyramids of inductions built up over time can be as persuasive as any formal, informal, intuitive, logical, emotional or otherwise credible proof. If one can (1) get an education realistically appropriate to the secular world of the twenty first century, (2) cease to be guided by wish fulfillment in the pursuit of knowledge, and (3) eliminate the fear of dying and of the unknown in general the accumulated evidence of the historical record readily blocks transcendental and supernatural explanations and affords new evidentiary opportunities.

The NOMA fallacy is specific to the problem of explaining religion and god. NOMA is an acronym for "non-overlapping magisteria." The evolutionary theorist and science writer S.J. Gould invoked this fallacy to keep science and religion at arm's length from one another. Once again, if we admit social science to the arenas in which the science and religion dialogue is being carried on, the NOMA fallacy is revealed.

We are fortunate that we can often rely on experience and feeling to help us figure out what is going on around us. But the idea that experience and feeling are trustworthy modes of interrogating and knowing reality is a fallacy. I call this the Tolstoy fallacy since he discusses this problem at some length in his novel *War and Peace*. Tolstoy is also my source for the Napoleon Fallacy, the idea that heroic larger than life figures make and move history. Consider that in astronomy as in history the whole difference of opinion is based on the recognition or nonrecognition of something absolute serving as the measure of visible phenomena. In astronomy it was the immovability of the earth, in history it is the independence of personality and free will.

I follow Tolstoy's logic and text closely in the following paragraphs skirting direct quotation by way of paraphrase.

We humans are prone to give lots of weight to the tests of our experience, and with good reason. Our survival depends on being alert to our immediate environment and ready at once to react to what our senses tell us about dangers or resources available to satisfy some need or desire. And yet we cannot use the test of experience as a guide to truth. Our immediate sense of things is that the earth is fixed in space and that the stars and planets move. If, however, we hold fast to that sensation, we will fail to grasp the reality of our planet wobbling in precession and racing "around" the sun, through the galaxy, and into intergalactic space. It is this same illusion of the transparency of experience that makes it hard for us to recognize that we are subject to the laws of nature. If we give up relying on our experience of the earth's fixity, we arrive at laws about time and space. If we give up relying on our experience of our consciousness, our awareness, and our will, we arrive at laws about human behavior.

In the first case it was necessary to renounce the consciousness of an unreal immobility in space and to recognize a motion we did not feel; in the present case it is similarly necessary to renounce a freedom that does not exist, and to recognize a dependence of which we are not conscious. Our experience and analytical purchase on freedom and necessity depends on the relationship between actions and contexts, actions and time, and the cascade of causes leading to an action. The relationship between freedom, necessity, and context can be illustrated by comparing the situation of a person who is drowning with the situation of a person standing safely on dry land close to the water. The drowning person is clearly less free than the person on dry land. Another way to say this is that the drowning person is running out of degrees of freedom for sustaining life. This example focuses on physical degrees of freedom. But consider a person working in a bureaucratic office; that person's behavioral repertoire is limited by the formal and informal rules, norms, and values of the organization. That same person camping alone in the woods is not constrained by the same set of rules, norms, and values and the argument can be made that s/he is freer in the woods than in the office. S/he has more social degrees of freedom and a different

configuration of freedoms based on the constraints imposed by the environs of the woods.

If we see or otherwise consider a person in isolation it is easier to attribute free will to h/er actions. However, if we view h/er in context, then the things and people around h/er and past experiences revealed in memories, self-narratives, and histories begin to bring into focus the context of h/er actions and then a variety of possible causes behind those actions. We see the person in relation to things and people and events, we see h/er in interactions, we even see h/er breathe and respond to light and shadow. We see then that we are observing controls on h/er behavior, outside influences and causes. Attention to context(s) forces us to revise our notions of freedom and necessity in our understanding of human behavior. Furthermore, we should consider the relationship between the person's actions and time. We view the lives of people who lived long ago with more of a sense of necessity than we view ourselves and our contemporaries. In a similar way the actions I have performed in the near past seem to be freely willed while those performed in the far past can be more readily viewed in terms of their dependence on various circumstances and contingencies.

Tolstoy points out that Bismarck seemed in his time to be behind the unfolding of the Austro-Prussian War, just as the Napoleonic wars seem to be rooted in the wills of their heroes. Even then Napoleon can already be seen to be losing the luster of the heroic will. If we now turn our attention to the Crusades, our judgment is that it is of a piece with a certain historical situation. Those who narrated the contemporary history of the Crusades did so without our perspective from afar and so gave undue credit to free willing individuals. Historical perspective has a tendency to drive out free will and credit necessity. The inevitability of events is not, however, a simple matter of material necessities but rather of different degrees of freedom and necessity given that we are dealing with more and less complex open systems.

Our understanding of the realms and degrees of freedom and necessity in human behavior depends on the extent to which we are acquainted with the human sciences. Only when we embrace that acquaintance will we be able to grasp the causal chains that place our

actions in the contexts of what has gone before and what will come after. We attribute free will, in any case, conditionally.

Where we do not know the cause of particular behavior, positive (a virtuous act), negative (a crime), or outside our moral parameters, we are likely to see the behavior as freely willed. Thus, the virtuous act deserves merit, the crime punishment, the neutral case praise for its originality. If, however, we know even one of the possible causes of a particular behavior, we are likely to back away from the attribution of free will. We think free will is less a force where the criminal was raised among criminals, where the virtuous act was carried out in anticipation of a reward, and where the originality of the inventor can be seen to be the result of h/er training and education. Tolstoy anticipated a social science that would multiply example upon example, case upon case, instance upon instance. The result would be that social patterns would come into view and with them the causal nexuses that explained the patterns. The social sciences could be expected to increasingly orient us to see human behavior in terms of necessity rather than freedom. I call to your attention two distinctions I introduced earlier: between freedom and free will; and between determined and lawful behavior.

In addition to the preceding fallacies which I have identified there are some classic fallacies that apply here. The fallacy of misplaced concreteness, described by philosopher Alfred North Whitehead, involves thinking something is a “concrete” reality when in fact it is an abstract belief, opinion or concept about the way things are. The fallacy refers to Whitehead’s thoughts on the relationship of the spatial and temporal location of objects. Whitehead rejects the notion that a real, concrete object in the universe can be described simply in terms of spatial or temporal extensions. Rather, the object must be described as a field that has both a location in space and a location in time. This is analogous to lessons learned from Abbott’s *Flatland* (1884); just as humans cannot perceive a line that has width but no breadth, humans also cannot perceive an object that has spatial but not temporal position (or vice versa). Whitehead’s “fallacy of misplaced concreteness” is more commonly known as “reification” or “concretism.” The error it points to is treating beliefs and ideas as real things or events in the world, mistaking a model for the real world it tries to capture, or the map for the

territory. My principle of mathegrammatical illusions is an example of this fallacy.

A category mistake, or category error, is a semantic or ontological error by which a property is ascribed to a thing that could not possibly have that property. For example, the statement “the business of the book sleeps eternally” is syntactically correct, but it is meaningless or nonsense or, at the very most, metaphorical, because it incorrectly ascribes the property, *sleeps eternally*, to *business*, and incorrectly ascribes the property, *business*, to the token, *the book*. The term “category mistake” was introduced by Gilbert Ryle in his book *The Concept of Mind* (1949) to remove what he argued to be a confusion over the nature of mind born from Cartesian metaphysics. It was alleged to be a mistake to treat the mind as an object made of an immaterial substance because predications of substance are not meaningful for a collection of dispositions and capacities.

First Criticism

One of the major problems we face when we come to interrogate religion is that it is surrounded by implicit and explicit protections from critical scrutiny. Norms of religious freedom and religious tolerance serve as barriers to interrogation. My own thinking on this matter goes back to my childhood when I was already asking what seemed to be obvious questions, Emperor’s New Clothes questions. In college, I came to Marx before I encountered Durkheim and Nietzsche. I was struck by his statement that “the criticism of religion is the prerequisite of all criticism.”

What I understood immediately and transparently without careful dissection of his contextual meaning was that if we could not criticize religion, if we could not interrogate religion, we were hamstrung in trying to carry out any criticism whatsoever. Our ability to detect errors, to uncover mistakes, is compromised if we are always inquiring in the shadow of the prohibitions of religious freedom and religious tolerance, never mind beliefs about heavens and gods. Marx had already figured out that interrogating the “fantastic” realms of religions and gods turned

up only our own images. The foundation of the sociology of religion or what Marx called “irreligious criticism,” is that religion is a social construction, manufactured by humans in the crucibles of cultures. We do not and cannot stand apart from the human world. We cannot find a place to stand that allows us to see into realms of reality beyond our social and material existence on planet Earth. We can, however, make mistakes in reference. Mistakes in reference can be overcome through vigilant continuous systemic disinterested communal inquiry – in short, through science. For Marx the issue was that humans had not yet “found” themselves or had found themselves and lost themselves again. He was elegant in his description of what religion was all about as an inversion. His words are potent, evocative: religion is the general theory of this inverted world, its “encyclopaedic compendium,” its logic for everyman, its spiritual “point of honor, enthusiasm, moral sanction.” It is humanity’s realization in a fantastic imagined world, a realization before humans have been realized. It is in this context that he arrives at the phrase that has stamped him as an unbelieving icon of atheism: religion is the opium of the people. But read what comes immediately before this phrase. Religious suffering is at once about real suffering and an expression of resistance to that suffering. How that oft-quoted phrase changes its tone and meaning when read in the wake of Marx’s description of religion as “the sigh of the oppressed creature,” “the heart of a heartless world,” “the soul of soulless conditions” (Marx (1970/1844: 131).

Durkheim had the insight that it was not possible to criticize, analyze, interrogate, or study religion scientifically unless one had a religious sentiment. Marx had that sentiment, a sentiment, incidentally, that is absent in the rants of the so-called New Atheists. Like all thinking men and women, Marx is comfortable with abolishing illusions because the happiness they engender is transitory, ungrounded; and we thinking ones demand real happiness or no happiness at all (perhaps replaced by something less romantic like satisfaction, contentment, inner peace). I stand shoulder to shoulder with Marx in calling on my believing readers to give up their illusions. Put baldly this sounds arrogant and unnecessarily intolerant. But what I am really asking you to give up – and here I am addressing the society at large – is the conditions that

demand these illusions. Here again it is impossible to match Marx's humanistic elegance: the criticism of religion is "in embryo, the criticism of that vale of tears of which religion is the halo." To call on religious readers to give up their illusions about their condition is to call on them to give up a condition that requires illusions. I do not expect and ask people to give up illusions. That's not how things work. The "giving up" occurs socially in the way we "give up" believing in Santa Claus and the Easter bunny. Giving up God and religion can evolve as a matter of education and changes in the cultural contexts of our lives. But giving up God and religion on a larger-scale requires certain changes in the vectors of social and cultural dynamics.

There is no clearer statement of Marx's participation in that great Copernican sociological revolution of the nineteenth century than his explanation of what we lose and what we gain by way of irreligious criticism. Criticism kicks the props out from under us, takes away our crutches, destroys our fantasies not in order to force us to bear the chains of suffering but in order that we may live a human reality – a social reality – as emancipated beings. We have revolved around an illusory sun, religion; we should desire to revolve around ourselves. Marx's rhetoric is another way of expressing that Copernican revolution that replaced the free-willing, souled, self-interested, independent ego at the center of ancient humanity with the group, the collective, society, culture, social institutions. This is a program for overcoming the estrangement of humans from their humanity, not a program for subduing the individual person. If irreligious criticism disillusion humanity, it does so that we will think, act, and fashion ourselves and our worlds realistically, in touch with our senses. Our goal here is (and Marx saw this as a philosophical enterprise) to transform the criticism of Heaven into the criticism of Earth, the criticism of religion into the criticism of law, theological criticism into political criticism.

Marx is one of the founders of the social sciences, locating the production of culture in human labor. By acknowledging human labor as the font of humanity, humans prove that they are the manufacturers of history, and of themselves. Here, Marx argues, we have proof ("palpable and incontrovertible") of humanity's "self-mediated birth." This is not some anticipation of self-organization theory, nor an acknowledgement of

free will but a fully sociological view of humans. Marx comes closer perhaps than any of the other discoverers of “Society” (the social level of reality) to understanding humans in the context of society, culture, ecology, and *umwelt*. The emerging nineteenth century theories of social humanity were making it increasingly clear that God was impossible in principle and in practice.

We no longer need to negate God in order to affirm humanity; in other words atheism is no longer necessary. For Marx, we do not need to affirm our humanity by negating a God who doesn’t exist. We do not start from God and negate him to get to humanity. We start from our own sensuous awareness unmediated by alien entities and realms of reality.

Human Survival and the Big Questions

We are asking ourselves the big questions about life, the universe, and everything with more sound and fury than ever. The media are overflowing with explanations about miracles, Biblical facts, the life of Jesus, the dogma fights of the fundamentalism wars, and the creationism/intelligent design versus evolutionary theory conflict. Dan Brown’s *The Da Vinci Code*, a work of fiction, spawned an industry of criticisms, commentaries, editions and translations, a Hollywood movie, and a lawsuit. The discourse on the *Code* continually blurred the distinctions and rules that have traditionally separated fiction and non-fiction. All of this is being driven more by anger, fear, and ignorance than by sound scholarship and fearless inquiry. And even where sound scholarship gets a foothold, it does so without the fearlessness needed to get to the bottom of the issues.

The Emperor’s New Clothes

The sociologist Randall Collins has argued that there are two obvious positions one can adopt on the question of religion; the same positions apply to God. Either you believe, or you do not believe. The average college student will know three positions on the religion and God question: atheism (you don’t believe), theism (you do believe), and agnosticism

(you don't know for sure either way). Sociologists, social thinkers in general, and scientists are believers and nonbelievers in different proportions across cultures. Over ninety-percent of scientists in the National Academy of Sciences and the Royal Society do not believe in God. The percentages are not as high when we look at scientists across the globe. There are believers among the sociologists, those who are not paying attention to the evidence generated in part by their own colleagues.

There is another way to open a study of religion and the gods. We can follow Nietzsche. He wrote to his sister Elizabeth that every "true faith" claims that it is infallible. It gives believers what they hope for, what they wish for, what they want to believe. True faiths, however, offer no grounds for objectivity, for establishing (however tentatively and corrigibly) what is really the case. If your goals are happiness and peace of mind then you should choose faith and unquestioning belief. The disciple of truth, on the other hand, is obliged to search, to think, to inquire, to interrogate. The 1960's slogan "Question Authority" becomes for the thinker an everyday imperative. But the thinker is also obliged to reach conclusions with certainties commensurate with the weight of the evidence.

If you want to achieve peace of mind, you should have stopped reading this book a long time ago. If you are ready to engage the world and discover how it works once we give up wishing, hoping, and praying that it works in ways that make our lives happy, worthwhile, and maybe even worthy of the attention of a God and the promise of an after-life, then I invite you to read on. Our goal here is to interrogate religion and the gods fearlessly, courageously, ready to follow wherever our interrogations lead. We take our lead from the child who pointed out that the emperor was naked.

Occasionally, a self-proclaimed voice of reason emerges to bring order to the chaos of these debates and conflicts. Philosophers and journalists come to our intellectual rescue with naturalistic explanation for religion based on cosmology, evolutionary theory, genetics, biology, sociobiology, and brain research. An oceanographer tells us that the Sea of Galilee may have been frozen when Jesus "walked on water." The New Atheists mobilize a logic of anger against the alleged irrationality of religion. The explanations, criticisms, theories, and ideas proliferate without end and without critical stop signs. Physical and natural scientists figure

prominently in this discourse, some proving God with science, others using science to disprove God. Notably missing from this dialogue are sociologists and anthropologists. One notable exception, sociologist Rodney Stark, has made it into the bookstores with his book, *Discovering God*, but Stark is an independent Christian. He begins his book with a welcome critique of the New Atheists but concludes it with the claim that the universe is the ultimate revelation of God and that (following Kepler) “science is theology and thereby serves as another method for the discovery of God.” And anthropologist Barbara King has written beautifully about the social roots of the religious imagination in our evolution as a species bound by belongingness. And yet, while she believes that science has something meaningful to say about the evolution of the religious imagination, she cannot bring herself to grant that science might actually “explain” religion. So the problem persists. In spite of the overwhelming consiliency of evidences that God and the gods are human creations, very few people seem to have the intellectual and community contexts and resources needed to give up their belief in God – and this is the key issue – publicly.

Where are the fearless social scientists in these debates, discussions, critical explorations? Why are they silent and silenced? Where are the voices of the intellectuals and scholars who see all of this transparent freedom to explain, criticize, and debate religion and God as another cover up – unintentional and intentional – of the discoveries made by sociologists, anthropologists, archaeologists, and scientific historians?

There are two problems with the analytical and explanatory literature on religion flooding the media today. One is that even writers who are nonbelievers are hesitant to close off reasons to believe for their readers, even when the evidence they present fairly assessed leads to that conclusion. The most curious feature of this literature is that nonbelievers or theological radicals are quite ready to throw out the Biblical Jesus of the miracles and resurrection while at the same time (relying on the same sources) accepting the Historical Jesus. The second is a social blindness that keeps writers from seeing the sociology staring them in their faces as they propose one genetic, physical, biological, or neurological explanation after the other for “miracles.”

The easiest and least relevant way to criticize religious ideas is to use logic. I agree with Durkheim that one must possess a “religious sentiment” in order to understand and analyze religion and the gods. Marx had a religious sentiment. The New Atheists do not have this sentiment and so can only conclude that the religious and the believers are ignorant, irrational, and unscientific. I think this applies to those who try to undermine religion and the gods using logic. Religious sentiment is important; so is an understanding about the substance and contexts of religious systems from symbols to rituals and from texts to everyday beliefs and practices. A system, action, event, or process must possess a certain structure for it to be amenable to logical analysis. Since classic logic is at the end of the day a product of our interactions with the world we stand on and in – salient, sensuous, physical – the subjects of logical analysis must possess these same features. This is one of the reasons we need, for example, a quantum logic for the world of the “very small.” Religion and the gods are symbolic, created and nourished in myth and allegory, and social through and through. They do not meet the conditions for being amenable to classical or Aristotelian categorical logical analysis. In fact, because of their very nature they are easily demolished if wrongheadedly analyzed logically. Aristotelian logic and classical logic differ; one of the most important differences is that for Aristotle from “All ravens are black” it logically follows that there must be at least one raven; in classical logic this no longer follows but speaking generally this is indeed true. The way of thinking (!) about logic is basically the same. And, as Aristotle did not really do “formal” logic, all arguments are interpreted and so they deal with “real” stuff. The logical destruction or deconstruction of religious ideas is literally child’s play because they are not built on logical foundations to begin with. The most thoroughgoing logical critique of religion that I am familiar with is Raymond Bradley’s *God’s Gravediggers: Why No Deity Exists* (2016). On its own terms it is devastating but leaves us with only the New Atheists’ explanations for why people believe in things that are logically unwarranted and without scientific merit. Durkheim already made this point in a discussion of religious sentiment (1887/1994: 37). The solution is to use a more appropriate tool for the critical study of religion and the gods.

A scientific approach (read *social* scientific) to religion and the gods will be no more effective in undermining the fallacies and illusions of religion and gods than logic. Such an approach will uncover the mistake in reference and explain the referenced phenomenon. It will be no more successful than logic, however, at changing people's minds. Let's start with two familiar quotation from Marx: (1) "The philosophers have only *interpreted* the world, in various ways. The point, however, is to *change* it" (1998/1846: 571); and (2) "The abolition of religion as the illusory happiness of the people is the demand for their real happiness. To call on them to give up their illusions about their condition is to call on them to give up a condition that requires illusions. The criticism of religion is, therefore, in embryo, the criticism of that vale of tears of which religion is the halo" (1970/1843–1844: 131). What follows from this viewpoint is that we do not have to actively "bring down religion," we do not have to destroy religious structures, properties, peoples, and ideas. Religion as we know it in common sense terms – that is, the moral orders supported by the alienating religions abroad in the world today – will disappear as a consequence of human beings realizing their own non-illusory material essence; it will be replaced by a non-alienating moral order. This is not a prediction, it is a desirable outcome in two senses: first, it represents an emancipation from fantastic ideas; second, it is a pre-condition for the short-term (in evolutionary time) survival of the human species. We need to be guided by something like the nontheistic moral order Michael Harrington outlined in his book *The Politics at God's Funeral* (1983). While it is possible to explain religion sociologically, that is, once we leave the realm of the physical and natural sciences and their logics, it is no more possible to change beliefs in this way than to rely on logic.

The philosopher's caveat might be a straightforward claim that one can logically analyze anything, including allegories and metaphors. This caveat is strengthened by the fact that there are so many logics around that it might not be too difficult to find "the right" logic for any given application. Even a system characterized by inconsistencies would yield something interesting logically by applying a paraconsistent logic. But I do not want to stray too far from the main point here: (a) logic (any logic) can never be assumed to "say" everything there is to be said about any given phenomenon; (b) logic cannot be assumed, the philosopher's

caveat notwithstanding, to be universally applicable and appropriate; and (c) logic cannot be expected in isolation to have any bearing on the believer (cf. Kafka: "logic is doubtless unshakeable, but it cannot withstand a man who wants to go on living").

The Mormon, Jesus, and Mohammad Narratives: Case Studies in Institutional Schizophrenia. Writing about religions and gods can be a dangerous occupation whether you write scholarly treatises or novels. Salman Rushdie was subjected to death threats in the wake of the publication of his novel, *The Satanic Verses* (1989). The Ayatollah Ruhollah Khomeini, Supreme Leader of Iran, issued a *fatwā* (technically, a legal opinion or interpretation in Islamic law) on February 14, 1989, sentencing Rushdie to death for remarks in the novel that were critical of Islam, the Prophet, and the Koran. Dan Brown's *The Da Vinci Code* provoked a lot of controversy but he did not have to assume a new identity to protect himself from assassins. However, the author and activist Kathleen McGowan received death threats in the wake of defending Ron Howard and the production of the film version of Brown's *Angels and Demons*. Some authors of monographs on Islam, including Christoph Luxenberg and Ibn Warraq, publish under pseudonyms to avoid threats and violence. I write with the headlines still echoing the assassinations at Charlie Hebdo in Paris. We scientists, thinkers, inquirers into the nature of things have always worked knowing the barbarians were at the gates. Thomas Wolfe's *The Story of a Novel* offers some insights on why we write, and write, and write no matter what. This is also an insight into why we think and think and think no matter what.

There are many prejudices and uncritical assumptions we need to eliminate in order to grasp the nature of religion and the gods. One of the most serious of these is that the alternative to miracles is a physical or natural science explanation. This approach assumes that a reported miracle is about some event that actually happened. So, for example, if a text narrates the parting of the Red Sea, the physical or natural scientist assumes that this was an historical event that was reported accurately but that exceeded the powers of knowing in the observers. As scientists, the explainers automatically eliminate a miraculous cause. In its place they put a known physical or natural process that could explain the reported event – in this case, for example, an earthquake. When Jesus walks on

water, the “scientific explanation” is that the water was frozen or that he walked on a levee. Once we have social science, we can see that such narratives are cultural and symbolic. The social science explanation would be that Jesus did walk on a levee but he did this in order to reach a baptismal boat and to claim the traditionally hereditary role of the priest. Notice that the physical and natural scientists never question whether Jesus was real or not and whether or not there was a real “walk on water” event.

Mormonism is as much a construction of personal, political, and manipulative agendas as any other religion. It is a fantasy built out of illusionary bricks and mortar. It lacks the sophistication of the Biblical allegorists. It is a parasitic derivative that exploits the historical power of Christianity. The difference is that unlike Christianity, for example, which emerged two thousand years ago, Mormonism came onto the world scene in the 1820s. More than any other contemporary religion that is of any societal consequence, the evidence on the inauthenticity of Mormonism is readily available. We do not have to depend on archeological digs, the reconstruction of missing or partially destroyed texts, or multiple translations of key texts. Mormonism is an exemplary emperor’s new clothes religion,

Mormonism emerged during a period in American history known as the Second Great Awakening. The Second Great Awakening was a Protestant revivalist movement led by Baptist and Methodist preachers that arose in the late eighteenth century, reached its peak between 1800 and 1820, and declined after 1840. The best explanation for the moment is that it was a reaction to skepticism, deism, and rational Christianity. It was during this period of millennialism and irrational evangelical exuberance that Joseph Smith, Jr. “saw” God and Jesus. The so-called “First Vision” of God and Jesus as two separate individuals established one of the key differences between Mormonism and traditional Christianity. Moved by instructions from the voice of God, Smith set out to establish the “true” Christian religion codified in the Book of Mormon. Smith and his followers began baptizing converts into their new church, formally organized as the Church of Christ in 1830.

Visions of God or Jesus or the Buddha are no more indications of a real entity than my four- or five-year-old self “seeing” Santa Claus meant

that there was a real Santa Claus (my experience was purely hallucinatory since I was in bed with both parents during this event and what I saw could not have been my father – or mother, or anyone else – dressed up as Santa Claus). Understanding what is possible or probable should be the starting point for an assessment of any event or process. If someone claims to have seen Elvis eating at McDonald's yesterday, you should know that this is transparently impossible insofar as it involves a real Elvis returned from the dead.

Smith claimed that he translated The Book of Mormon from an ancient language through God's intervention. God also instructed Smith not to align himself with any other church, for they were all wrong. True Christianity was to find itself in the Church of Christ established by Smith and his followers in 1830. Persecutions followed and the church fled from New York to Ohio, and Missouri. In the wake of conflicts in Missouri, the Missouri governor issued an "extermination order." The Mormons fled to Illinois where they lived peacefully until conflicts with non-Mormons escalated once again. In 1844, Smith was killed by a mob. Brigham Young succeeded Smith as the new leader of the largest group of Mormons, The Church of Jesus Christ of Latter-day Saints, and settled in the future Utah territory.

The details of Mormonism pale in the light of the biography of Joseph Smith. His reports of visions and golden plates are the ramblings of a person who combines the personalities of a con man and a schizophrenic. But mad or sane, consciously or not, Smith draws on and exploits the cultural resources of the world around him. The cultural context of his era made him as much as it drove others to embrace his ideas. Where did America stand among the nations of the world? What was her destiny? Belief in God and Jesus Christ drove a sense of promise and freedom that would morph into the idea of American exceptionalism. In the hands of Smith, and through the actions of his fantastic creation, the Lamanites, America is transformed from the promised land into what the Puritans referred to as a "howling wilderness." The westward movement of the Mormons, fueled by injustice, criminal behavior, and incompetence, was justified in an ideology of reclamation.

As sociological materialists and critical realists we deny the idea that Smith (or anyone else) could have been a prophet guided by God.

We do not deny that Smith experienced things that way. But we are obliged to apply our knowledge of human mentality grounded in psychiatry, behavioral science, and social science. Therefore the specific doctrines of Mormonism are pure fantasies whose only substance arises from the cultural resources of American myths and ideologies, and the mechanisms that drive the personality of a schizophrenic.

The lesson of the success of Mormonism is that belief is the riskiest form of reasoning. It is immune to the fundamental power of facticity. It is about wanting the world to be a certain way and living your life in accordance with the fantasies generated by wants and wishes.

Why is Jesus still worshipped and why do we take Mormons seriously? Consider that from the perspective of a sociological materialism, Jesus was either one of the mythical solar messiahs; or the solar messiah mythology was socially tattooed onto the life of an historical Jesus. There is a third possibility, and that is that Jesus was a composite character, a fictional person based on the lives of two or more historical and/or mythical figures. Finally, Jesus might be – and most likely was – a completely fictional symbolic construction built on the template of earlier fictional heroes and gods. Outside of this perspective, one general strategy tends to be to assume the reality of Biblical stories and then set out to prove or otherwise theorize the facts of the matter. Another is to assume the good intentions of the Biblical writers as news reporters trying to be “objective” and then to pull apart their stories. These are empty exercises given what we know sociologically, anthropologically, archeologically, and historically about the Bible and Christianity (and all other religions and religious texts).

Muhammad is just as elusive as Jesus. He is just like Jesus a fabrication based on a historical figure, a fictional symbolic construction, or some combination of history and myth. And the Koran, like the Bible, is not as many believers contend a once and only document. The various versions of the Koran are fewer in number than in the case of the Bible and more consistent across versions. But deletions and distortions are ubiquitous. By contrast with the Bible, the Koran is more repetitive and the writing style reflects the fact that a systematic prose style had not yet developed among teachers and rulers in the emerging Islamic world. Aside from and independent of the problems of reference that arise in

this sort of text, arguments are not developed within a well-developed paradigm of logic.

Just as ancient Palestine hosted a multiplicity of Christian, Jewish, and pagan movements, along with believers and skeptics, so early Islam was an arena of contesting spiritual and intellectual movements. We can ask about the Koran what we ask about the Bible: Which Bible? Which Koran? What was behind the selection and editing of these texts over the centuries? And what was Iraneus' rationale for creating a Bible out of four books and Abu Bakr's rationale for constructing the first tangible Koran? Iraneus' choices were intuitively symbolic – there are four gospels just as there are four points of the compass and four winds.

And just as we can't be certain that there was a real historical Jesus we can't be certain there was a real historical Muhammad. It is important to stress based on the sociological imagination that even if there was a Jesus he could not have been the son of God and Muhammad could not have been visited by an angel or otherwise had contact with Allah. I do not accept the claim that Allah coming to Muhammad through the agency of the angel Gabriel is a matter of faith whereas Muhammad's existence is a matter of history. Sociologically and anthropologically we can say unequivocally that there was no Allah and no Gabriel to reveal texts to Muhammad, even if he did exist.

The Koran has none of the literary qualities of the Bible. The historian of the fall of the Roman Empire Edward Gibbon described the Koran as "incoherent" and "rambling." And the Scottish philosopher Thomas Carlyle described it as "wearing" and "incondite." It should be no surprise that there were intellectuals who claimed that Muhammad was mad. The history of the Koran is a history of replacing, losing, revising, and omitting passages. The Koran as we know it is the product of a survey carried out during the reign of the first Caliph Abu Bakr (573–634 CE), Muhammad's father-in-law. The first Koran was collected in one volume by a freed slave, Salim, one of four men Muhammad anointed as a teacher of the Koran. His death during the Battle of Yamama led to the loss of that volume. Other Muslims who had memorized parts of the Koran were also killed. In the face of these potentially disastrous losses, Abu Bakr named Zaid bin Thabit to collect the Koran into one volume.

Uthman sent copies of Zaid's Koran throughout the lands of Muhammad and ordered all other versions burned. In 1972, the Islam "equivalent" of the Dead Sea Scrolls was discovered by construction workers restoring the Great Mosque of San'a in Yemen. The ancient cache contained Koran pages from the seventh and eighth centuries. The point here is that the difference among the texts and manuscripts are minimal, but they demonstrate that there was no perfect, no Ur-Koran sent from Allah. Even Aisha, "Mother of Believers," Muhammad's favorite wife, asked a copier to change a section based on what she had heard from Muhammad himself. Abdullah ibn Salam, a convert from Judaism and one of Muhammad's companions, had compiled his own Koran and there was an early compilation by another of Muhammad's companions, Ubayy bin Ka'b.

The crystallization of political units, the creation of new nations, requires the construction of a moral order that lays out rules and laws of conduct and the justification for the new regime. Muhammad's life comes into focus long after he is supposed to have lived in the context of a dynamic political era. The Koran too did not exist until long after it was supposed to have been revealed to Muhammad. So Islam comes into existence in the context of the crystallization of the Arab expansion. As the Arab regime got settled, Islam was pieced together to form the glue of the new state, its political theology. Muhammad and the Koran were created to cement the power of the Umayyad caliphate and then that of the Abbasid caliphate.

Until this political construction by the political regime there was not simply a lack of written evidence for Muhammad and the Koran but even in the chronicles of non-Muslims there is no mention of or allusions to a new prophet, a new holy book, or a new religion.

The oldest stories about Muhammad do not reflect the Islamic view of who he was and what he did. The nineteenth-century German universities were the earliest sites at which critical research was undertaken on the Abrahamic or Mediterranean religions. Gustav Weil pioneered research on the origins of Islam. His access to sources was limited but he pointed out the vulnerabilities of oral traditions to fabrication and distortion. Ernest Renan, although convinced that Muhammad was a real historical figure, nonetheless was suspicious of the integrity of the

Koran, which was transmitted over a long period of time by way of an oral tradition. Various degrees of skepticism about Muhammad and the Koran are expressed in the works of Muir (1819–1905), Wellhausen (1844–1918), Sprenger (1813–1893), and others. There is virtually no information about Muhammad in the Koran. “He” is mentioned only a handful of times and usually in ambiguous phrases such as “the praised one” or “the chosen one.”

Contrary to what journalist Nicholas Wade believes, religion and the social/moral order are not separate units of evolutionary natural selection, and there is no God gene. Society precedes the individual; the individual is a social unit, a social fact. Humans come onto the evolutionary scene not as individuals who then at some Hobbesian point choose to come together socially by way, for example, of a social contract. Rather, humans emerge everywhere, always, and already social. And these humans emerge everywhere, always, and already religious. That is, where we have societies, we have moral orders systematized as more or less distinct religious activities and institutions. We cannot argue as Wade does that the earliest societies vary according to whether they have religion or not and that natural selection selects for religion. Natural selection does operate on the level of culture and social organization, but cannot select for religion per se because religion is one with social order.

The anthropologist Maurice Leehhardt was told by his father, a pastor and a geologist, that facts are the word of God. Durkheim taught us that God is society. We could then say that facts are the word of society. For a less mythological way of putting this, we can turn to Nietzsche: “We are not thinking frogs, nor objectifying and registering mechanisms with their innards removed: constantly, we have to give birth to our thoughts out of our pain and, like mothers, endow them with all we have of blood, heart, fire, pleasure, agony, conscience, fate, and catastrophe” (*The Gay Science*, Aphorism 3). If we combine this observation with Marx’s insights on the social nature of thinking and consciousness, of science and religion, and of the self itself, and with Durkheim’s ideas on religion as an eminently social thing, we come up with most of the ingredients of what we can call the social constructionist paradigm for understanding religion and God.

My students sometimes ask me: "If sociologists have discovered God, why isn't this more widely known and taught?" My colleagues themselves are very tentative, ambivalent, and uncertain about this issue. Some say: "I agree with you that we have discovered God, but I don't think you should be revealing that sociological truth in your lectures or writings." Some of them write textbooks that demonstrate this discovery, but in the interest of a kind of misguided tolerance often start or end with the caveat that their findings should not disrupt anyone's beliefs. Science – systematic inquiry – is nothing if not a continuing process of upsetting and resetting our beliefs and transforming them into tentative corrigible grounded knowledge. At some point, those of us who are in a position to communicate mundane and revolutionary findings to our students and the reading public need to reveal the nature of our discoveries and convictions. When physicists discover new particles or astronomers discover new celestial bodies, they announce them publicly. When biologists discover new features of DNA, they announce them publicly. Sociological discoveries on the grand scale cannot yet be reported because the groundwork for validating such discoveries has not yet been established. There are other factors that make grand discoveries such as the societal referent for God difficult to communicate. But the media in recent years has brought to the public's attention many theological and scientific ideas that bear on the reality of the virgin birth, the divinity of Jesus, and the validity of religious beliefs around the world. We can say that we need to be more systematic about teaching and publicizing findings in the sociology, anthropology, archaeology, and history of religions and the gods without any intention of imposing our views on others, or with the goal of forcing others to take up our intellectual causes. Keep in mind, though, that education is nothing if it is not about imposing viewpoints. Tolerance and open-mindedness are as much impositions as "facts of the matter." We do, however, have an obligation as educators, scholars and intellectuals to let people know what we are up to. Education is a dangerous enterprise because it propagates new ideas that may eventually take hold in the future. Secularization is just one sign that the old religions are dead or dying. The web of doubt that spread among nineteenth and early twentieth century thinkers and was an early sign of this process – the novelist

Thomas Hardy writing a poem titled "God's Funeral," Nietzsche infamously proclaiming "the death of God;" H.L. Mencken listing the names of immortal gods who have died; the disappearance of colleges with religious affiliations; and the very disappearance of God. God progressively disappears in the Bible itself as we move from Genesis to Revelations; God becomes more distant from His creations, more "abstract."

All of this was foreshadowed by the Enlightenment, and Hobbes' defense of The Great Separation. Hobbes argued that no just and reasonable political life could be based on a Christian political theology. The modern romantics, following Rousseau rather than Hobbes, sought to implement a political theology grounded in human experience. They did not want to jettison the divine and religious sentiments but wanted instead to purify them in a rational way. In spite of their differences, Hobbes' and Rousseau's followers agreed that the Biblical God could no longer be taken seriously. Friedrich Schleiermacher tried to span this difference by claiming that we should refer to our human awareness of our dependence on "something" as God and let this replace the notion of divine revelation. It took someone with a highly developed sociological imagination combined with a refined religious sentiment, Emile Durkheim, to finally see that that "something" was in fact society, the social group.

Let us step back for a moment and recall the great controversy stirred up in ancient Greece when Protagoras (ca.490–420 BCE), a pre-Socratic Sophist, proclaimed that "man is the measure of all things." This violated the prevailing idea that the universe was based on something beyond human influence. Schleiermacher takes the same Protagorean step by making man the measure of theological truth in the midst of a world ruled by a God beyond humanity and human influence, a God we could only know through revelation. The revolutionary but unstated assumption in Schleiermacher was that God would be revealed as we came closer to finding ourselves. When Durkheim and the sociologists decentered the self and put society and the group at the center of the human universe, Schleiermacher's implicit assumption was refined into the scientific proposition that we can discover God by finding ourselves in society and the group. Durkheim and the sociologists benefitted from the development of modern critical Biblical studies pioneered in the German universities in the wake of the wars of liberation (War of the

Sixth Coalition, 1812–1814) that sent Napoleon Bonaparte into exile. We can no more declare the death of secularization because there are still vibrant signs of belief and faith any more than we can announce the death of evolution because there is resistance from creationists and intelligent design advocates. The debate between creationists/intelligent design advocates and evolutionary scientists shows up in an altered form as a debate between religion and education. For an example of that particular conflict see [Box 6.1](#).

Box 6.1 An Immodest Proposal

Before the start of the academic term, professors at most if not all secular universities receive the following type of message from a high ranking official in the administration, normally the provost. Underscoring the fact that the university is nonsectarian and inclusive, the provost lays out the policy that permits members of any religious group to absent themselves from classes without penalty when required for compliance with their religious obligations. This comes with a thank you to professors for their continued cooperation in creating an atmosphere of understanding and accommodation in response to students' commitments to religious observation.

How is it that we shouldn't be asking students for their understanding and accommodation to the institutions of higher learning which indeed have uncovered the referential errors of religious institutions and beliefs? Every rationale for religious tolerance in universities undermines the very idea of the university and the value of education.

The "respect for religion" paradigm infects the first amendment to the Constitution of the United States. That amendment reads: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances." We are not living in 1791; and even then the authors of the First Amendment were not well-informed about the nature and history of the relations between religion and governments, relying primarily on an exaggerated view of the correctness of their naively empirical reading of that history. Even Jefferson, while recognizing the limitations of the Bible as history stood firm on the religious teachings of Jesus. A 2021 First Amendment should read something like this:

Congress shall make no law respecting an establishment of education, or prohibiting the free exercise of thoughts, science, and research; or abridging the freedom of speech, or of the press; or the professoriate

and teaching professions; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

What would happen if I as a provost included in my message to the faculty that students whose religion was Atheism would not be penalized for missing classes on May 18 (Bertrand Russell Day), or January 29 (Thomas Paine Day), or February 12 (Charles Darwin Day)? Should Martin Luther King Day be a “religious holiday”? What about Sojourner Truth Day?

Concluding Sections: We Can Still Tell the Truth

It is crucial for human survival that we get certain things about how our world works right. Contrary to many of the conclusions reached by scholars and intellectuals in the postmodern world, it is still possible to tell the truth, it is still possible to distinguish what is real from what is not real, it is still possible to make a distinction between right and wrong facts of the matter. Hallucinations are real enough experientially; but one cannot feed them or get their help in crossing the street; they are not real in that sense. All of this has admittedly become more complicated, more subtle, more inspired sociologically. But truth telling has not become impossible. Historically, our collective capacity to solve problems of survival has depended on leaving childish things behind, on reasoning our way past the old myths and mysteries. Traditional beliefs about religions and the gods have survived the virtual onslaught against traditional beliefs in general by science and technology, but not without giving some ground. The first modern civilizational setback for religious beliefs came in the loss of faith that spread like a wildfire across the industrializing world in the nineteenth century. This was primarily a movement within the West but it held lessons for all the world's religions. Historical studies of the religions of the East emerged alongside a virtual avalanche of studies of Christianity. Of course, religious beliefs have been the object of criticism, skepticism, and theorizing from ancient times to the present. What was unusual about the nineteenth century was that assumed matters of fact started to wither in the face of new archaeological and historical evidence about and the emergence of social theories about religions and gods.

What are the consequences of viewing the history of the idea of God (and of gods in general) and religion in comparative and cross-cultural perspective, and intersecting this view with advances in the social and cultural sciences over the last two hundred years? More specifically, what are the consequences for the view of history as the divine unfolding of God's plan and God's voice if we adopt a view of history as a human narrative and moreover as a social and cultural narrative? What is the significance of death of God narratives in theology and philosophy for our understanding of history and time? Physical and natural scientists have had a great deal to say about such issues in dialogue with theologians and believers, both as participants in conflictful dialogues (notably though the efforts of aggressive opponents such as Dennett, Dawkins, Harris, and Hitchens using a logic of anger), and in dialogues of harmony, convergence, and détente (most notably and visibly in the works of Karen Armstrong and Tenzin Gyatso, the current Dalai Lama). The logics of anger, mystery, and uncritical, cynical skepticism have dominated debates and discussions about God, religion, and society for thousands of years. The emergence and development of the social and cultural sciences has changed the grounds and terms of heavenly discourses, but this change has not penetrated the centers of contemporary or even more broadly modern intellectual and lay circles of inquiry. What is more sinister is that where it has penetrated – and it has penetrated quite widely – it has been sucked into a black hole of withheld information. The public has been left in the dark even as the theologians themselves have increasingly become students of the sociology and anthropology of religion and the gods.

There are numerous indications that the continuing tolerance for religious ideas which even atheistic and post-atheism intellectuals and laypeople support is threatening our survival. Creationist museums in Ohio and Kentucky opened in this century and one in Texas founded in 1984 flaunt a level of ignorance that is equivalent to putting astrology on a par with astronomy or numerology on a par with mathematics. The problems being generated in the context of contemporary global society will not yield to solutions contaminated by illusory and delusionary belief systems.

Closing the Door on Pure Reason

Gertrude Stein's "There is no there there" has been widely quoted and her meaning probed by critics. I was struck by how it echoes "the emperor has no clothes," but adds a dimension of nostalgia to coming face-to-face with a reality that can take away things we cherish and challenge us with its recalcitrance. I have in the past linked this quotation to challenging the cult of pure reason (der Kulte der Reine Vernunft). There is no pure reason there; there is no God there. We are continually forced to wonder about the resistance of Platonic, transcendental, and supernatural thinking to the lessons of history and science. Those who continue to praise Plato and the gods include great thinkers who are prepared to dismiss out-of-hand beliefs about Yetis, alien abductions, astrology, and visions and voices of God. Platonic, transcendental, and supernatural thinking are robustly resistant to the lessons of modernity and post-modernity. The completion of the Copernican sociological revolution demands the end of Plato, Descartes, Kant, and God. These ghosts cannot be sustained in an age of sociological and cultural materialism. Increasingly, every mistake in reference, every error in logic, every gap in knowledge becomes a threat to reason in our liminal time. We are no longer working and playing on a planet whose limits we can take for granted. We may not have the resources we need materially and intellectually to solve the species and planet level problems we face. But we surely will fail if our efforts are burdened by the ghosts of the past.

Plato, Gödel, Einstein, and Heisenberg have not given us the keys to our survival as the philosopher Rebecca Goldstein would have us believe. If these are the only or the most important keys to our survival with quality we will fail. I don't endorse Goldstein's iconic saviors approach, but if we did want to play that game it is Darwin, Marx, and Durkheim who hold the keys to who what, where, and why we are. It is obvious that even my choices bind us to a white European male paradigm. My choices, however, are more readily linked to traditions from Madame de Stael to Harriet Martineau, Emma Goldman, and Rosa Luxembourg,

and from Sojourner Truth to Betty Friedan, Angela Davis, Germaine Greer, and post-colonial feminists such as Chandra Mohanty.

If there was ever a time when we could defend art for art's sake or science for science's sake, if there was even a time when this was possible, that time has passed. We can no longer tolerate exercises in pure reason for the sake of pure reason, a strategy that still to this day sustains the lives and livelihoods of philosophers like Goldstein and Latour. I do not deny that the philosophers are well-intentioned, only that they are increasingly the theologians of a secular world sustaining a worldview more medieval than modern. Pernicious myths and dogmas flourish in this atmosphere. The claims that you can't prove or disprove God, that faith escapes the chains of reason, and that science and religion stand apart as non-overlapping magisteria only make sense in a world without social science. We know with the same certainty that we know the planets orbits are elliptical that the referents for God and the gods are always going to be found in our selves, our cultures, our material environments.

This is a terrible, terrifying claim to make and defend. So even those with the courage to share what they know on this matter feel obliged to leave believers with hopes they know to be false. This is a formidable undertaking because God, gods, and religion are about the social glues of society. It is not, however religion or the gods per se that are the glue; moral orders are the glue, and moral orders can be variously configured, religiously, politically, and even around physical fitness (as illustrated in the biography of fitness guru Jack LaLanne). Our goal in these liminal times should be to construct moral orders that are not anchored in entities and realms that do not refer materially, naturally, and socially. I have written elsewhere that making a distinction between "abstract" and "concrete" ideas and levels of reality brings with it a volatile potential for entrapment by transcendental and supernatural realisms. The difference between abstract and concrete is in fact a difference between levels or degrees or types of concreteness. Abstractions are a form of concreteness associated with highly professionalized activities, and find their acme in the intellectual professions. The very idea of an abstraction is an invitation to purified reason; it takes us to the very threshold of transcendental and supernatural realities. There also we find the danger of falling into the trap of believing in supernatural and transcendental entities.

In my concern for understanding the limits of tolerance, I have come to the position that ecumenical efforts across the religious landscapes and bridging the gaps between science and religion are misplaced. If, as Karen Armstrong and the Dalai Lama claim, religion is universal and that all religions share the characteristic of compassion, then the ecumenical strategy has a chance to work. The problem is that compassion is a centripetal force, a force that draws people toward the moral center of their societies while establishing a more or less impenetrable boundary that outside forces of compassion cannot penetrate. Centrifugal compassion is weak at best. It is never easy to peacefully meld even equally compassionate societies. That said, Karen Armstrong is in my view the most intelligent and knowledgeable contemporary writer on religion and the gods. Her sociology is not always at a level I can endorse without reservations, but her history and her religious sentiment are more than adequate compensation. I read everything she publishes and I urge you to do the same: https://www.google.com/?gws_rd=ssl#q=karen+armstrong+books.

Epilogue: A Social Science and Historical Evidentiary

The mountain of evidence against the existence of gods and transcendental and supernatural realms has been built up from within religious institutions themselves and from outsider scholars and social critics. Outsider critics include scholars across the intellectual spectrum some of whom are believers, and some who are comedians. Sociology as a discovering science has demonstrated that the gods are human creations, symbols of social life. But not all sociologists view their discipline as a discovering science, nor do they view the sociology of religion as a challenge to faith and belief. Personal beliefs among sociologists can trump sociological knowledge about religion, gods, and beliefs and faith itself. Allow me two examples.

Rodney Stark, a distinguished sociologist with reasonably sound claims to scholarly acumen is known for his lucid contributions to the sociology of knowledge and religion. Consider, then, what our expectations should be upon seeing the title of his 2008 book, *Discovering God*:

The Origins of the Great Religions and the Evolution of Belief. This is a very promising title from the perspective of sociology as a discovering science. And indeed Stark's sociology doesn't fail him when it comes to criticizing the New Atheists and their fellow travelers. Religion and belief and God are not as the logic of anger that guides the New Atheists would have it delusional, based on ignorance, and worthy of contempt from the scientifically literate. What is missing in the New Atheist arguments is any religious sentiment or robust understanding of the sociology of religion and its findings on symbols, rites, rituals, and morals. Stark understands the sociological truth that society and religion are mutually implicated. He doesn't see that religion is just one of the ways the glue – the moral order – that binds us in families, communities, and societies can be constructed.

Nonetheless, there is a great deal of valuable historical and cultural information about religion and belief in Stark's book. The problem with the book is signaled by the leading headline blurb on the back of the book jacket: "Did God Create Us, Or Did We Create God?" The answer to this question is signaled by Durkheim's discovery that the gods are symbolic constructions forged by humans in cultural contexts. But Stark is haunted by the shadow of a confusing experience of religious faith. In the late 1980s he described himself as incapable of religious faith but not an atheist. When he joined the Baylor University faculty in 2007, he said he had changed his view and now described himself as an "independent Christian" and in any case always a "cultural" Christian. He was also willing to associate himself with agnosticism. All of this may help to explain why all of the laudable scholarship that characterizes his book on "discovering God" comes apart in his closing paragraphs. Here he falls victim to intelligent design arguments and takes the side of those who believe that life, the universe and everything could not possibly be one big meaningless accident.

At the end of the day, Stark claims the universe is the "ultimate revelation of God," and that science is fundamentally theology. This is an exemplary failure of the sociological and the scientific imagination. Michael Harrington, political philosopher, social critic, and socialist activist writes more explicitly about the death of God but under a comparable shadow of faith and belief.

Harrington has stronger grounds for his atheism than Stark has for his beliefs. He nonetheless carries a religious burden that as we will see colors his brilliant 1983 book on *The Politics at God's Funeral*. He was educated at St. Roch Catholic elementary school (which describes its mission as Faith, Education, Service, and Discipline), and the Jesuit secondary school Saint Louis University High School). His interest in left wing politics and Roman Catholicism led him to join Dorothy Day's Catholic Worker Movement. He edited *The Catholic Worker* from 1951 to 1953. Though he came eventually to atheism, he always remained, like Stark, a cultural Christian, and more specifically a cultural Catholic and a "pious apostate." Given this background should we – as sociologists of knowledge – be surprised that in a book that literally screams out that there is no God or gods, he timidly skirts around making that claim explicit.

In the first place, Harrington repeats the oft-claimed "truism" that one cannot prove or disprove the existence of God. This is no longer defensible once we have a social science that can identify and explain symbols and cultures. Second, he evades confronting the relevance of his analysis for the individual, which is exactly the most important focus for the sociology of religion for reasons I have discussed earlier. If the death of God is as significant as Harrington claims – even if this is "only" the death of the political God – how does this not redound to individual belief? Doesn't Harrington think at least some of his believer readers will wonder why he doesn't believe in the supernatural – isn't that where the God of the believers if not the political God "resides"? One will find the same failure of courage (however politically, culturally, and economically it demonstrates a capitulation to everyday social expectations) in sociology textbooks. Chapters on the sociology of religion never lead the student to the conclusions entailed by a full-fledged social constructionist understanding of religion, god, the supernatural, and the transcendental.

Finally, Harrington's proposition for a coalition of believers and nonbelievers suffers from the same sociological naiveté expressed in the calls for a contract of compassion by Karen Armstrong and the Dalai Lama. We are in a competitive struggle of competing (in Darwinian terms) cultural species that will not break through the barriers of centripetal compassion.

Even if Jesus lived, and even if he was remotely the character that evolved out of the pages of the Bible, his “life and works” would not explain the origins of Christianity. The matter of fact for the lay student of Christianity is that it arose on the foundations of and in the context of pagan cultures. The signs and scars of its pagan origins are still visible in the diversified Christianity of today. Jesus is a symbolic construction manufactured out of pagan myths and legends, a selective reading of Hebrew Scriptures, and very likely bits and pieces of Eastern narratives that had traveled West primarily in the tales and ways of traders. On an organizational level, we see that religions are in and of the cultures they represent and arise in the way that early Christianity organizes on the organizational template of the Roman Empire.

What should you believe if you are a Christian? If we sociologists and historians have our narrative right, we should expect beliefs to change as societies change. Consider, for example what Christians should believe if they follow Jesus in accordance with the Sermon on the Mount in the New Testament (Matthew Chs. 5–7), and what they should believe according to the Nicene Creed, originally adopted in the city of Nicaea (Iznik in present-day Turkey) at the first ecumenical council in 325 CE. And then compare the original creed with the version used today. If Christian doctrine were about following the Sermon on the Mount, it would be about how to live one’s life. On one level, this would be about living your life in a way that was pleasing to God and dedicated to Him. On the level of everyday life, it would be about how to be a good person within your family and community, an encouragement to be good and do the right things (according to the values of the society Matthew Chs. 5–7 reflects; some of these would apply today, some would not because times and values have changed). However, to the extent that Christian doctrine is about following the Nicene Creed it is more about adhering to certain theological doctrines about the nature of God and Jesus and their relationship. This takes the focus away from living the good life in the good society and makes it more a matter of following the precepts of the church fathers who draw their ideas about everyday life from the powers they derive from general theological doctrines.

As critical thinkers, we need to have some strategies about how to proceed when we arrive at the intersection between faith and knowledge,

at least if we still harbor faith as a strategy of life. What happened to those ancient people who were convinced about the reality of their gods? Some of them were as convinced that Osiris was real as some are today convinced that Jesus is real. What's the difference between Osiris and Jesus? And who are those "other gods," Mithras, Tammuz, Hermes, and a multitude of others whose lives mirrored the life of Jesus? Many of these gods were sun gods who revealed the truth in Macrobius' claim that "All gods are only different powers of the sun."

Who do you think said the following? What is the first name that comes to mind as you begin to read?

He who will not eat of my body and drink of my blood, so that he will be made one with me and I with him, the same shall not have salvation.

If you went to the school in the West, and whether you are Christian or not, you are most likely to have associated the quote with "communion" and with Jesus. The correct answer is Zoroaster. Zoroaster is the first person we know of to make this declaration and he lived (?) thousands of years before Jesus. At the end of the day, however, we cannot be certain about attribution but we can within the certainty constraints of the history of the ancient world recognize certain ideas that appear over and over again over thousands of years and get associated with persons who may or may not have lived.

We know with a high degree of certainty that Jesus – whether he was a real person or not – stands in a long line of potential saviors, from Adonis and Horus to Krishna and Osiris, who occupied a social role with certain characteristics. They were all born on "Christmas Day" in a cave, underground, or in a grotto to a virgin, served their people, died and rose from the dead, and were celebrated with a eucharist. This social role, to varying degrees correlated with the solar messiah concept, or that of the magus (see Morton Smith's *Jesus the Magician*, 1978), existed for thousands of years. And it is a pattern that can still be found in the poorer parts of the world as well as in major urban centers. Consider, for example, the emerging cult of Elvis. Some people have constructed altars to worship him and there are many signs that, however small the scale at the moment, Elvis is being transformed into a Jesus surrogate who will return. Some of his followers believe he has already returned.

I had the advantage of a head start in critical thinking about religion and that made me more aware of the implications of these matters of fact. I got my head start because I grew up in a Roman Catholic household in which my mom and dad represented two widely different worldviews. My mom was born in Calabria, Italy, and came to the United States when she was a young girl. She had a couple of years of schooling and then went to work. Her religious beliefs were inertial. She believed what she'd learned from her parents, relatives, and the church uncritically. My dad was born in Brooklyn, New York, of Sicilian stock. He went to school up to the eighth grade and then went to work when his dad died. What I remember most about his way of thinking is that he was fond of saying, "I don't believe in anything." My mother was, in short, an untutored, uncritical believer; my dad was an untutored critical nonbeliever. I took to science early on and almost immediately started to find church boring and filled with meaningless nonsense. In my teens and deeply engaged in science, math, and engineering, I shed the last remnants of belief but not without some misgivings. After all, I was only a teenager facing an unfathomable cosmos; what, after all, did I really know? But as I read more, took courses, encountered nonbelievers, atheists, agnostics, believers across the spectrum of religious and spiritual systems, matters of fact accumulated. Of course, I was slowly entering a world of research, theory, and experiment and therefore encountering more and more people and more and more information that undermined what I'd been taught. And the matters of fact continued to accumulate.

A certain humility which does not come easily to me did keep me from fully and unequivocally embracing the fact that the universe is natural top to bottom, godless and without inherent meaning. I was well into my forties before the tipping point arrived in the form of too many Jesus surrogates, too many virgin mothers, too many sons of gods, too many twentieth-century discoveries of gospels in the deserts of the near east (and now available in local bookstores and online; see *The Nag Hammadi Bible*, the *Dead Sea Scrolls*, *The Other Bible*, and other collections). Patterns emerged, took form, and solidified: the paradigm of the solar messiah; the social role of the magus ("magician"); the practice of transforming personages known to be human and of human parentage into sons of gods upon their death or during their lifetimes (as in such prominent cases as Julius Caesar,

Alexander, and Plato); and the practice among young women in this world of mischievous beliefs to claim that their unplanned pregnancies were inspired by the Holy Spirit or something like that.

All the Jesus stories have precedents. And this applies to all gods in all traditions. The differences are not differences that matter in this respect. Ultimately, as Durkheim concluded, gods are symbols period. When we combine the matters of historical and archaeological fact with the matters of sociological and anthropological research and theory there is no ground for believers to stand on. Only a fragile and ephemeral faith can sustain their beliefs. But do not misunderstand me; faith is a collective enterprise – it takes a village to raise and sustain a faith. And because faith is coupled with the fundamentals of belongingness that make us human as a biological species and cultural species it is a force to conjure with.

There are some basic things about human behavior and culture that we need to know in order to make our claims about religion, the gods, and their texts coherent. First, we need to understand the very idea of culture, the institutions and patterns of behavior that we are born into and do not choose any more than we choose our DNA. We are born into a language and a network of symbols that we absorb as our own. This process gets more complicated as societies and cultures become more complicated but the process of socialization, or programming, does not change. Societies and cultures are *sui generis*; that is, they are part of the natural world, products of general evolution, and they are a locus of causal forces.

The second thing we need to know is that human lives revolve around symbols. Symbols are ubiquitous but they vary by levels of reference. If I use symbols to direct you to a tree, and you follow my directions and come to a tree, the symbols I used are said to be first-order referents. “The sun” refers first order to the glowing object we see in the sky. Other symbols are not coupled to real objects accessible by way of our primary senses. From the point of view reflected in this book, God is not a first-order referent. The process of referring is more complicated than this but it is important to know the difference between first-order referring and second-order referring (leaving aside the question of higher-order referring). The development of science and knowledge is marked by changes in reference, notably in the present context the change from

“God” referring to a transcendental supernatural entity to “God” referring symbolically to society. Again, cross-culturally and historically our term “God” doesn’t always translate neatly. But “God” or “god” as a cultural idea never refers materially or naturally.

The third thing we need to know is that the Bible and other religious texts, along with many other kinds of texts including fairy tales and moral stories for children, cannot be read literally. We need to know that the art of concealment in writing has a long history that encompasses the ancient philosophers from Plato and Galen to the philosophers of Islam’s Golden Age (700 CE–1500 CE), including al-Farabi, Ibn Sina, al-Ghazali, and notably Averroes and Maimonides. These philosophers operated with a sense of the separation between insiders and outsiders, knowers and novices, the initiated and the uninitiated. Averroes is among the most skillful in the practice of “double writing,” writing that conveys one meaning to the uninitiated and a different meaning to the initiated. He outlined the basic techniques for achieving this form of writing: symbolic allusion to doctrines, hiding the premises of an argument, treating subjects out of context, treating significant issues enigmatically, using equivocating language, confusing the reader with contradictory premises, stating truths very briefly, failing to draw obvious conclusions (choosing to be silent where voicing views is demanded), and attributing one’s views to hallowed real and imaginary ancients. Often when such techniques are used there will be an intra-textual warning to alert the reader. For example, in The Bible, the disciples ask Jesus why he speaks to the multitudes in parables (Matthew, 13:10 (KJV); he replies: “Because it is given unto you to know the mysteries of the kingdom of heaven, but to them it is not given” (Matthew, 13:11 KJV). Clement of Alexandria wrote: “For neither prophecy nor the savior himself declared the divine mysteries in a simple manner, so as to be easily comprehended by ordinary people, but rather he spoke in parables” (Miscellanies 6 15,124. 5–6). In MK 4:9–12, we read: “—And he said unto them, He that hath ears to hear, let him hear; 4:9: Unto you it is given to know the mystery of the Kingdom of God; but unto thee that are without, all these things are done in parables.”

There is a specific version of double writing that applies to the Bible known as the “pesher.” Use of the pesher as an interpretative technology is based on the knowledge that the authors of the Bible “hide” a

“mystery” or a “puzzle” underneath the valid surface text that can only be unraveled by initiates. In their writing, they give words special meaning, turn universals into particulars, and use other techniques described in the writings of Averroes.

These basic resources are enough to help us resolve the problem of miracles in the Bible. There are no miracles. When Jesus walks on water, he does not literally walk on water. This parable symbolizes Jesus adopting the role of the priest, traditionally an inherited role. Jesus does not literally raise Lazarus from the dead; he releases him from his excommunication by the Jerusalem community. Some critics may want to argue against these particular interpretations but the question you have to ask yourselves is whether a symbolic, allegorical interpretation is more plausible than the idea that a miracle occurred. Miracles require suspending natural laws. Symbolic interpretations require consistency with the laws of society *sui generis*.

The authors of the Bible, just like the authors of other major religious, theological, and philosophical texts, were highly skilled in their knowledge and use of literary devices. Allegories were basic to their trade. They were a small elite in a population where the percentage of literate adult males has been estimated to be two percent. Think of this, then. Most of the early Christians could not read let alone understand the Biblical texts. That canon, the four gospels, was a product of political reduction from no fewer than eighty gospels by some estimates. Tradition says that the final formation of the New Testament was the work of St. Jerome in 381 CE. And at the end of the day, when you pick up a Bible today, you are reading the most recent of a long line of translations and copies of copies. No wonder that in spite of the claims by believers that there are no contradictions in the Bible, the number of variations and their contradictions in the New Testament alone are in the hundreds of thousands. The history of the Bible does not end in some final translation that solidifies into a final version. The text continues to be updated in line with changes in mores, values, and ethics. You can go into any bookstore today and find new versions of the Bible that reflect changes in our ideas about gender and social relationships and other cultural factors.

The matters of fact about God, the gods, and religion are now readily available freely in libraries and online and for purchase in bookstores and online. They document the accumulation of evidence to an extent that

overwhelms traditions and faiths to a degree unknown before the 1950s. I have drawn on those materials in writing this book. My remarks on religion and the gods are a generalization of the knowledge, the facts of the matter, contained in the apex of the pyramid of that consiliency of evidences.

Coda: Sociology Meets Theology

Against the background of the consiliency of evidences, I would like in the final section of this chapter to consider once again the place of theology in the world today. In [Chapter 5](#), I discussed theologian Anne Foerst's ideas on robots and theology and demonstrated that she infects her own argument with a self-defeating sociology and anthropology. Here I want to consider Nancey Murphy's argument that science needs theology. Murphy is an internationally distinguished theologian cum philosopher, and one of the most scientifically literate among contemporary theologians. She builds her argument on the foundation of a hierarchy of the sciences, with physics at the bottom followed by chemistry, biology, psychology, and sociology. She follows biochemist Arthur Peacocke, widely published in theology, in placing theology above sociology at the top of hierarchy. The rationale for this placement is that the interaction between God and the whole of reality is the most complex level of reality. Murphy argues that up-down- and top-down causation characterizes the hierarchy. She assumes with other Christians that God is the ultimate cause of the universe and furthermore that the laws of nature are fine-tuned by God to allow for His eventual creation of creatures like us. It follows in her scheme that we need a science above psychology and the human sciences that deals with "the ethical." This reflects the fact that the human sciences are not value-neutral. Here she seems to be unaware of the literature that brings into question the value-neutrality of all the sciences.

In any case, she argues that the social sciences (she uses social sciences and human sciences interchangeably) are suited for studying means-ends relationships but not for studying the ultimate ends of human life. Therefore we need a "science of ethics" at the apex of the hierarchy of the sciences. Ethics needs theology because it is dependent on an account

of ultimate reality and humanity's place in that reality. That account does not have to be theistic. In fact, Murphy points out Owen Flanagan's nontheistic grounding of ethics. Flanagan is a philosopher with wide-ranging interests across the sciences, arts, and literature. Murphy writes that she is at one with Flanagan in assuming that humans are born with a "predisposition" to social behavior (thus missing the fact that humans are born social). She also shares a physicalist worldview with Flanagan (where physicalism is opposed to dualism). Flanagan, however, is not a Christian and does not "know" that we exist in the God of Jesus Christ.

How is it possible for Murphy, as learned as anyone could hope to be in our society, to argue for such a narrow theistic, indeed, theistist view of the world? The puzzle has another dimension. Murphy is a physicalist; humans *are* their biological parts. Furthermore, she quotes me (from a personal communication) on the idea that we are individually and collectively social facts. It is not easy to be a physicalist and a defender of social facts and to defend a Christian theology that makes it into the hierarchy of sciences without negotiating some level of cognitive dissonance. Earlier we wondered how God escaped Foerst's concept of culture; now we must wonder how God escapes Murphy's concept of society.

When Durkheim corrected our reference error and showed that God is a symbol of society he eliminated the need for theology. Coincidentally, he established the programmatic foundation for a science of morals and ethics. Sociologists failed to build on this foundation and so philosophy and theology continue to hold onto their classical jurisdiction over all things moral and ethical. Durkheim, however, has a powerful theological nemesis in the person of former Cambridge University theologian John Milbank, now a professor at the University of Nottingham. His book, *Theology and Social Theory* (1993) is on the surface a formidable engagement with sociology. Milbank's objective in this book is to establish the legitimacy of theology as a meta-discourse for articulating "the word of the Creator God." Judging from his later works his goal seems more like establishing a theocratic Christian state (see Eugene McCarraher's remarks on Milbank's *Beyond Secular Order* (2014) at <https://syndicatetheology.com/commentary/christendom-take-two/>).

It seems hardly worthwhile to bother but there's a lesson in Milbank's puny effort to take down sociology. He challenges the ideas (1) that

sociology gives a significant “reading” of religion which theology must take into account, and (2) that theology must base its diagnoses and policies for social ills on social theory. Milbank’s conclusion is that by identifying the “social fact” with the “sacred” sociology makes itself primarily sociology of religion and a theory of secularization. Milbank senses correctly that sociology is a science that emerges out of the scientific requirements of the industrial revolution. But his paranoid fear of the secular and the modern (never mind the post-modern) distorts his reading of this episode in the history of science and society. He badly misreads the sociological project out of necessity given how close he comes in more recent writings to calling for a new Crusade to resurrect Christendom on the ashes of the secular society.

There is an interesting middle range theology between the Constantinian theology of Milbank on the one hand and the philosophically saner theologies of Foerst and Murphy on the other. In *The Theological Imagination* (1981) Gordon Kaufman, late Professor of Divinity at Harvard (d. 2011) offers a view of God as “creativity,” “ultimate mystery,” and a living symbol of our culture. This God is a god of the global ecumene independent of the local and world religions. This God bridges the faith-science divide and meets the requirements for a God of the twenty-first century, a century in which global threats have replaced the traditional existential questions of guilt, sin, happiness, and so on. If Kaufman does not reach the point of defending a social constructionist view of God, he does view God in terms of a process of construction. God is the unfolding of creativity in the universe, a process that is happening around us and within us. This middle ground forces theology to take full account of modern thinking in evolution, biology, and cosmology. Sociology seems close by but Kaufman was unable to cross that threshold.

Bibliographical Epilogue for Chapter 6

I came early to the idea that religion and god were not to be taken for granted. I discussed my family background above. When my two sisters and I had occasion to ask our dad if he believed in God or an afterlife, he

emphatically said, “No.” His view was that God was actually nature – trees, flowers, the sun and stars, and so on. He had a pantheistic perspective free of any notion of divinity. God looked more and more like the same kind of lie that Santa Claus was. During my confirmation, there was a moment when the priest proclaimed, “You are now all soldiers in the army of Jesus.” I buried my head in my godfather’s chest and said tearfully, “But I don’t want to be in the army.”

By the time I got to college I was experimenting with being an atheist and agnostic. I could see no good reason to believe in God or an afterlife. However, aside from the knowledge that there were very smart people who didn’t believe in God I really had no evidentiary grounds for not believing. I was still trying to make sense of it all and I came across a book on Catholicism for intellectuals (the exact title and author escapes me now). I read it and didn’t find that it really appealed to the intellectual in me. Politically, my incipient atheism was being fed by my increasingly self-conscious attraction to socialism and communism. By the time I got to graduate school I had a reputation as a Marxist and I was prepared for Durkheim’s *The Elementary Forms of Religious Life* (1912) to convince me that it was possible to theorize God and religion sociologically (and see Emile Durkheim, *Durkheim on Religion*, ed. by W.S.F. Pickering (Atlanta, GA: Scholars Press, 1994). This made a lot more sense to me than trying to theorize God logically or by relying on physics, chemistry, or biology. It wasn’t until sometime in the 1970s that the evidentiary grounds for disbelief and for positive knowledge began to take shape for me. Morton Smith’s *Jesus the Magician: Charlatan or Son of God?* (New York: HarperOne, 1978) was a major discovery. It put me on the path to developing a segment of my introduction to sociology course on the social role of Jesus. About the same time, I discovered E.M. Butler’s *The Myth of the Magus* (Cambridge: Cambridge University Press, 1948). The paperback version I read appeared in 1979. In the intervening years the development of an ensemble of probabilities and consiliency of evidences has been fed by an improving appreciation for the contributions of the classical social theorists to the sociology of religion; in addition to Durkheim, Max Weber is among the most important in this group: see Weber’s writings on the religions of China (1920), India (1916), and Judaism (1917–1919), and see *The Sociology of Religion* (Boston: Beacon

Press, 1961; originally published in German 1922). The general bibliography contains many items that are important to understanding religion and god as social constructions. Among those that have significantly influenced my thinking and that I have not included in the general bibliography are Daniel Lawrence O'Keefe's *Stolen Lightning: The Social Theory of Magic* (New York: Vintage, 1983). John Leonard of the *New York Times* described the book as "splendid, daunting, almost wicked." It is a tour de force analysis of the place of magic in society and draws on materials from Egyptian theurgy to Zande witchcraft and from Western astrology to modern cults. In the process, O'Keefe develops a theory of religion. To my knowledge, O'Keefe never wrote anything like this again and when I contacted him about the book he was working as a senior staff editor at *Readers Digest*.

For a more detailed philosophical analysis of the very idea of reductionism discussed early in this chapter, see Richard H. Jones, *Analysis and the Fullness of Reality: An Introduction to Reductionism and Emergence* (2014). The fundamental flaw in Jones' approach to social science is that he criticizes the very idea of a scientific (causal) social science without addressing the social scientists most closely identified with a causal social science (notably Randall Collins).

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7

The Social Construction of Mathematics

My objective in this chapter is to review some of the general ideas that have come from studies in the sociology of mathematics. More details can be found in my earlier books and by following up with the material in the bibliographical epilogue. [Chapter 8](#) focuses more particularly on the sociology of logic.

Mathematicians, philosophers, and scientists traditionally considered all talk about mathematics to be technical talk about mathematics in itself. The assumption was that the secret of mathematical power ultimately rested on formal relations between meaningless symbols. This represented a late nineteenth-/early twentieth-century transformation of mathematics from a general Platonist transcendental phenomenon to a professional utilitarian Platonism, a game for mathematicians who in this period became strongly influenced by formal and logical views of mathematics. Sociologists of mathematics have, however, shown that technical talk about mathematics cannot by itself provide a complete understanding of mathematics. Relying on technical talk obscures the social dimensions of mathematics and the social dimensions of technical talk itself. Indeed, technical talk *is* social talk; there are no forms of talk that transcend society, culture, and history.

We can talk about mathematics using terms such as social power, social structure, social class, culture, sex, gender, ethnicity, and values. Classically, technical talk about mathematics isolates it from social practice; it spiritualizes mathematics, and makes it seem magically inevitable, mystically unquestionable. Mathematics cannot be understood as “a parade of syntactic variations,” a set of “structural transformations,” or simply “concatenations of pure form.” To study mathematics as a social practice is to study a sensibility, a collective formation, a worldview, and a form of life. The features and foundations of mathematics – like those of art, poetry, religion, and other human activities and cultural productions – are as wide and deep as social existence.

I have adopted this way of talking about mathematics from anthropologist Clifford Geertz’s (1983: 94–120) remarks on “art as a cultural system.” Talking about mathematics this way gives us the sociology of mathematics. Following Geertz’s analysis of art, we could speak of “the natural history of signs and symbols,” “the ethnography of vehicles of meaning,” and “the social history of the imagination.” In order to engage in social talk about mathematics, we must study the social worlds in which mathematicians “look, name, listen, and make.” The concept of “math worlds,” like the concept of “art worlds” (Becker 1982) draws us into a network of cooperating and conflicting human beings. Mathematical objects embody math worlds. They are produced in and by math worlds. That is, it is math worlds, not individual mathematicians, that manufacture mathematics.

Mathematicians, like other workers, use tools, machines, techniques, and skills to transform raw or already worked materials into finished products. The products of mathematical work are mathematical objects, including theorems, proofs, rational and irrational numbers, functions, integers, and numerals. There are two general classes of raw materials out of which mathematical objects can be fashioned. One is the class of all things and events in human experience which are outside of “math worlds” but that can be mathematized (represented or modeled as mathematical objects). The second is the class of all mathematical objects. The classes of mathematical objects, raw materials available for mathematization, and the tools and machines for mathematical work overlap.

Anti-Plato

Broadly speaking, then, the sociology of mathematics is the study of mathematical work (including the mathematicians themselves) as a process of social production. Math objects and mathematicians are social constructions, and mathematics is a social activity that arises from the specialization, professionalization, bureaucratization, and institutionalization of number work.

Sociologists of science have traditionally been concerned with two basic problems: (1) how and to what extent is scientific activity facilitated or inhibited by factors such as politics, economics, and religion; and (2) how does science operate as a more or less autonomous social system, institution, or community. In both cases, the sociologists assumed that scientific knowledge is not dependent on the peculiarities of human personalities, cultures, genders, classes, or history. From this perspective, mathematics and logic are considered the “purest” forms of knowledge, fully removed in the view of the most extreme Platonists, from all human influences. It is this view of mathematics and logic that made them classically the ultimate arbiters of the limits of the sociology of knowledge and science. In the late 1960s, a new criticism of the purity of science, mathematics, and logic began to emerge.

The late 1960s witnessed the emergence of an interdisciplinary social science and humanities hybrid approach to the study of science and society. Sociologists of science, many with academic and professional credentials in the physical and natural sciences, mathematics, and engineering, were in the forefront of this movement (S&TS for short). One of the most important approaches in S&TS was developed by ethnographers of science. Their on-site research on scientific practice, discourse, and culture led to new insights on the social aspects of fact and knowledge production. Scientific knowledge was a social construction. These studies sparked an interest in the sociology of mathematics. Platonism was about to take a big hit.

Some examples may help the reader understand the sorts of problems that sociologists of mathematics take as their domain of inquiry. They have studied the relationship between the development

of the calculus and the emergence of capitalism, the influence of eugenics on the development of statistics, the role of cooperation, conflict, and negotiation in the development of logical and mathematical thought, mathematical objects as cultural resources inside and outside of the mathematical community, changing ideas about what counts as a number, or a proof, in mathematics over time and across cultures, and the birth and death of proofs and theorems. These studies follow the imperative of the new sociology of science to unravel the social construction of mathematical ideas and objects; but the traditional focus of the sociology of science on social organization and the mutual influences between science and society at the institutional level have not been ignored. We have come to recognize that knowledge, the social organization of knowledge production and producers, and the cultural and historical contexts of manufacturing knowledge are all intimately interconnected in a complex causal nexus.

The Social Structure of Mathematics

The sociology of mathematics requires two basic assumptions. First, references to mental events, activities, and processes including intuitions and cognition are references to social phenomena. Second, the activity or process of abstraction (the movement toward “purity”) is grounded in the material world and in the social processes of specialization and professionalization (which involve extending, systematizing, and rationalizing the knowledge and training required in an occupation, processes that strengthen the boundary between mathematics and other social systems). Abstraction understood in this way is just another instance of concretization.

The social structure of a field, discipline, or specialty is a causative sociological nexus. There are indeed limits to the explanatory power of externalities in the analysis of mathematical and scientific knowledge. But there is more beyond those limits than pure thought. Not only is the social structure of a field and its social network a source of social determinants that determine to different degrees of certainty the form

and substance of knowledge; the scientist him or herself is a social structure, a self and personality constructed out of and constituted by chains of social relationships.

The idea that mathematical knowledge is a social construct does not necessarily lead to some sort of naïve or radical relativism. But the avoidance of relativistic conclusions depends on developing a complex and dynamic notion of objectivity as a social fact rather than a simple matter of directly coordinating “things in the world” and “terms that refer.” These are the terms used by naïve realists who assume a straightforward unmediated relationship between objects in the world and what we see and name.

Number Facts

Number facts, statements, and expressions such as “ $1 + 1 = 2$,” “ $2 + 2 = 4$,” “ $1 + 1 = 1$,” “ $2 + 2 = 5$,” as well as more advanced theorems, equations, and proofs from $E = mc^2$ to the Dirac equation $[\hbar A^\mu \gamma_{(a)}^\mu \partial_\mu - m_0 c] \psi = 0$ and proofs for and against the existence of God are cultural resources used to support, challenge, and symbolize interests and arguments inside and outside of mathematics. Of course, these are at the same time workable and unworkable solutions to real and imagined world problems. In *Notes from the Underground*, Dostoevsky uses “ $2 + 2 = 4$ ” to symbolize the taken for granted and often oppressive world of everyday life, and “ $2 + 2 = 5$ ” to symbolize the antiauthoritarian and creative impulses in human beings. On the other hand, for Orwell in *1984*, “ $2 + 2 = 4$ ” stands for everything that is true, beautiful, and liberating in life, and “ $2 + 2 = 5$ ” stands for everything that is authoritarian, totalitarian, and oppressive in life. These are examples from outside of mathematics. Inside mathematics, number facts (even simple ones such as the ones used by Dostoevsky and Orwell) figure as resources in debates among formalists, logicians, and intuitionists, and in conflicts between realists, relativists, Platonists, and anti-Platonists.

Terms such as “rigor,” “truth,” “proof,” “false,” “discovery,” “pure,” and “applied” are all resources variously conceived and mobilized to

further special interests and support particular ideologies. For people in the everyday world, number facts and terms can be useful in furthering interests associated with making one's way in the world in healthy, vital ways; but they can also be pathologized and made to foster dogmas and obsessions. Psychologically, formalizing mathematics may demand an obsessive-compulsive personality that is weak in mathematical creativity. One study (Tomkins 1964) concluded that "right-wing" mathematicians are attracted to mathematics as children by its certainty and discipline and by the existence of right answers that they could figure out; "left wing" mathematicians, on the other hand, are attracted by the novelty and excitement of mathematics, and by its wild, unaccountable spaces.

God and Math

There are interesting but understudied cases that link mathematics and theology. The historian Morris Kline argues that sixteenth-, seventeenth-, and most of eighteenth-century mathematics was driven by a religious quest. The cases of Kepler, Newton, and other fashioners of the scientific revolution are well known. So is the ancient connection between mathematics and religion in the lives and works of Pythagoras, Mahavira, and others. Number work and the construction of altars is a feature of ancient cultures. Numbers and ratios were deified, as in the case of Ea the Creator, the Mesopotamian god who was the deification of the ratio $2/3$. In general, it is the "regular" rational numbers that tend to be deified. The "irregular" 7 is an interesting exception. The fact that 7 "does not divide" (the reciprocal has no ratio) was a number property that struck the mythopoeic sensibility and led to an association between 7 and the gods. "7" came to symbolize the sacred world in Mesopotamia, and 7 and its multiples show up as sacred symbols beyond Mesopotamia's borders.

The monotheistic Hebrews rejected the mythopoeic practice of deifying numbers (or better, numerals), with the exception of "1." "1" in Isaiah 44:6 is the beginning and the end. And from at least the time of ancient Greece until the present the connection between mathematics

and heavenly discourse has been reflected in and sustained by the concept of mathematics as the “science of the infinite.” In tenth-century Egypt, a prominent leader of Babylonian Jewry, Sa’id ibn Yusuf, presented the mathematics of his age in a theological treatise, *The Book of Beliefs and Opinions*. The chapter on God includes discussions on abstraction, the syllogism, proof by contradiction, and adumbrations of the functions of existence and uniqueness theorems. In medieval Europe, theological discussions of infinity became an important part of the history of the calculus.

Nicolas of Cusa (1401–1464), philosopher, jurist, theologian, and astronomer, defended an intellectual art that reveals the Divine in mathematics. Friedrich von Hardenberg (1772–1801), the poet and philosopher known as Novalis, considered mathematics to be religion. He believed that the life of the Gods is mathematics, and that humans could only achieve mathematics through theophany. The distinguished mathematician Herman Weyl, writing in 1932 on *God and the Universe*, speculated on the parallel between the mathematical concept of infinity and religious intuition. Georg Cantor (1845–1918) argued that the transfinite numbers he had invented had religious significance. In our own time, the mathematician Edward Nelson of Princeton University told me during an interview that his works on quantum fluctuations and other topics have religious implications. Case after case illustrates Oswald Spengler’s claim that mathematical innovators tend to be either religious leaders or people who experience mathematics as a religion. It is probably more accurate to speak here about religious sentiment rather than religion per se. We know God by conjuring Him. To know, to bind, bridle, and placate are all in the end the same thing. So to know God is in a sense to capture Him and we do this by means of names, labels, and numbers.

In 1930, the physicist James Jeans argued that it was becoming clear that God (“The Great Architect of the Universe”) was a pure mathematician. Newton of course had already put the governing of all things in the hands of God (“an intelligent and powerful Being”). Newton believed that God had revealed Christian doctrine to humans and was the cause behind all natural forces and phenomena. It is now widely understood that religious interests motivated Newton’s scientific and mathematical work, and indeed the bulk of his writings

are readily identified as religious. In 1733, he published *Observations on the Prophecies of Daniel and the Apocalypse of St. John*. His *The Chronology of Ancient Kingdoms Amended* and hundreds of additional unpublished manuscript pages reveal his efforts to establish the chronology of Biblical events. Newton's main rival, Leibniz, also believed in God as the maker and driver of the world. He criticized Newton's *Principia* as anti-Christian because he believed it revealed a world that functioned according to a plan that could work without God.

In 1744, Maupertuis formulated the famous principle of least action and declared it a universal law that scientifically proved the existence of a wise God. The mathematician Euler in the same period argued that the universality of rules of maximum and minimum also revealed the existence of a wise Creator. Consistency and completeness, hallmarks of pure mathematics, are central to the idea of the Holy. Boole and Hamilton are ideal representatives of the pure mathematician whose work muddies the distinction between mathematics and religion. Mathematics is everywhere contaminated by infinity and therefore by God. Richard Price (1723–1791), a moral philosopher and liberal theologian who supported the American Revolution, is generally credited with using Bayes' theorem to prove God. There is no evidence that I know of that shows that Thomas Bayes (1701–1761) himself, a mathematician and Presbyterian minister, constructed the theorem as a proof for the existence of God. But given his professions and the era in which he lived, and that indeed the theorem could be used according to Bayes to update beliefs it is not improbable that he viewed the theorem as one that could be brought to bear on the God question. It is interesting to note that Bayesian statistics as a legitimate inferential tool has in recent years been overshadowed by the use of Bayes' theorem to prove and to disprove God.

Pure Mathematics

What about “pure mathematics,” then, which seems to be as removed from terrestrial roots as God himself? It is, as the reader should be prepared to see by now, not an unmediated cognitive process any

more than God is a supernatural revelation. For example, the logician and mathematician George Boole (1815–1864) set out to discover the “laws of pure thought” (which, as it happened, was one with his effort to prove God). He failed in this effort because he did not recognize the social and material roots of categorical propositions. Such propositions (for example, Aristotle’s categories and Kant’s categorical imperatives) are in fact high-level exercises in generalization based on species experiences and chains of inductions accumulated over thousands of years. The self-evidence of such propositions is not based on their status as “laws of thought” but on the accumulation and institutionalization of human experiences. In the case of metamathematics it is possible to show that problems, work, symbols, and meanings are not simple products of unfettered mentality or pure cognition but rather elements of the highly refined professional culture of mathematics. If the categories generalize human experience, metamathematics generalizes the professional experiences of mathematicians. Whether in culture at large or within the specialized circles of professional scientists and mathematicians, generalizations build on generalizations and eventually reach so many levels above the everyday world that they appear to be rootless and take on the spiritual qualities of universals, the a priori, and self-evidence.

I referred to the idea of the “hard case” in the sociology of knowledge early on in this volume. Pure mathematics is a special hard case in the sociology of ideas and thoughts. The goal in this arena is to explain the social and material foundations of what some people experience as and label “pure” ideas. The *Oxford English Dictionary* defines “pure” as “without foreign or extraneous admixture; free from anything not properly pertaining to it; simple, homogeneous, unmixed, unalloyed.” With specific reference to a subject of study or practice, “pure” means “restricted to that which essentially belongs to it; not including its relations with kindred or connected subjects (often denoting the simply theoretical part of a subject, apart from its practical applications, as in *pure mathematics*).” Antonyms for “pure” include *applied* and *mixed*. The OED illustrates its definition of pure mathematics using two quotations. One is from Wilkin’s *Math Magick* of 1641. Wilkin describes the usual division of mathematics into “pure” and “mixed.”

Pure mathematics deals exclusively with abstract quantity; mixed mathematics considers quantity in relation to a specific “determinate” subject matter. The second illustration is taken from Samuel Johnson’s 1750 *Rambler*. Johnson notes that pure science deals only with ideas and must be distinguished from the application of scientific laws “to the use of life.” In Johnson’s essay, the term “pure ideas” stands for various types and levels of abstract and theoretical ideas, concepts, and knowledge thought to be independent of social interests, forces, and relations.

In earlier chapters, I sketched the fundamental idea that it is the social network or community that thinks, not the individual. The question this idea addresses has nothing to do with networks or communities as self-conscious entities and everything to do with the source of the individual’s thinking. That source is not within the individual but abroad in h/her social environment. The Polish sociologist Ludwig Gumplowicz, defending this idea in the early twentieth century wrote that the source of our thinking is in the social atmosphere we breathe. This idea finds its earliest formulations in the writings of Durkheim and Marx and is later rehearsed in the writings of Ludwik Fleck. Fleck, a physician and social thinker, writing in the period between the two world wars, identified the “thought collective” as a network of individuals mutually interacting and exchanging ideas under conditions of what I have called generational continuity. The thought collective is a “carrier” for a field of thought, a stock of knowledge, and an epistemic culture, together defining a “thought style” that is expressed through the voices of the individuals making up the collective. Ideas are products of and sustained by social practices and discourses. Such symbols represent numbers and at the same time the computational histories of those numbers. The integration symbol as we write it today is a variation on the summation symbol handwritten by Leibniz. The deeper insight that symbols *embody* – are constitutive of – social relations and histories requires recognizing that social processes of competition and consensus are involved in the development of symbol systems, notations, and representations. These are more and less simple or complicated processes. When we unpack the historical and semantic content of a symbolic or notational system we do not always find the same sort of complex and fascinating material we find in the case of the integral

calculus. In some cases, the embodied social practices and histories mainly involve saving space, helping hurried printers, and improvising in the typesetting room.

The development of pure mathematics as a self-conscious professional endeavor in modern mathematics is coincident with the emergence and institutionalization of modern science and the differentiation of pure and applied science. References to pure and mixed mathematics were not uncommon in seventeenth-century Europe. By the eighteenth century, France had established university chairs in pure and applied mathematics. Germany, however, was the center of activities that led to the crystallization of mathematics as a profession and pure mathematics as a distinct form of mathematical work.

In the nineteenth-century secondary schools of Central Europe, mathematics, Greek, and Latin functioned as systems of formal operations within neo-humanist educational practices. Terms such as *abstract* and *formal* were often paired with *Mandarin* and *Brahmin*, emphasizing the lack of practical utility in mathematics and the classical languages. While analytic geometry and calculus formed the foundations of the more practical mathematical concerns at the French universities, German neo-humanism-inspired mathematics was characterized by what the historian of science Lewis Pyenson (1983) has described as “the icy glaze of logical deduction.” Mathematics was a self-contained system echoing the ideal harmony sought by the neo-humanists. This mathematics was designed to develop and elaborate sets of relationships between transcendental quantities. The goal, as the mathematician August Crelle argued in opposition to the ideas behind the Ecole Polytechnique in Paris, was to foster spiritual enlightenment and mental power.

In the 1850s and 1860s, the split between pure and applied mathematics continued to widen. This was notably reflected in the mathematical work at the universities in Göttingen and Berlin. In Berlin, Kummer and Weierstrass promoted a formalist approach to rigorous mathematics. In Göttingen, by contrast, pure mathematics remained tied to the intuitive perspective and applications; this was also the case at Königsberg, where Jacobi and Neumann taught.

The University of Göttingen was founded by King George II in 1737. Gauss was called there in 1807. Gauss felt that the more deeply he

understood mathematics, the more clearly he recognized the significance of its applications in everyday life, and in the natural sciences. In a letter to W. Bolyai in 1803, he wrote that his mind was drawn to the magnetic poles of astronomy and pure mathematics. Mathematics, he said, brought him closer to the “spiritual world.” Mathematics, Gauss wrote, helped to reveal the “immortal nucleus” of the soul. It was a source of recreation and consolation, and in his later years a source of confidence. Gauss’s views key us into some of the functions of “pure ideas” in the lives of individuals. And this suggests why pure mathematicians seek timeless truths. The other side of this coin is a failure to reflect on time in a profound way. To do so might, in some individual cases if not more generally, undermine one source of assurance about an eternal afterlife.

By the 1870s and 1880s, the Göttingen–Berlin split was so great that young mathematicians could for the first time seriously consider a career in pure mathematics. Both pure and applied mathematics became features of the professionalization of mathematics beginning in the seventeenth century, but pure mathematics played a stronger role in the process. The pursuit of pure mathematics was considered to be more demanding and in the words of the Griefswald mathematician Eduard Study, required “a whole man.”

By 1910, thanks to developments in pure mathematics, mathematics was recognizably a profession; the main audience for and beneficiaries of mathematical teaching and research were now the mathematicians themselves. They had professional societies, journals, teaching positions, and degree granting powers. Applied mathematics was still recognized as an important part of the field, but it was the pure mathematicians who were cast in the role of the guardians of professional mathematics and arbiters of abstraction in mathematics.

The professionalization and purification of the mathematical sciences advanced more rapidly in Germany than elsewhere. This is reflected in the “universalism” that characterized scientific writing in the research outposts established by Germany in Samoa, Argentina, and Tsingtao, China. Other countries established research centers as a feature of European colonial expansion. Science in the German outposts was carried out with an agenda that ignored local cultures. In the centers

established by other European countries, neither science nor European culture dominated; there was a great deal of interaction between Europeans and their indigenous counterparts. For example, the buildings erected by the Dutch in Indonesia combine Dutch and Indonesian architectural styles and principles. By contrast, the closed city the Germans built at Tsingtao is architecturally totally Germanic. But the scientific writing that emerged from the German outposts was presented as science that was neither German nor indigenous, nor for that matter European. The universalistic manner in which the Germans presented their science reinforced the idea that science was independent of society and culture.

From another perspective, the rhetoric of universalism can be viewed as a result of scientists beginning to create a transnational culture. Common communication strategies, networks, and media linking scientists across cultures began to crystallize. These developments resulted eventually in an international scientific community, but one in which cultural differences were never entirely erased. It can hardly be doubted that the rhetoric of pure science and activities in its defense were fuel for and fueled by imperialism. Scientific articles began to look alike no matter where they were published, and to look like business and commercial articles. The assumed progress of knowledge represented by the accumulation of objects of knowledge mirrored the assumption that material progress is measured by the accumulation of objects. In both cases, production is carried out for the sake of production and carried out as a competitive game.

Purism and some sort of technicism have a mutual affinity. The purer, more formal, and more mechanical a specialty language is the easier it is for that language to break down common language barriers. Such a language captures easily generalizable features of social life and can link culturally distinct populations. Pure mathematics has been described as being based on a notation and an order that have become mechanical. Proofs, the central apparatus of pure mathematics, are machines for factoring out human agency. They mechanically validate theorems by machining them into matters of fact or truth.

In the laboratory, experiments are machines that help eliminate human agency. In a classic study in the history of science, Steven

Shapin and Simon Schaffer point out that Boyle criticized one of Huygen's experiments not in terms of "ratiocination" but rather on grounds of "the staunchness of his pump." In mathematics, a theorem is an experimental result. Mathematical experiments are carried out with pencil or pen and paper, chalk and blackboard, computers, and in conversations based on communicable thoughts. The proof machine is offered as a material objective validation of such experiments. In effect, the mathematician, in a first stage dictum, says: It is not I who say this, but the proof. The testing and refinement, the acceptance and rejection of proofs brings other mathematicians into the arena to bear collective witness and so make the operation of the proof a collective performance. In the end, if the proof is accepted it is as a result of a public (a network or community of mathematicians) constituting and validating a bit of knowledge, under the stage-two dictum: It is not I, it is not the mathematician who says this, and it is not the proof per se who says this, but all of us. The stage-two dictum socially validates a theorem as a matter of fact. When the validation occurs in textual contexts through virtual witnessing, literary resources help to factor out human agency and to contribute to a community of consensus.

It is important to read the preceding with the understanding that establishing a matter of fact in mathematics is no different than establishing a matter of fact in science generally. The establishment of a matter of fact, in accordance with the norms of science in practice, is carried out in a spirit of skeptical acceptance. Facts should always be considered fallible, corrigible, and tentative; this is even more important in the case of newly established facts. Matters of fact are subject to challenges and reversals. Matters of fact achieve increasing degrees of closure over time to the extent that they survive these challenges and reversals. As facts become more firmly established it becomes increasingly costly to challenge them. Think, for example, of the costs (scientific, emotional, reputational, and material) of challenging the fact that the planet Earth is an oblate spheroid wobbling in precession; or, to put it differently, the costs of defending the flat earth theory. The facticity of "oblate spheroid wobbling in precession" is for all practical purposes closed. However, closure is never complete. One can imagine, for example, new theories of space-time, gravity, matter and energy that

would disrupt this particular fact. We already see such a possibility in the holonomy physics proposed by David Bohm.

Proofs, like other technologies, can become obsolete. Abel's proof constructed in the 1830s that equations of higher degree than four cannot be solved by root extractions except for special values of the coefficients is an example of an obsolete proof. It is interesting to note that the inevitability of the development of mathematics, a feature of traditional history of mathematics and mathematics in the public imagination, is widely considered to be characteristic of technological development. This view has shown up in interviews with scientists and engineers, including a notable sociology of science study of radio astronomers carried out in the early years of the science studies movement. If we view mathematics as a technology, it becomes easier to see that what appears to be an "inner logic of development" is a matter of social practice and not at all some mysterious, mystical, or magical unfolding of a transcendental inner logic.

Machine imagery is not uncommon in the mathematics literature. Gauss described modern mathematics as a lever for reducing complicated arguments to specific mechanisms. He contrasted this situation with that of mathematics in antiquity, but there is no reason to assume machine and mechanism images were inapplicable in the ancient era. Analytic geometry and the calculus have been described as great machines in the history of mathematics literature, and mathematicians have employed terms like "algebraic machinery" and "mathematical machinery" to describe their inventions and creations.

If mathematicians build and use machines, if they invent as much as discover (and if discovery is just another form of invention), it is reasonable to assume that their work will have a tinkering aspect. Studies of laboratory science have demonstrated that tinkering is a key feature of scientific practice. Tinkering even seems to be one of the processes central to the evolutionary process. We don't have the same level of or amount of ethnographic information about mathematical work but there are indications that mathematical work involves more tinkering than it does formalistic and deductivist modes of inquiry and argument. When the mathematician Paul Halmos (1916–2006) described his approach to proving a theorem,

he used terms like “trial and error,” “experimentation,” and “guess-work.” He said explicitly that he works like a laboratory technician. His claim that he works with greater precision and more information than the (typical?) laboratory technician, however, is not at all obvious.

N. Bourbaki (the pseudonym for a group of influential twentieth-century mathematicians including such notable mathematicians as André Weil, Jean Dieudonné, Henri Cartan, and Serge Lang) views the axiomatic method (as they practice it) as closer to the experimental method than other mathematical approaches. In some respects, mathematics appears to be highly improvisational, and to operate as a naturalistic enterprise.

G.H. Hardy’s defense of pure mathematics – “I have never done anything ‘useful’” – is less a defense of pure contemplative mathematics than a manifestation of his hatred of war and his opposition to applying mathematics to problems in ballistics and aerodynamics. However, his work has found numerous applications in the sciences, for example, in populations genetics (the Hardy–Weinberg principle) and physics (the Hardy–Ramanujan asymptotic formula). The perennial conflicts between pure and applied mathematics within and across university faculties reveal struggles between competing value systems and competition for scarce resources more than they demonstrate a real distinction between “pure” and “applied.” The conflicts of the “pure” mathematician Giuseppe Peano (1858–1932) with Vito Volterra (1860–1940) and other “applied” mathematicians at the University of Turin is one example of that perennial conflict from the early history of modern professionalized mathematics.

Pure mathematics, as one instance of pure science or knowledge, can serve to demonstrate a society’s capacity for research. It can demarcate and defend the pursuit of mathematics in the service of one as opposed to another set of social, political, military, and economic interests. Individuals can seize on it as a strategy for gaining control over a world that they experience as on the verge of chaos, a world ruled by chance and fate. This strategy is readily combined with a search for god, beauty, truth, and all that can be considered universal and eternal.

Mathematics embraces values and expresses worldviews. The early twentieth-century historian Oswald Spengler, himself a mathematics

teacher, argued that each culture has its own number-world. In classical (Greek) culture, the number-world is based on the Pythagorean conception of number as “magnitude,” and on geometry as a visual exercise. In Western culture, the number-world is understood in terms of images of pure thought (what Spengler referred to as “desensitized understanding”); the focus is on relations and on functions as the nexus of relations. A more mundane but no less dramatic example is that summing a grocery bill is not a neutral application of addition but carries the assumption that it is natural to pay for food and to buy food in grocery stores.

Controversies in European mathematical work (e.g., Tartaglia versus Cardano in the sixteenth century, Newton versus Leibniz in the seventeenth century, and Cantor versus Kronecker in the nineteenth century) are sociologically important because they reveal transitions in the way mathematics is organized. Mathematics like science more generally does not change as the result of struggles between advocates and critics of established paradigms but rather as the result of rival innovators. The Tartaglia/Cardano dispute in the 1540s over credit for the cubic equation solution marks the beginning of the breakdown of the patrimonial organization of intellectual property and interpersonal contests. The secrecy accorded general methods and the publicity given to particular problems and solutions begins to be superseded in the era by a more generalized intellectual competition. The Newton/Leibniz priority controversy over the invention of the calculus (between 1670 and 1730) reveals a shift from traditional forms of patronage to more permanent government patronage through organized academies and a related shift from an informal communication network held together by individuals who act as message centers (exemplified by Marin Mersenne, 1588–1648) to the more impersonal arena of scientific journals. And the late nineteenth-century dispute between Georg Cantor and Leopold Kronecker reveals a transition to a worldwide mathematical community of specialists, professionals, and bureaucrats. Cantor invented transfinite numbers and defended extreme “abstraction” in mathematics; Kronecker argued that only the positive integers were real.

The conflict theory of mathematical dynamics (developed in my collaboration with Randall Collins) does not lead to the conclusion

that there are inevitable stages in the evolution of mathematics. There is no reason to believe, for example, that secrecy can never again become normal in mathematics. In our own time we have seen efforts by governments to classify advances in areas such as cryptography in the interest of national security.

There is no such thing as pure mathematics in the sense of “pure contemplation.” Mathematics is a human and therefore social creation and activity and therefore cannot be conceived independently of human contexts and interests. “Pure” is a label for mathematics in the service of the sorts of interests I described above. But it can also refer to mathematics carried out with reference to the internal organizational interests of a specialized or professional community of mathematicians. The very idea of purity is generated by the processes of specialization and organizational and institutional closure relative to the wider set of organizations and institutions that make up a society. Specialization, professionalization, and bureaucratization have all impacted the history of modern mathematics on scales unknown in earlier eras. The overall effect of these processes has been to increase the degree of closure to inputs from outside mathematics. Closure is never complete in the real world. But the permeability of the boundary between mathematics and other activities can be severely reduced. The boundaries of social institutions and organizations are thickened and made increasingly impermeable during the development of specialized linguistic, symbolic, notational, and communication systems.

As specialization proceeds and proceeds with generational continuity a subgroup of specialists takes on an increasingly active interest in promoting and protecting professional closure. This process, in mathematics and elsewhere, facilitates the production of products that are increasingly constructed out of already existing objects within the boundaries of the profession. The idea that pure mental activity is the source of the objects produced becomes increasingly prominent and plausible both within and to a larger degree outside of the professional community. Workers forget their history and fail to reflect on the social aspects of production as the source of their ideas. At the same time, certain specialists who are more aware of the social dimensions of their work set out deliberately to protect the

sacred aspects of their work. These priests of the profession do this to gain control over their specialty in opposition to external agents and agencies and to strengthen their competitive power relative to other specialists in the struggle for scarce societal resources. This sort of conflict can be repeated inside a specialty once it is large enough and complex enough to sustain sub-specialties.

Ultimately, specialization, professionalization, and bureaucratization lead to a high degree of closure. Complete closure is an ideal state (in the theoretical not the normative sense) and impossible to achieve in the real world. But any degree of extreme closure and isolation in a social system is a death warrant. At the very least, it inhibits social change; at worst, the system deteriorates, breaks down, and without ameliorative interventions, dies out. The advantages of closure – of specialization and professionalization – must be balanced against the advantages of interaction with (exchanges of information with) other systems.

Purism, the ideological companion of purity in the sense I have been using it here, can affect both pure and applied mathematics. That is, we can have a “purist” pure mathematics and a “purist” applied mathematics. Purism presses professionals to realize an unadulterated version of their work. The danger for pure mathematics is that it will be cut off from energizing external problems and become increasingly self-generating. The ultimate result will be that pure mathematics will become less and less applicable to problems outside of pure mathematics per se. The danger for applied mathematics is that it will not have enough autonomy to sustain its power as an institutionally independent generator of creative and innovative ideas and methods.

The beginnings of the modern transition from a mathematics of survival to professional, pure mathematics can already be graphically observed in the mathematical works of Isaac Newton. In Propositions 35–41 in the *Principia*, we find diagrams in which the left side represents the physical description of an actual planetary orbit, while the right side represents the results of mathematical manipulations and reasonings. This type of diagram (drawn to my attention by the historian of mathematics Michael Mahoney) stands between the classical geometrical representation of physical realities and the diagramless works of Lagrange. Varignon’s analytical

extension of Newtonian mathematics paved the way for the analytical refinements of Euler and Lagrange that contributed to the crystallization of pure mathematics. Gauss had also moved beyond the mathematics of survival. But he never moved fully over the threshold to pure mathematics. Gauss, who liked to think of himself as at once “the most refined geometer” and “the purest astronomer” worked between “the magnetic poles” of pure mathematics and astronomy.

Newton (1642–1727) and Gauss (1777–1855) worked within the boundaries of a watershed. The modern conflict between pure and applied mathematics began as early as the 1630s. The seventeenth century witnessed the early stages of the demise of the amateur mathematician. Between 1485 and 1715, the role of the mathematical practitioner consolidated and began its evolution into the role of the professional mathematician.

Newton’s work helped forge a new attitude about the relevance of mathematics and the need to promote it as a creative field of study. Teaching would come to play an increasingly important role in the birth of pure professional mathematics. Between 1695 and 1714 in England, practical geometry and astronomy were introduced as regular parts of the school curriculum. Teachers in this period worked under conditions roughly comparable to those of the Old Babylonian scribes. Students were given problems on navigation, fortification, and other areas of formally applied mathematics. The problems, however, were completely divorced from reality and practical utility (that is, the students were being given problems that were pure mathematics in substance).

By the early 1800s, specialties were being conceived and organized on a large scale and the distinction between pure and applied science was becoming clearer. Between 1820 and 1840 the traditional linkages among and the identities of inventor, maker, and user essentially disappeared. Craft workers became factory hands, instrument makers became retailers, and “gentlemen of science” became salaried professionals. At the center of these developments we find greater complexity, more focus, and institution building. It is easier to see the pure mathematics trend when we look at the extreme contributions of those on the periphery of the institution building activities. The contributions of

Boole and Hamilton early on in this process, and of Frege, Peano, and Russell and Whitehead later on carry purism and logicism to extremes. Their work takes place on the periphery of the major institutional changes being fashioned by the likes of Felix Klein and David Hilbert. Those on the periphery were in the best position to reflect on mathematics for its own sake and to carry out the iterative process that led to higher and higher levels of generalization (abstraction).

The transition to modern abstract mathematics emerges slowly during the early stages of the “scientific revolution.” D.F. Gregory, the first editor of the *Cambridge Mathematical Journal*, was one of the scholars who brought nineteenth-century mathematics to the very edge of the threshold to modern abstract mathematics. He died in 1844. Boole was instrumental in fashioning the final stages of the transition.

Generational continuity is a crucial condition for the unfolding of highly general (abstract) ideas; it allows one generation of workers after another to focus on and work with the products of the preceding generation. While the sociological significance of generational continuity for abstraction is not widely discussed, the iteration involved here has been recognized by mathematicians and some math observers. The mathematician Lars Garding (b. 1919) introduced the notion of second-generation abstract mathematics; in 1851, the mathematician J.J. Sylvester described the theory of determinants as “an algebra upon algebra”; and more recently (1981) the algebraist Saunders MacLane described mathematics explicitly as an iterative activity. We can see this process at work in such cases as the development of the concept of space as a structure in relativity theory and the development of the conic sections, the second-degree surfaces, the quadratic forms and the self-adjoint operators on the foundation of practical mathematics over a period of two thousand years.

Iteration is visible in generalizing processes such as those involved in constructing Russell and Whitehead’s *Principia Mathematica*, which unites the Boole–Schneider algebra of logic and the theories of Frege, Cantor, and Peano, and the objects generated by generalizing curves and surfaces. In metamathematics, a mathematics of extreme iteration, we get for example S' , the metamathematics of S , by making sentences such as “ $7 + 5 = 12$ is a theorem in S ” a theorem in S' . One can follow the

iteration process in great detail by observing how Boole moves through levels of abstraction starting from the “primitive” ground of everyday reality. For the details of this process, see Restivo (2001: 160–165).

Classically, philosophers of mathematics and philosophically oriented mathematicians have been prone to analyze pure mathematics from the standpoint of naïve realism. That is, they have been inclined to be Platonic realists, assuming that mathematical objects without any material or cognitive links to everyday reality were nonetheless real. The high degree of self-consciousness in metamathematics makes it paradoxically a good entry point for sociologists of pure mathematics. For example, Cantor’s highly abstract and indeed “other worldly” realm of transfinite numbers is created on the foundations of a self-consciously realistic definition of *set* as a collection of definite distinct objects of our perceptions or thoughts (the elements of the set X) transformed into a whole. One has only to recognize the social foundations of perceptions and thoughts and the significance of experience in a world that can be apprehended as a set or sets of discrete objects to see that this definition of sets is neither transcendental nor a product of an individualistic or idiosyncratic cognitive act.

Drawing on the ideas in particular of one of the greatest of the twentieth-century metamathematicians, S.C. Kleene, it is possible to unravel the social and material grounds of the purest of the pure mathematical objects. Looking at things from the metamathematical perspective, we can say that propositions embody the results of mathematical work. A mathematical theory is constructed out of propositions, that is, it is a set or system of propositions. Propositions and systems of propositions are objects in mathematical reality. It is important to notice that the continuum of real numbers provides the fundamental system of objects for analysis. In the arithmetization of analysis, real numbers are defined as certain objects constructed out of natural numbers (integers or rational numbers). In this process, mathematical objects such as integers are constructed in relationship to nonmathematical objects such as cows, apples, sheep, fingers, and the like. In the higher mathematics, where mathematical objects become the materials out of which new mathematical objects are manufactured, mathematical objects come to be and mean things in mathematical reality. That is, in the higher

mathematics we are in a math world that is analogous to our everyday world. In this math world, mathematical objects are analogous to cows, apples, and all the other objects of the everyday world.

The upshot of all this is that in math worlds, and especially in the higher realms of those worlds, mathematical objects are used as material resources. There is a kinship here with the two ways of introducing systems of objects into mathematics. The genetic or constructive method is illustrated by the manner in which the natural numbers are generated by way of inductive definition. Consider side by side with this idea that the development of the natural number idea occurs as a consequence of our commerce with the natural world. The second method is the axiomatic or postulational method. We begin with some propositions that are assumptions or conditions of a system of mathematical objects. We can then develop a theory about any system S which satisfies the axioms. Informal or material axiomatics, in brief, can be made to operate on any known real or imaginary set of objects.

Consider what happens in the formalization process. Mathematicians create mathematical realities in much the same way Tolkien and Frank Herbert create fantasy and science fiction worlds. The mathematician, like the science fiction or fantasy creator, carries over into his or her new world certain preferences and taken for granted notions from the everyday world. The metamathematician carries over a worldview that is analogous to the worldview of the naïve realist natural scientist. The object theory in the metamath world is a system of symbols and objects (or simply objects if we understand symbols as material objects) manufactured out of symbols and objects (or just objects). The metamath world is constructed by applying intuition and informal reasoning in ordinary language to manipulate metamathematical objects. Human agents (mathematicians) create a world of objects; a social network (society, culture, community) then moves into that world and goes to work on and with those objects. The mathematician in other words creates a world, then is “born” into it and raised in it as a member of a culture. Like any newborn, the mathematician is faced with the problem of creating order out of chaos (or one kind of order out of another kind of order). There are no transparently given rules here, no immediately given patterns. The role of the mathematician is to set about unraveling

the nature of that world. The formal symbols (objects) of the new math or metamath world are the ultimate objects of this world. They do not refer, they are referred to. A formal object (let's call it "M") in the math world is like a tree in the everyday world. Humans will eventually encounter and name natural objects like trees, plants, and so on. The math world's equivalent of trees, plants, rocks, moon, stars, and so are "Ms," "Ns," "Xs," and so on.

The rationale for a constructivist sociological interpretation here is provided by the metamathematician h/erself. A self-conscious mathematician, a vehicle for a thought collective, and a socialized product of a world of natural objects (World I), creates an object world (World II). Object world I encompasses object world II and its product, the metamathematician and h/er mathematical and metamathematical objects. The whole process stylizes the idea of objective pure science. Just as in the case of the social construction of the gods, people can come to alienate themselves from the things they themselves have manufactured and in the case of mathematics Platonize them.

Mathematics, Community, and Self-Reference

Mathematics communities, like all communities reflect on themselves and generate folk sociologies and psychologies. Extreme closure protects folk sociologies and psychologies from the influences of professional social and behavioral scientists. This makes it less likely that the community will develop a critical self-awareness. This folk self-reflexivity converges with purism and impacts the possibilities for critical innovative social changes. Put simply, closed systems are less adaptable than open systems. Openness entails interaction across system boundaries. Ideally, there should be cycles of closing and opening in social and in individual systems. This serves to periodically reinforce the integrity of the system (closure cycle) and energize it through inputs (information and resources) and challenges (problems, issues, questions) from the outside (open cycle). Mathematical innovations with applications are fueled by the interaction of insider (folk) and outsider (professional and

folk) sociologies and psychologies of mathematics, science, and knowledge; the interaction between mathematical and nonmathematical systems; the inter- and intra-action between pure and applied mathematics. In general, the greater the number and complexity of inter- and intra-system interactions the greater the viability of the organizational ecology and the greater the probability that mathematical work will yield applications in the world outside mathematics proper.

Mathematics has to varying degrees been a tool of ruling elites and their political allies and opponents from the development of the ancient civilizations to the present. Anecdotaly, we have Napoleon I asserting that "The advancement and perfection of mathematics are intimately connected with the prosperity of the State;" revolutionaries in Mozambique in the 1970s creating the slogan "Let us make mathematics a weapon in the building of socialism." We see governments everywhere promoting mathematics in the interest of national growth, national defense, national security, and national prestige. Systems of knowledge in general tend to develop and change in ways that serve the interests of the most powerful groups in society. Once societies reach a viable level of social stratification, the nature and transmission of knowledge begins to reflect and reinforce social inequalities. The content and methodology of the mathematics curriculum provides one of the best means of maintaining class divisions in support of ruling class and state interests.

The mathematical curriculum, like curricula in general, is conditioned by the social functions of education in stratified societies. Educational institutions in advanced techno-industrial societies at every level are stratified. Personal development and relationships are fostered differently in different educational organizations and institutions. Public high schools in general are organized around rules, dress codes, and time management schemes that reflect the close supervision of low-level workers. Elite high schools and colleges foster the internalization of norms of freedom from continual supervision thus reflecting the social worlds of upper-level white-collar workers. Most state universities and community colleges enforce regimens that conform to the requirements imposed on low-level technical, service, and supervisory workers. In cities where classes are clearly demarcated by neighborhood schools, each neighborhood will have its own class appropriate grammar

school marked by funding distinctions and distinct behavioral regimens. In our own time, we find an across the board homogenization of traditional class divisions and a social bifurcation that increasingly reinforces the system of haves and have-nots. The bureaucratization, commodification, and commercialization of the schools is increasingly driven by security and social control concerns and reflects an environment governed by secrecy, surveillance, and suspicion.

Traditionally, teachers in inner-city schools are programmed to expect their students to be low achievers; good conduct is as much a guarantor of promotion as good grades. In the wealthy districts, by contrast, the school curricula tend to be up-to-date and the latest technologies are on call; teachers are well trained, and it is not unusual for every student to have a computer and the latest smartphones and tablets. It's not clear that this feature of the school systems is weathering the economic crises of recent decades and its consequences very well. In this context, the "back to basics" movement in mathematics and other subject areas helped to divert funds from education to defense and to reinforce old stereotypes about women and minorities and their roles in "capitalist" societies. These facts are reflected at national, regional, and international levels of education in society.

The social construction (sociological) perspective reveals how deeply politics, class, race, sex, gender, and ethnicity are implicated in mathematical work. That perspective should help policy makers willing to listen and change, along with parents, community leaders, and the more mature students understand that mathematical reforms and more radical changes cannot be effectively carried out in isolation from broader concerns about power, social structures, and values. If, on the other hand, we adopt conventional mathematical tools and ways of working to help solve social, personal, societal, and environmental problems we will fall short of our goals. As a social institution in modern society modern mathematics is a social problem. It is unreasonable to suppose that social reformers and revolutionaries could eliminate mathematics from society, and equally unreasonable to suppose that mathematics as we know it today could be reshaped into a mathematics for the people independently of broader societal and cultural changes.

Mathematics in the World and in the Schools

What is the rationale for the view of modern mathematics as a social problem? It tends to serve ruling class interests, it is a resource that allows a professional and elite group of mathematicians to pursue material rewards independently of socially responsible activities, and the pursuit of aesthetic goals in mathematics can be a sign of alienation or of false consciousness regarding the social roles of mathematicians. Mathematical training and education tends to stress “puzzle solving” (in historian of science Thomas Kuhn’s sense) rather than ingenuity, insight, and creativity. Efforts to address these problems will fail if they are based on the view that mathematics is a set of statements, a language, a body of knowledge, or a methodology. This view is summarized in the idea that technical talk about mathematics gives us a complete understanding of mathematics. If, on the other hand, we adopt the social constructionist perspective that social talk about mathematics is the key to understanding mathematics and even to understanding technical talk about mathematics then our focus will be on social roles, social organizations, and social institutions.

How then should we approach social change in mathematics with an eye on “mathematics for the people?” Sociological thinking recommends focusing not on mathematics per se but on transforming ways of living, social relationships, and values in society at large. A radical change in the nature of our social relationships will be reflected in radical changes in how we organize to do mathematics and science – and these changes will in turn affect how we think about and the content of our mathematics and our science. If we take this approach and look to “Society,” we will be intimidated and frustrated, and rightfully so. We would all have to be Lenins, Maos, and Lincolns not to be stopped in our tracks by such large-scale goals. However, if we focus on reasonable things we can do in our families, our communities, and our occupational and professional networks, we will not be stopped in our tracks and we will find there are things we can do to bring about change at the local, personal, family, and friendships levels. Our efforts will be facilitated if they line up with large-scale societal dynamics, obstructed if they do not, and serve as

vanguards of new social movements that will build into societal dynamics of reform and revolution.

New social circumstances and arrangements will give rise to new conceptions and forms of mathematics. We cannot anticipate these new conceptions and forms; in fact, we cannot even imagine them. The very notion of mathematics as we know it might disappear in a different social order. What we can imagine and can actively engage is practicing, teaching, producing, and using mathematics in new ways. This does not require attacking all social ills on all levels simultaneously. It does, at the very least, require that we approach revisions, reforms, and revolutions in mathematics with an awareness of the web of roles, institutions, interests, and values mathematics is imbedded in and embodies.

It is more important, then, for people concerned with improving mathematics literacy and mathematical education in general in pursuit of a more egalitarian and cooperative society to focus their attention on social arrangements rather than on matters of textbooks, curricula, problem-sets, and high-order pedagogy. Curricula, for example, can be changed without touching the basic social arrangements that ultimately give us our mathematical perspectives, products, and purposes. We have to think about social change in mathematics and society in terms of what mathematical workers produce, how they produce it, what resources they use and use up; what are the by-products and wastes of their work in human and environmental terms; what good is what they produce, and for whom; what is the relationship between mathematical workers and various publics; how do mathematical workers relate to each other, their families and friends, and their colleagues in other fields? Are they engaged with what they do or alienated from their work, from their selves, from their social and material environs? What is their relationship, in their social milieu, to the owners of the means of mathematical and social production? In the end, we want to know what kinds of human beings mathematicians are and what kind of world they are helping to build. These are general strategies for social change.

We are hearing a great deal these days about STEM. STEM stands for Science, Technology, Engineering, and Mathematics. STEM is an initiative designed to address the problem that American students are not

getting adequate training in these fields and that they are graduating at all levels of the educational system without the STEM literacy required to succeed in the “real world,” a world increasingly driven by a knowledge-based economy. The assumption behind the STEM initiative is that the problems of modern industry and of the global society are problems that are unlikely to yield solutions if the work force isn’t STEM literate. The STEM initiative also assumes that training and education in these fields promotes innovative and critical thinking. At the level of our everyday status quo world and the values that guide our society in the context of the global economy, the claims made by STEM advocates are well grounded. However, STEM reflects the viewpoint I criticized earlier that Plato, Gödel, Einstein, and Heisenberg have given us the keys to solving the basic problems of humanity. Blind acceptance of STEM initiatives means that once again the social sciences and humanities fail to get their due as keys to problem solving on every level from local to regional to global. Recognizing that STEM subjects are social facts should open minds to broadening the STEM concept to embrace the social sciences, the humanities, and the arts.

In the next chapter, I will explore the general ideas of the sociology of pure mathematics in the special case of logic. The bibliographical epilogue for [Chapters 7](#) and [8](#) follows this chapter.

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8

What Can a Sociologist Say about Logic?

There is no Logik, only logics (after Lotze 1888)

Suppose that logic transcends society, culture, and history; and suppose furthermore that it transcends space and time. Too many philosophers and theologians are prepared to ignore the fact that in that case we would be speechless and unaware in the face of logic. This is a special case of the apophatic fallacy. Apophatic theology seeks to describe the unknown and unknowable God by negation. Notice that the alternative approach, cataphatic theology, is considered by the apophaticists as limiting God by trying to describe Him positively. In an apophatic framework, a sociologist could have nothing to say about logic just as s/he could have nothing to say about God. Something like this view of logic has prevailed since ancient times but has not prevented the unfolding of a large literature on the nature, uses, applications and theory of logic, just as in the case of God. The certainty of Logik, not unlike that of Mathematik and God, has classically been protected by a triply reinforced iron cage of certainty, authority, and tradition. This iron cage has made Logik appear invulnerable to social criticism, skepticism, analysis, reading, and deconstruction. But that iron cage is and always has been an illusion, much more readily penetrated than the warning

signs pinned to it are designed to make us think. We have created monsters in Math, Logic, and God, then forgotten we created them, and as a result they frighten us into silence.

So what do we find when we ignore the “do not enter” signs, what do we learn about what logic is and where it comes from? In this chapter, I have the modest goal of exploring what we sociologists might be able to say about logic. I draw heavily on what we have already said about mathematics, and in particular about pure mathematics. I am going to treat logic as an extreme extension of pure mathematics.

In the case of mathematics, I have approached the “comes from” question in terms of the answers offered by mathematicians and philosophers. Everything that has been said about where mathematics comes from can be said *a fortiori* for logic. It could come from God (*Die ganze Zahl shuf der liebe Gott, alles übrige ist Menschenwerk*, Kronecker declared) or a Platonic realm of Forms. It might *represent* or *be one* with God. For example, in Mesopotamia, the ratio $2/3$ was deified as the god Ea the Creator; and consider that there is a rationale for translating John 1:1 in *The New Testament* this way (Clark 1980): “In the beginning was Logic, and Logic was with God, and Logic was God. . . . In Logic was life and the life was the light of men”).

What philosophers and other advocates of a transcendental realm of reality fail to come to grips with is that it puts too much of a strain on the scientific imagination to assume that material beings somehow could have access to immaterial realms. Various forms of naturalism, materialism, and critical realism are under the same strain.

Perhaps the *Parmenides* is a sign of this strain in Plato. The whole idea of the Forms is left in doubt at the end of Parmenides’ critique. Plato did probably believe that the “Forms” or “Ideas” exist outside of our minds. But in this dialogue Plato comes across as more of a naturalist and a pragmatist, more grounded than ethereal.

The iconic source of our classical ideas about logic is Aristotle, and even here we find evidence of a latent sociological imagination. He begins Book 1 of the “Posterior Analytics” with the sentence: “All teaching and all intellectual learning comes about from already existing knowledge.” He makes it clear that he means this to apply to the mathematical sciences, to “each of the other arts,” and indeed to both

deductive and inductive arguments. Aristotle is keener to insist that all knowledge can be drawn from the mind in the sense of actualizing a potential. The important point here is that Aristotle seems to introduce activity in the world as a condition for knowing.

Even if one can find hints of social theory in the Platonist view of mathematics and the Aristotelean view of argument, the image of something “outside” of us – something transcendent, godlike, pure, abstract – keeps mathematics and logic ultimately separated from the social and material realms of experience. For the sociological theorist, references to realms “outside” of us are mistakes in reference; they are in fact to be understood as pointing to social or more generally to natural and material referents. We find ourselves once again in the business of rejecting transcendence, immanence, and psychologism.

In spite of the widespread support in mathematics and the philosophy of mathematics for Platonism, supporters have not been able to escape the self-contradiction, and even the absurdity, of the transcendence claim. If mathematics is outside of space and time how can we reach it from our earthbound grounds? It is clear that exactly the same problem arises in the case of God when the faithful argue that God cannot be captured by our eyes, our words, or our minds. What can such claims possibly mean? Any effort to answer such a question will mangle reason, experience, and understanding. The apophatic fallacy applies equally to logic and to God.

Within the material (“the natural”) world there is an often overlooked source for logic, mathematics, science, and God; that is the social world. Here too we find the roots of the very ideas of transcendental and supernatural realms. The only reasonable answer, I argue with my fellow sociological materialists, is that logic comes from the social world, and in particular from social networks.

The idea that mathematics as a vocation is social would not be disputed by most working mathematicians. The trouble begins when the sociologist wants to draw out the more technical meanings of “social.” The sociologist wants to press the idea of the “social” beyond its everyday meaning and to argue (1) that there are more dimensions to social interaction than are evident in everyday social life, and (2) that mathematical objects themselves are social. The transcendental realm is a cultural creation, not a reality out of space and time. So is the

supernatural, and so then are the gods and God. The fundamental project of the sociological sciences can indeed be viewed as locating the everyday world referents for transcendental, supernatural experiences and in general experiences that seem mysteriously without earthly referents. The act of “referencing” experiences is dependent on the progress of our knowledge and understanding of the world, the progress of the sciences and more generally of the learning arts.

What can we conclude as social constructionists, that is, as sociological and materialist critical realists? The idea that mathematics and logic are pure or transcendent arises out of autonomous organizational structures. The certainty of mathematics and logic are a function of (1) the intensity and density of a network of mathematicians or mathematical workers, and (2) how tightly the generational links across mathematical networks are interwoven. Generational continuity is the fundamental source of abstractions and certainty about their truth value. The network of norms, values, and beliefs in mathematics is robustly repeatable. It is this robustness that accounts for the sense of certainty mathematicians and logicians, along with laypeople, share about mathematics and logic.

Neither truth, certainty, nor thought itself are products of isolated brains or some sort of immaterial mindstuff. They all arise in social networks. Consciousness itself, as Nietzsche already recognized, arises in and is a network of social relations. At the end of the day, sociologists are wont to ask, “How could any of these phenomena arise anywhere else, be anything else; what is there that is anywhere else?” It is the sensuous material reality of discourse that produces the sense of a constrained implacable truth. Even the most elementary exercise in mathematics or logic, indeed even the most elementary understanding of an equation, engages us in a form of discourse (and more broadly, in Wittgenstein’s terms, a form of life), a network of teachers and students, of researchers, inventors, and discoverers. The “universality” of mathematics and logic, like the universality of any cultural system, trait, or representation is grounded in the universality of its social practice and discourse. “Universality” is a function of the diffusion of discourse by means of social exchange (trade, communication, military and scientific missions).

Toward an Archaeology of Logic

As soon as we question (for whatever reasons) the unity, purity, and universality of logic, it is no longer self-evident but rather reveals itself as a product of dense and complex networks of discourse. The philosopher Michel Foucault is associated with the methodology of the archaeology of discourse. He considered mathematics (and by implication, certainly, logic) as immune to this methodology. But once we understand that logic is not in fact immune to this methodology, we can ask some Foucauldian questions about logic as an everywhere dense discourse. Do logical symbols hide something? Are they embedded in networks of power, and are they deployed in ways that purposefully obscure the power behind their visual and oral re-presentations? How is it then that logic seems to have escaped matter? How has logic hidden the fact that it is a (indeed *the*) discipline that disciplines? How do we reveal the systems of regularities that determine logicians by determining their situations, functions, perceptions, and practical possibilities? How do we reveal the social, cultural, and historical conditions that “dominate and even overwhelm” logicians? Logic is more than a discourse, more than a language. It is an institution embedded in a culture and assigned a more or less specific domain of control.

We need, following Foucault’s methodology, to be able to reconceptualize the problem of logic not as a problem in ontology (or even in classical epistemology) but as a problem in politics and ethics (or a problem in morals). Individuals do not make decisions about what is right and wrong or true and false on their own. Such decisions are settled by institutions. We are born into classifications, logical operations, languages, and metaphors. It is on the basis of such considerations that sociologists of knowledge of my type reach the conclusion that logic is a moral system. It is important to keep in mind that the categories of space, time, and causality are the most general relations between things, and they dominate our intellectual and everyday lives. Communities of men and women must be in accord about these essentials at any given historico-cultural moment. Without this accord, they would not connect intellectually, emotionally, and linguistically. Humans are not free

to choose or deny “the categories.” But these are not Kantian aprioris but cultural givens. Social life requires a minimum consensus without which society dissolves. This makes adherence to social norms and expectations a moral imperative, a moral necessity. It is important to reiterate that these categories are treated as if they are a priori but they reflect, arise and crystallize in social and cultural contexts. This consensus rule allows for various degrees of deviation but communities break down very quickly if deviations reach even modest levels. The sources of deviation are based on factors such as the movement of material resources, engagements with hostile forces, and disease.

What role do numbers and formal symbols play in grounding our ideas or experiences of abstraction, purity, and the sacred? How do numbers and formal symbols play into constructing and sustaining boundaries and relationships? The moral necessity of logic is enhanced as its professional boundaries are constructed and concretized around those thought communities and thought collectives dedicated to these very ideas. Logic develops a capacity to overtake and dominate all other forms of reason by persuading leading minds that it is the God of reason. It does this by becoming purity, abstraction, and generalization in extremis.

All institutions provide the categories of thought, set the terms for knowledge and self-knowledge, and fix identities. But more than this, they must ground social life by making principles of law and justice sacred. In logic, classifications, theorems, proofs and conjectures are held together by the sacred glues of logic itself and logicized canons of reason. Given the sociological conception of the nature and function of institutions, it should not be surprising to find that questions and issues of morals merge with questions and issues of what is real and what is illusory, what is true and what is false.

With Spengler, I have claimed that “*Esgibtkeine Mathematik, esgibt-nur Mathematiken.*” That remark can be considered a key moment in the emergence of a sociology of mathematics. Now, with the nineteenth-century philosopher Lotze in mind, I make the parallel claim for logic: “*Esgibtnicht die Logik, esgibt logische.*” There is neither Mathematik or Logik, only mathematics and logics. This then puts us on the pathway to a sociology of logic.

Purism and some sort of technicism have a mutual affinity. The purer, more formal, and more mechanical a discourse is, the easier it is to claim that it can be used to break down common language barriers. Pure mathematics, for example, has been described as a notational doctrine for relatively ordered thought operations which have been mechanized. Proofs, perhaps the central apparatus of pure mathematical work, indeed seem to be machines for factoring out human agency. They are an important part of the material validation of theorems, devices for transforming theorems into matters of fact.

Facticity is established in experimental settings by machines, which are assumed to eliminate human agency. I pointed out in [Chapter 7](#) the historical demonstration of this idea by Shapin and Schaffer in the case involving Boyle and Huygens. I went on to show that mathematics can be considered an experimental science and subject to this same idea. The final stage of the purification of reason is its transformation into logic. And mathematics, to the extent that it develops independently, is eventually overtaken and taken over by logic. Logic, too, then, is an experimental science. This is true even when logic leaves mathematics behind and then “the world.” What have sociologists made of this phenomenon?

The Sociology of Logic

We have had a sociology of logic developing within the sociology of mathematics since the early 1970s (not counting the adumbrations in Durkheim’s 1912 study of religion). There have been empirical studies of logic in mainstream sociology and in ethnomethodology.

Consider, to begin with, Eric Livingston’s ethnomethodological approach to logic, a sociology of logic in practice but one that is limited in its sociological import. The limitations follow from the sociologically idiosyncratic methods and assumptions of ethnomethodology. Livingston addressed two core concerns in the philosophy and sociology of mathematics: what are mathematical objects, and what is the source of the compulsion associated with mathematical reasoning? The answer to these

questions lies in attending to the moment-to-moment work of the mathematical reasoner(s) at the site of the mathematical work. We see in this attention to the “living foundations of mathematics” what looks like the ethnographic approach to scientific practice pioneered by the new sociologists of science in the late 1960s and early 1970s. Livingston’s work is designed to reveal the social processes behind logic as understood in the classical tradition, that is, logic as a pure, abstract manipulation of formal symbols. The major focus of Livingston’s work is Gödel’s theorem and Livingston clearly has a firm grasp on the technicalities of the theorem. Livingston’s approach is to walk us through the proofs in Gödel and in the simpler case of Euclid. What, in other words, is going on in the unfolding of a proof? Ethnomethodology does not pretend to theoretical explanation, does not debunk or demystify, and does not promote understanding by way of historical and scientific analyses. Without denying the innovative and informative nature of this study, sociologists like myself are left to wonder what exactly Livingston has achieved here? My answer is one that I argue applies to the ethnomethodological approach in general; what it achieves is a translation not an explanation

From the standpoint of the ethnomethodologist, this is not a devastating criticism. They achieve what they set out to achieve, and that is to give some sort of account of what it is like to do the kind of work they are studying in any given case. But the failure to offer an explanatory account – the goal of any scientific inquiry – makes their project one that fails to further our understanding of the phenomenon at issue. Livingston fails because he refuses to theorize, he refuses to “do science.” And he fails to theorize because the ethnomethodologist is obliged to make the distance between him/herself and his/her subject as small as possible. What this means is that in the case at hand, Livingston does more mathematics than he does sociology (or philosophy). Bloor (1987) shows clearly that there is an unarticulated theory here, a locality theory. We ethnographers of science expect to find science in the contexts, contingencies, and conditions of the work environment. This is where Livingston leads us, but he doesn’t end up at a social work environment but rather in an abstract “primordial setting,” a system of pure mathematical work in a closed system apart from history, culture, and

profession. I will leave the Livingston story here with a recommendation that the interested reader consult Bloor's outstanding review for a full analysis of what Livingston has accomplished and what he has failed to accomplish. For the sociologist of logic in my or Bloor's sense, Livingston provides some interesting and useful data but does nothing to further our explanatory agenda.

Consider next Boole's *Laws of Thought* (1854/1958), which was to ground a science of the mind in observations. This was a different endeavor than studying the external world of nature. The laws of Nature, according to Boole, are not in general accessible to immediate perception. Certainty may be ever more closely approached, but it is never achieved. By contrast, knowledge of the laws of the mind appears in "particular instances." The truth of such laws requires no repetition of confirming instances, and no large set of observations.

Boole fails the "sociological awareness test" by not recognizing that Aristotle's dictum *de omni et nullo* (whatever is affirmed or denied of a whole may be affirmed or denied (respectively) of any part of a whole; all valid syllogisms are reducible to applications of *dictum de omni* and *dictum de nullo*). Furthermore, the so-called "categorical propositions" (e.g., All Ys are Xs) are in fact high-level exercises in generalization grounded ultimately in inductions based on experience. The repetition over great expanses of time of such experiences is the source of the sense that certain things are "self-evident." The flaw in Boole's thinking arises from his failure to see himself as a product and agent of culture. He is in fact a vehicle for the cultural experiences that have allowed him to believe in his capacity to clearly apprehend a single instance of an event or phenomenon (thus trapping himself in the fallacy of introspective transparency).

If Boole fails to see himself as a vehicle of culture, it is not because of any resistance to seeing himself as a vehicle. Science, Boole says, is the business of discovering laws, not creating them. Our minds are not our own; we do not constitute them and our intellect is not the product of our will. Science, then, is not dependent on individual choice. In his pursuit of the laws of thought, Boole is guided above all by his own sense of self-evidence. Formal laws are based on observations and reflections, Boole writes. But "results" are independent of whether we treat theory as

grounded in experience or as a matter of strict deduction. It is notable that Boole wanted his work to gratify the intellect but also to contribute to “human welfare.”

From Boole’s perspective, science gives us primary (fundamental) and secondary (derived) truths. Boole focuses on the fundamental truths, laws and principles from which all the rest of science may be deduced and into which all may be again resolved. The test of the “completeness” and “fundamental character” of the laws of science is the completeness of derived truths and the general methods used in science.

Boole believed that commonalities and universals across human cultures reflected the laws of thought. But of course the situation is that genetic and biological commonalities interact with “external” (including social) commonalities to produce mental commonalities. Boole mistakenly assigns priority to the “awakened” (my term) mind, the socialized mind, without acknowledging the social foundations of thought. He is thus left with no alternative but to argue *from* universal laws of thought rather than *to* socially constructed categories of thought. The mind is not the pristine, a priori genetic-biological instrument Boole thinks it is.

Boole gives us an excellent opportunity to watch the progress of moving up levels of generalization (“abstraction”) from the “primitive” ground (or frame; see Goffman 1974) of everyday life. He shows that the symbols of Logic he introduces are subject to “the special law” $x^2 = x$. But having introduced this formal law, he goes on to indicate its “primitive” roots (Boole 1958: 37). What in fact Boole does is move into an imagined world in which there are only two material resources, the numerals 0 and 1. Like things in our everyday world, they are subject to certain lawful relationships, in this case $0^2 = 0$ and $1^2 = 1$; thus $x^2 = xx$, considered algebraically, has no other roots than 1 and 0. Only differences of interpretation will apply within this Algebra. Thus does Boole set forth the principle upon which his method rests. However, if we look at the earlier paragraphs leading up to Boole’s laws, we notice that $x^2 = x$ is developed in a materially grounded way. First he shows that $xy = xy$ in his developing system based on a “class” perspective and grounded in examples such as “white things” (x), “sheep” (y), and “white sheep” (xy). He then argues that the combination of two literal symbols in the form xy expresses the whole of that class of objects to which the names or

qualities represented by x and y are together applicable. It follows that if the two symbols have the same signification, their combination expresses no more than either of the symbols taken above would do. This leads to $xy = x$, and then (since y has the same meaning as x), to $xx = x$. Finally, by adopting the notation of common algebra, Boole arrives at $x^2 = x$. We are now back in the realm of his earlier use of $1^2 = 1$ to represent the phrase "good, good men." So Boole constructs a "primitive" everyday world in which only 0s and 1s exist. Eventually Boole gives 0 and 1 in Logic the respective interpretations *Nothing* and *Universe*.

The mind, Boole claims, arrives at the existence of a universe as a deduction from experience or *hypothetically*. Either way we are dealing with a social mind, a socialized mind. Boole's implicit recognition of this occurs at the end of a critical discussion of the syllogism. The syllogism is associated with the development of language, a social process. Intellectual processes involve memory, and usage; and certain canons of ancient logic have become inculcated in the very fabric of thought characteristic of a cultured mind. This has to apply to Boole. He has inculcated the "texture of thought" characteristic of his time and place.

It is commonplace in fields that are considered "pure" to find workers oriented to "unity and harmony." Even if other values such as power and efficiency are acknowledged, they are subordinated to values of unity, harmony, fitness, and beauty. This conception would be most fully realized if even the very forms of the method were suggestive of the fundamental principles, and if possible of the *one* fundamental principle, upon which they are founded. I suggested earlier a connection between pure disciplines and religious or theological quests. The connection between such quests and the isolating effects of professionalization and specialization cannot be considered further here. That we are dealing, in any case, with a worldview nourished by notions of gods and kings ruling orderly domains, and especially of an omniscient, omnipresent God-King is suggested by Boole's commitment to identifying a central pervading law. This is not a "mere metaphor"; on the other hand, it is not necessarily unrelated to developing a capacity for gaining personal or collective control over some area(s) of the worlds of self, society, and nature. We must take seriously Boole's reference to the "Author of Nature" and His "immutable constancy" as an indicator of what it is

about the world that is significant for Boole. Boole's logic is in fact part of a strategy for establishing the existence of God and Universal Morality. Logic, like pure mathematics and God, can serve as a strategy (however illusory) for gaining control over a world that threatens momentarily to reveal itself as a world of "chance and inexorable fate." If the order in a person's or community's life is felt to be fragile and in need of an anchor for its security, then there will be a search for – and even the fabrication of – order; thus the coordinated search for God, Beauty, Truth, Logic, and Purity among pure scientists, mathematicians, logicians, linguists, and artists.

Given that Boole can be situated between two generations of mathematicians concerned with issues of Logic, and given that there are readily identified organizational changes across these three generations in the directions of specialization and professionalization, then we should find a decreasing emphasis on common language and (in the case considered here, secondary propositions) a decreasing emphasis on time. My conjecture is that the orientation to abandoning ties to the everyday world can be related to organizational changes that induce a timeless view of individual and collective life. Professionalization, a process that was already operating in the mathematical community of Boole's time, is a key determinant of the orientation to time. The process of professionalization fosters the abandonment of time. First, it removes the professional from the time frame of the everyday world. It creates a new frame for professional time. Thus, a certain *kind* of time is abandoned. But the new time is more flexible, perhaps more general and abstract. Time then becomes (like God) remote for the modern secular universalistic professional. (This notion is compatible with a mundane time perspective that dictates short-term activities and which professionalization may actually intensify). In the extreme case, universalistic standards and eternalist orientations to such notions as "making a contribution," receiving eponymous rewards and constraints (working "outside time and space") may make time disappear.

How does Boole arrive at the idea of "the perfect liberty which we possess" when it comes to choosing and ordering while pursuing the implications of premises in given demonstrations of propositions, that is, when it comes to "determining what elementary propositions are true or

false, and what are true and false under given restrictions, or in given combinations”? This idea of liberty is not grounded in some sort of organic sense of free will but rather in a mechanistic framework. Rigorously demonstrating real premises is achieved when we remove all doubts and ambiguities. Boole’s objective, realized in arranging the order of premises and demonstrating their connections is carried out with indifference. Inference is conducted precisely and mechanically. The inference machine Boole aspires to invent is a perfect companion for his purism, and is analogous (in part if not entirely) to the mechanical social rituals designed to guarantee or underwrite truths.

Boole is on the threshold of the purification of modern mathematics. I want to jump ahead now to the relatively recent past and look at metamathematics. The general strategy I have outlined in this chapter can help to make sense out of highly generalized (“abstract”) mathematical work without recourse to nonmaterialist (and especially mentalistic or cognitive) categories and “explanations.” The case I examine shows how a given set of generalizations (“abstractions”) can become the raw materials of later everyday work. When this occurs (and this is characteristic of science-oriented fields and in fact all fields oriented to generalizing principles), the reaction among workers will tend to get grounded in a philosophy of naive realism. This then becomes the basis for operating on old and creating new generalizations. The greater the extent to which their work is removed from the context of everyday (mundane) work, the more difficult it is for them to gain access to the social and material groundings of their work.

S.C. Kleene’s (1950) *Introduction to Metamathematics* is the focus of my discussion here for two reasons. It was for a long time a leading textbook introduction to metamathematics by a leading practitioner; and – more importantly – Kleene’s exposition is detailed and clear, and makes it relatively easy to identify the roots of pure ideas in material reality and the cultural continuities that make “pure” work possible. In a way, Kleene makes the sociological and materialist case all by himself. The relevance of his work to the sociology of logic lies in the way he allows us to examine the process of constructing higher and higher levels of generalization. This process in mathematics leads inevitably to the development of or convergence with logic. I should note that the

development of linguistics plays a role in the unfolding of the Parmenidean goal. We see this connection in the works of Leibniz, Hamilton, and others.

Kleene states that propositions embody the results of mathematical work. A mathematical theory is constructed out of propositions, that is, it is a set or system of propositions. Propositions and systems of propositions are objects in mathematical reality. Now we notice that the continuum of real numbers provides the fundamental system of objects for analysis (Kleene 1950: 30). In the arithmetization of analysis, real numbers are defined as certain objects constructed out of natural numbers, integers or rational numbers. When we arithmetize analysis, we get an infinite collection that is constitutively an object. The set of all such objects is a new collection. Cantor's general set theory follows naturally from this collection. What Kleene is pointing to is an iterative process that produces new objects out of old objects.

Notice that mathematical objects such as integers are constructed in relationship to nonmathematical objects such as cows, apples, fingers, and so on. Kleene refers to a later development in mathematics associated with the transformation of mathematical work into a highly specialized activity where mathematical objects become the materials out of which new mathematical objects are formed. The referent mathematical objects can be the source of models, that is, they can be taken as things in mathematical reality that are analogous to cows, apples, etc., or they can be directly manipulated and used in a sort of tinker-toy way to create new objects. So they can be used as sources of generalization or as material resources. There is a kinship of sorts here with the two ways of introducing systems of objects into mathematics identified by Kleene. The *genetic* or *constructive* method is illustrated by the manner in which the natural numbers are generated. Kleene has in mind the inductive definition of natural numbers. But this is nothing more or less than the development of the natural number ideas in our commerce in the natural world. In the *axiomatic* or *postulational* method, we begin with some propositions that are assumptions or conditions on a system of mathematical objects. The consequences of the actions are then developed as a theory about any existing system *S* of objects which satisfy the axioms.

To recall, then, the idea presented earlier of creating a mathematical reality in the spirit of a Tolkien or Herbert, the formalization process is one in which symbols are built out of symbols. These symbols are understood to be various kinds of objects that can be referenced and manipulated.

Note that the metatheory, the theory about the object theory, is intuitive and informal, and expressed in ordinary language using mathematical symbols (Kleene 1950: 62):

“... the assertions of the metatheory must be understood. The deductions must carry conviction. They must proceed by intuitive inferences, and not, as the deductions in the formal theory, by applications of stated rules. Rules have been stated to formalize the object theory, but now we must understand without rules how these rules work. An intuitive mathematics is necessary even to define the formal mathematics.”

It is clear from the way Kleene keeps introducing the need for intuitive mathematics that we must attack the naive realism of formal mathematics in quite the same way that we attack naive realism in the sciences in general. We do this in the way I recommended in the previous chapter when I introduced the idea of World I and World II object worlds. This social reproduction of the worldview of objective science qua naive realism is explicitly illustrated in Kleene's claim that metamathematics is about a formal system as a system of symbols considered objectively. These symbols self-refer, making them uninterpreted and meaningless objects. The metamathematician looks *at* these objects. They are analogous to “things in the world” for which the metamathematician conceives “terms that refer,” the formula for naive realism in science.

The rationale for a constructivist sociological interpretation here is provided in great part by Kleene himself, even while he adheres to a form of naive realism. What we see is the self-conscious creation of an object world (world II) by a vehicle for a thought collective, and a product of a natural and social object world (world I). Object world I encompasses object world II and its product, the metamathematician; the whole process stylizes the idea of objective science. And we see how, just as

in the case of social construction of the gods, people can come to alienate themselves from the things that they themselves have manufactured.

The idea of “operation” is crucial for understanding mathematical activity as a social, material process. Let us begin by noticing that in the elementary school arithmetic of positive integers, the numerals $1, 2, 3, \dots$ had meaning in terms of counting and measurement. But when it came to the addition and multiplication tables, those numerals could be “any enumeration of distinct objects”; From this standpoint, the arithmetic deals with operations, i.e., functions, $+$ and $\times$ over a domain of objects $(1, 2, 3, \dots)$, and depends only on the possibility of recognizing and distinguishing between those objects, and not on their intrinsic nature.

Kleene now follows the same procedure to set up a new arithmetic. He constructs a domain of two objects and four operations or functions. In effect, he creates *six* objects, since the four functions are, metamathematically speaking, “meaningless given objects.” The two objects to be operated on are t and f ; the four functions are: $\wedge$, $\&$, $\vee$, $-$. It is important to note that these “meaningless” objects are all part of the cultural baggage of mathematics. Kleene clearly introduces the process of operating on operations reintroduced as objects. I want to draw attention to the process rather than the mathematics. The details are that we introduce a valuation procedure (a metamathematical computation process) that allows us to correlate a truth table to each of the symbols and then to each proposition a letter formula (PLT). We then study the properties of PLTs defined using correlated functions (tables).

Note that Kleene chooses “suggestive” symbols (in this case, t and f suggest the notions of “true” and “false” in the logical interpretation), even though it is theoretically immaterial what symbols we choose – so long, of course, as they can be distinguished from one another. This is a common procedure in mathematics. Gödel’s famous results follow this pattern of getting into the structure of a formal system as a system of objects. The mathe-logical world that Gödel enters is, of course, a world constructed by Russell and Whitehead, *Principia Mathematica*. He enters this world’s environment and explores it in great detail. Kleene describes what this process is like in part. We start with a particular enumeration of the formal objects, or correlation of the formal objects with specific natural numbers. Next we consider the correlated numbers

rather than the formal objects. In this way metamathematics becomes an arithmetic of the natural numbers (Gödel numbering).

The most important contribution to the empirical sociology of logic is Claude Rosental's (2008) *Weaving Self Evidence*. Rosental engaged the realm of logic by wondering if it was possible to grasp sociologically the process of producing a logical theorem. All of his expectations had already been realized in the ethnography of science beginning in the early 1970s. What is original about Rosental's research strategy is not the strategy itself but applying that strategy to an extreme hard case in the sociology of knowledge. The strategy he adopted involved locating his study at the intersection of technologies of proof and forms of ostentation. Ethnographers of science will not be surprised that Rosental found a diversity of practices mobilizing heterogeneous resources at the center of the production of logic.

We learn here, as we learned from the pioneering ethnographies of science, that writing is at the center of the development of "economies of conviction." When we attend to social practices in the sciences, mathematics, and logic we see material practices rather than the exchange of "immaterial" ideas predicted by classical paradigms in the history and philosophy of science. Logic cannot be "reduced" to a process of reasoning.

Let us pause a moment to consider Rosental's concern with "reductionism." The fact that he considers social constructionism reductionist demonstrates that he has failed to grasp the essence of reductionism and failed equally to grasp social constructionism. I have been at pains in several papers and lectures to argue for social constructionism as the fundamental theorem of sociology. Unfortunately, issues in the unfolding of the new sociology of science in association with the science studies movement have led to the mistaken assumption widely held throughout the intellectual community (and not exempting sociology itself) that social constructionism entails some form of relativism. Social constructionism is a scientific idea fully compatible with the most advanced notions and forms of critical realism.

It is important to keep in mind that the new sociology of science, in conjunction with the science studies movement and postmodernism, has changed our understanding of the very idea of science and the terms of

scientific discourse including truth, objectivity, and realism. Science itself has to be considered in at least two senses. Small “s” science is the fundamental and primordial mode(s) of human reasoning strategies. Capital “S” Science is science as a social institution. In our time, Science in this sense refers to a social practice embedded in the modern modes of techno-industrial production (loosely, the knowledge system, the system of rationality, associated with “capitalism”). Realism is no longer the naive version featured in classical philosophy or the traditional scientific worldview. In both cases, and in the case of the entire lexicon of science, these concepts have for the most part become grounded materially and socioculturally, and all Platonic idealisms have been erased.

It is thus curious to find sociologists of knowledge such as Rosental recognizing on the one hand and correctly that the experience or practice of logic cannot be explained in terms of “reasoning” or interactions between individuals; the focus has to be necessarily on group dynamics. On the other hand, Rosental argues that “rematerializing” the debates among logicians helps us escape social relations in the “strict sense of the term.” In fact, if Rosental is worried about avoiding some sort of sociology, then the solution is already abroad. Social constructionism as I have construed it is intimately embedded in a social ecology and indeed in a sociological materialism that escapes the strict sense of social relations.

All of the factors Rosental identifies as implicated in the sociology of logic are encompassed by the version of social constructionism I speak for. It is instructive to note that Rosental turns to philosophers at critical moments to support his arguments and not to the sociologists of science who would seem to be better placed to support him. Again and again he misses opportunities to acknowledge sociologists who have contributed to empirically establishing the diversity and heterogeneity of the sciences, and the contexts of debate in the sciences and mathematics. He is therefore led to turn to Ian Hacking to defend his understanding of the limits of social constructionism, a philosopher who treats social constructionism as a philosophical idea rather than a scientific concept.

Rosental argues that we must restore eyes and hands to those who produce and manipulate formalisms. To support this argument he turns to a cognitive scientist (Edwin Hutchins) when he could more

easily find support among his colleagues in the sociology of knowledge, and more directly relevant support. My point here is not to promote disciplinary imperialism but rather to argue that there is something invidious about turning away from those closest to your training, interests, and research focus and going to relative “outsiders.” It diminishes and makes invisible the contributions of sociology and subordinates it to traditional disciplines that tend to ignore, dismiss, or misconstrue sociology. Rosental seems to assume that cognitive scientists and philosophers have more intellectual legitimacy in the world of research than do sociologists.

Rosental’s results regarding plurality, the lack of a universal consensus, and the wide variety of elements debated by the logicians are just what we would expect given the history of the new sociology of science and the assumption that logic is a social practice. A closer attention to the sociology of science literature might have led Rosental to see that what he calls “tangential viewpoints” and a “wide variety of debated elements” are just constituents of the facts of logic as a practice.

In identifying the work of “de-monstration” as a major finding of his research, Rosental again misses the point that all of the ingredients of demonstration are what social constructionism is meant to capture. “Demonstration” is used to point to a strong form of demonstration that draws out what is “between the lines” so to speak, that is, to construct a new layer of inscriptions that will literally lead the reader, viewer, or listener to a specific conclusion. The practice here is grounded in the use of eyes and hands – one might perhaps say postures – and not on a mode of reasoning that links thinking minds.

In the end, Rosental finds that logical statements are produced and stabilized in the same diverse, heterogeneous ways as the facts of the experimental sciences. This is not as “unexpected” as Rosental seems to think. After all, we have already found in the sciences and mathematics that facts and findings are constructed in social worlds out of the material and social resources of those worlds. The more organized these social worlds become, the harder it becomes to ground the productions in that world in the worlds of everyday life; the result is that these productions are projected into a transcendental world. In this regard, Rosental has helped us by underscoring empirically what we

have known directly and indirectly in science studies: that not even logic escapes reality.

In spite of his affinity for Durkheim, Rosental is too enamored of the ethnomethodologists and the Latourian ANTs (actor-network theorists) to see that Durkheim is above all a social constructionist. This incidentally helps explain why Rosental does not agree with those who, like me, view ethnomethodology as a process of translation. The Durkheimian tradition, in fact, has been instrumental in opening up a road to grasping the dynamics behind the production of certified knowledge claims. Rosental's work has more in common with that tradition as it unfolds in the works of Ludwig Fleck, Mary Douglas, David Bloor, and myself than it does with the ethnomethodologists and ANTs. His failure to align himself more fully with that Durkheimian line is rooted in the fact that he conflates social constructionism and sociologism, and with relativism. It appears that it is just these flaws in his perspective that lead him to stress correctly that his findings do not show that logic is "inconsistent" or "irrational." This is just what logic is, this is just what the facticities of logic are. And they are no less factual, no less useful, no less "real" because they have been shown to originate in the spheres of human life rather than the illusionary realms of the transcendental and Platonic. All of our ideas – whether true or false – are only accessible through our social practices and discourses in our social ecologies.

Suppose once again that logic exists outside of time, space, history, society, and culture. It would then be unreadable. There could be no account of logic that was not an account of the truths of logic. Nye's (1990) achievements are a consequence of her courageous unwillingness to accept the logician's account of "himself" on "his" own terms. Nye assumes that logic, like all human activities, must be motivated by and embody desire. So she sets out on a difficult trek with the expectation that her assumption would lead to a reading of logic. This is in fact the motivation behind all post-1970 sociologies of knowledge. There can be no human activity, no practice, no discourse that transcends time, space, history, society, and culture, none that cannot in principle be read. Where should we begin our effort to read logic? Aristotle of course is a possibility; so is Plato. But if we go further back with Nye to

Parmenides, we discover passionless logic beginning to loosen itself from the realities of everyday life but still linked to emotive poetry.

The Parmenidean flight from the world is doomed to fail from the beginning. Parmenides speaks for a world without women, sexual generation, fertility, change, emotions, and flesh. Aristotle and Plato speak for a masculine culture divorced from the life of the household. Ockham and Abelard speak for a patristic Church committed to the absolute authority of a transcendent male god, an exclusively male priesthood, and a theology that equates women with sin and evil. Incidentally, I suggest rethinking the relevance of Occam's razor to science since it is proposed in a theological context by a Franciscan theologian with a theological agenda. What could be simpler in the realm of hypothesis than God as cause? And Frege speaks for the male sanctuary of the German university where men engage in symbolic mortal combat to achieve status, power, and privilege. It seems to me that Nye's feminism gives her the courage to try to read logic, but her reading is not so much strictly feminist as it is a sociology of knowledge.

Nye claims that logic flourishes where human community fails: the collapse of the city state, economic crises, disease, hunger, exposure to radically different cultures. If logic demands that we ignore context, circumstances, and personhood when assessing the claims of the logician, reading asks us instead to consider these things carefully.

Conclusion

Abstraction depends on realizing opportunities for producing, publishing, and disseminating ideas in a specialized community of teachers, researchers, and students that extends over a number of continuous generations. If the abstracting (or as I prefer, generalizing) process is carried out under the conditions of social fragmentation (e.g., class divisions and class struggles), and the fragmentation of knowledge (e.g., separating and opposing natural knowledge and political-ethical-moral knowledge), it will generate ideologies of purity. Thus, arguments for purity are not simply consequences of professional autonomy and

specialization. They are an imperative of social conflict (including class struggle). The work of scientists consists in great part of rationalizing thought and developing algorithms for the ready application of ideas to the political, economic, and military ends of ruling elites. But the more insulated their work becomes from “external” interests, the more the algorithmic imperative is subordinated to the imperatives of teacher/researcher-student relationships and traditions, the more we find self-consciousness about and the defense of professional autonomy. This leads to the development of ideologies that justify and glorify the separation of hand and brain, or more generally the concept of “. . . for its own sake.” Ideologies of purity are not unrelated to the role of the thinking class as a tool of the established order. Ideologies of purity are a product of the extreme separation of hand and brain. Logic is the extreme consequence of this process.

Notice that there is a tension between the role of scientists as the brains (and to some extent the hands too) of the political, military, and economic interests on the one hand, and their roles as members of a community whose professional autonomy guarantees them certain perquisites, especially a certain degree of apparent independence in the pursuit of their teaching and research goals. This community is not geographically or nationally bounded. The resources at the disposal of scientists for sustaining and defending autonomy, however, are available ultimately at the pleasure of the ruling classes. If the ruling classes decide that autonomy is producing too much independence, and that it is generating too much insularity, criticism, and meager payoffs, it will adjust the distribution of resources accordingly in order to effect a lower autonomy profile in and a more directly profitable relationship with, “society.” “Society” can refer to general community interests as well as the special interests of the business and increasingly the financial communities. We have seen just this development unfold in the last half-century in the historical centers of academic freedom and tenure in the United States and in the broader societal impact goals used in evaluating proposals submitted to the National Science Foundation.

Theory is related to the speculative thought that accompanies the division of society into social classes. It is in general the special possession of the ruling classes. As a ruling class becomes divorced from basic sustenance labor, its thought patterns become increasingly “speculative.”

These thought patterns correspond to the relatively isolated and insular material conditions of the ruling class lifestyle, or at least the lifestyle of that segment of the ruling class divorced from the day-to-day activities of gaining, keeping, and expanding control of societal resources. A scholarly subclass within or supported by the ruling class transforms speculation to theory. This subclass is directly or indirectly dependent on the patronage of the ruling class. This distinction between speculation and theory depends in part on the degree to which the theory specialists can and do maintain some ties to productive labor. The ties may be to engineering or applied science, or to the internal labor of science known as “experimentation.” The extreme and prolonged separation of the hand and brain endangers the autonomy and the very existence of a community of specialists, as I will argue below.

The development of a more or less autonomous institutional sphere creates a new context for productive labor. The same sort of analysis that at a more primitive level begins with activities aimed at satisfying basic human needs must now be carried out simultaneously on a new level where one aim is to satisfy organizational and institutional imperatives. The institutionalization of science creates the conditions for generating science out of science. This does not mean that the material foundations of earlier sciences are transcended. Rather, they become transformed and more complex. New organizational levels are built upon lower-level sustenance organizations. Occupations, professions, and institutions are higher-order material foundations for human productive activity.

When we focus our attention on internal social structure and autonomy, it becomes clear that processes of specialization, routinization, institutionalization, professionalization, and bureaucratization increase the degree of closure in a social activity relative to other social activities. As closure increases, the boundary separating a given activity from other activities becomes thicker and more difficult to communicate across. A boundary can be thickened, for example, by increasing the degree of specialization and uniqueness in linguistic, symbolic, and notational systems. The process of closure is initially promoted by large-scale developments (e.g., increases in the scale of exchange economies). As specialists emerge, they take an increasingly active and self-conscious role in promoting and protecting closure (i.e., “boundary work” takes up

more and more of their time). Under such conditions, activities within and across generations (assuming generational continuity) will yield increasingly general (“abstract”) productions, or objects. Historically, in the absence of the sort of analysis and awareness reflected in this chapter, the process of closure eventually leads to conjectures about cultural creation or social production as matters of pure mental activity. As closure proceeds, such conjectures become increasingly prominent and plausible. This is so in part because most workers are ignorant of, or forget, their history and therefore the material, practical, and social roots of their productive activities and their products; and in part because certain more self-aware representatives of the specialty *deliberately* set out to protect a “sacred” image of their work and to compete against other specialists for scarce resources. Purity has both sacred and demarcation functions.

As a social activity becomes more specialized and more autonomous in relation to other social activities, it becomes increasingly focused on its own products as objects *and* tools of social production and reproduction. Given generational continuity and a parasitical or otherwise umbilical relationship to the “external” society (so that significant resources and energy do not have to be devoted to primary sustenance concerns), an iterative process occurs in which the products of one set of activities or of one generation become the materials (the material foundation) for the next set of activities or of the next generation’s productive activity.

Logic carries this process to its extreme and gives logic dominion over the rules of reason in every arena of life. Logic does not exhibit a logical history. It is a proper subject matter for the sociologist of knowledge. And Andrea Nye demonstrates that there is more than one “strictly” sociological path to that conclusion. Nye, the feminist, the philosopher (in unacknowledged concert with the sociologist of knowledge) argues that the genesis of logic(s) *is* relevant to the truth(s) and falsity(ies) of logic. A critical understanding of the logician as a person in a socio-cultural context *is* relevant when assessing whether his or her logical claims are true or false. The goal of the logician is to establish laws of truth-telling that stand apart from people, social and cultural conditions, history, and time and space themselves. I have offered some empirically

grounded reasons for why at the end of the day logic cannot stand apart from the contingencies of human life and natural language.

Bibliographic Epilogue for Chapters 7 and 8

A more or less standard history of mathematics is an important companion to my chapters on maths and logics. I recommend a classic text, now out in a new edition revised by U.C. Merzbach, C. Boyer's *A History of Mathematics*, 3rd ed. (New York: John Wiley, 2011), along with D. Struik's *A Concise History of Mathematics* (New York: Dover, 1987). Boyer's book includes material and references on mathematics in the major civilizational areas. Struik's book reflects his Marxist insights on the social contexts of mathematics and mathematical change. And see Alexander Murray's *Reason and Society in the Middle Ages* (Oxford: Clarendon Press, 1978), brought to my attention by my colleague, the late Joe Brown, as I was completing an early draft of this chapter. Murray has some interesting material on the social origins of mathematics. J.L. Berggren, *Episodes in the Mathematics of Medieval Islam* (New York: Springer-Verlag, 1986), is a good introduction to the mathematical details of the "golden age" I discuss in Sal Restivo, *Mathematics in Society and History* (New York: Springer, 1991). For historical details on the scientific literature of this period, see, for example, B.R. Goldstein and D. Pingree, "Astronomical Computations for 1299 from the Cairo Geniza," *Centaurus* 25 (1982): 303–318. Pingree has analyzed specific texts in detail; see, for example, his "The Fragments of the Works of al-Fazari," *Journal of Near Eastern Studies* 29 (1970): 103–123. But he is not concerned with social or cultural issues and problems. For a systematic study in the philosophy of mathematics education that draws heavily on the lessons of the sociology of mathematics, see P. Ernest, *The Philosophy of Mathematics Education* (London: The Falmer Press, 1991). Finally, see T. Crump, *The Anthropology of Numbers* (Cambridge: Cambridge University Press, 1990). Crump, like Ernest, recognizes the contributions of sociologists of mathematics, but is a little more conservative in his interpretation of

their ideas. His discussions of China, India, Japan, the Arabic-Islamic world, and Africa add important material to the accounts in this book. My chapter on Japanese mathematics in *Mathematics in Society and History* follows closely the chronology in D.E. Smith and Y. Mikami, *A History of Japanese Mathematics* (Chicago: Open Court, 1914). Y. Mikami's *The Development of Mathematics in China and Japan*, originally published in Leipzig in 1913, has been republished by Chelsea, New York, first in 1961 and in a second edition in 1974. On the history of Chinese mathematics, see Li Yan and Du Shiran, *Chinese Mathematics: A Concise History* (Oxford: Clarendon, 1987). According to the translators, J.N. Crossley and A.W.C. Lun, this book gives "a more detailed Chinese view" by comparison with Needham.

The history of nineteenth-century mathematics is important for understanding the development of modern ideas about "pure mathematics." See especially Lewis Pyenson, *Neohumanism and the Persistence of Pure Mathematics in Wilhelminian Germany* (Philadelphia: American Philosophical Society, 1983), The collection edited by H. Mehrtens, H. Bos, and I. Schneider, *Social History of Nineteenth Century Mathematics* (Boston: Birkhauser, 1981), is an excellent source here, in particular because of the extent to which the contributors are sociologically oriented (e.g., Hodgkin, Struik, and Bloor) rather than "merely contextual." It is unfortunate that Jens Hoyrup's writings on the comparative history of mathematics are not more widely available. But his numerous reprints and preprints, available from the Institute of Educational Research, Media Studies, and Theory of Science at the Roskilde University Center in Denmark, are a treasury of sociologically informed and historiographically sophisticated analyses of mathematics in the ancient and medieval worlds, as well as of important bibliographies. See also his "Varieties of Mathematical Discourse in Pre-Modern Socio-Cultural Contexts: Mesopotamia, Greece, and the Latin Middle Ages," *Science & Society* 49 (1985): 4–41; and "The Formation of 'Islamic Mathematics': Sources and Conditions," *Science in Context* 1 (1987): 281–329. As editor of the SUNY Press series in Science, Technology and Society I was privileged to publish Hoyrup's *In Measure, Number, and Weight: Studies in Mathematics and Culture* (Albany, NY: SUNY Press, 1994).

In addition to the material cited in my remarks on ethnomathematics, I want to note here M. Closs (ed.), *Native American Mathematics* (Austin: University of Texas Press, 1986), especially J.P. Denny's chapter (pp.129–180) on the cultural ecology of mathematics. Howard Becker's concept of "art worlds" was the inspiration for my concept of math worlds: Howard Becker, *Art Worlds* (Berkeley: University of California Press, 1982). On the ethnomethodology of logic and its sociological limitations, see David Bloor, "Review: The Living Foundations of Mathematics" (a review of *The Ethnomethodological Foundations of Mathematics* by Eric Livingston), *Social Studies of Science* Vol. 17, No. 2 (May, 1987), pp. 337–358.

For a general overview of contemporary math studies proper, I recommend W. Aspray and P. Kitcher (eds.), *History and Philosophy of Modern Mathematics* (Minneapolis: University of Minnesota Press, 1988), and S. Restivo, J. Paul Van Bendegem, and R. Fischer (eds.), *Math Worlds: Philosophical and Social Studies of Mathematics and Mathematics Education* (Albany: SUNY Press, 1993). The latter volume includes a substantial section on the politics of mathematics education. On left- and right-wing math, see Sylvan Tomkins, "The Psychology of Being Right-and Left," *Trans-action* (1965): 3: 23. On Goffman's concept of "frame," see E. Goffman, *Frame Analysis* (Cambridge: Harvard University Press, 1974). Goffman explains how conceptual frames structure an individual's perception of society. He focuses on the organization of experience rather than the organization of society. A frame is a set of concepts and theoretical perspectives that organize experiences and guide the actions of individuals, groups, and societies. Imagine a picture frame; we use the picture frame (the structure) to hold together a picture (the content) of a life experience. Primary frameworks take an individual's experience or an aspect of a scene that would originally be meaningless and makes it meaningful. One type of primary framework is a natural framework, which identifies situations in the natural world and is completely biophysical with no human influences. The other type of framework is a social framework, which explains events and connects them to humans. An example of a natural framework is the weather, and an example of a social framework is a meteorologist who predicts the weather. Goffman's goal was to theorize the structure of the moment-to-

moment experiences individuals have as their social lives unfold. From my perspective, logic and common sense emerge at the intersections of primary and secondary frames. For views on strong sociology in the high tradition, see Ludwig Gumprowicz, *Grundrisse der Soziologie* (Berlin: Heptagon Verlag, 2013/1885); English translation, *The Outlines of Sociology* (1899) Translated by Frederick W. Moore (https://openlibrary.org/publishers/Arno_Press, 1975). Ludwik Fleck's *Genesis and Development of a Scientific Fact* (Chicago: University of Chicago Press, 1979; orig. publ. in German, 1935) is a milestone in the sociology of science. The material on experiments and witnessing is based on Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1989).

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9

Conclusion: The Liminal Context

The interdisciplinary imperative in contemporary science comes, quite simply, from the failure in the course of the twentieth century of our reigning and routinized rationalities. Playing off what anthropologist Mary Douglas described as the Kantian principle “that thought can only advance by freeing itself from the shackles of its own subjective conditions,” as cultural prisoners of rationalities that have inevitably led us to an ecological cul-de-sac we can only escape by loosening the canons of rigor. This has to be done, however, within the broad and flexible confines of the sciences as the repositories of the basic methods of human reasoning. Perhaps it would be more in keeping with evolutionary imperatives to speak here not of science but rather of the basic methods of human reasoning. It is in this liminal context that the full range of absolutes, essentials, and foundations have shattered. This book has focused on four key cultural objects that have had to be put back together again along with science itself – the Brain, God, Mathematics, and Logic. The strategy for achieving this has been first to pluralize these objects and begin a new conversation about brains, gods, maths, and logics. The basic tool I have used to help bring about putting these objects back together in new syntheses is sociology (which I have treated

as one with anthropology and social psychology). I began by situating myself in the midst of postmodernisms. In this conclusion I situate myself in the broader context of our liminal society.

The end of Western rationality was widely acknowledged during the course of the last century. Milton Yinger, in his 1977 presidential address to the American Sociological Association, said that we were experiencing a planetary-wide civilizational transformation. He pointed out that the countercultures of that period were trying to escape the cul-de-sac through mystical insights, or what I would identify as a variety of “new age” strategies. These strategies represent the typical way the West has dealt with the routinization of rationalities. Whereas in earlier periods we witnessed Taborites contending with Prague University masters or English sectarians denouncing the clergy’s monopoly on truth, in the last half of the twentieth century, science itself was identified as the dying rationality of a system the West had made to travel to the farthest reaches of the planet. One must be careful here not to identify science as the basic reasoning tool of our species either with modern science as a social institution or with rationality as the reigning and routinized system of categories, classification, and rules of reasoning in the West.

Another sociologist, Edward Tiryakian, described “the occult revival” in the middle of the twentieth century as part of a new international “cultural matrix.” Are we experiencing another one of those historical episodes in reaction to the end of a rationality, a “sleep of the senses?” If the Hermetic philosophers of the Renaissance were in some ways harbingers of the scientific revolution, were there early signs in the twentieth century of a new rationality emerging from the debris of wars, holocausts, atomic bombs, economic booms and busts, and ecological degradations? Perhaps the earliest signs were the physicists’ “capitulations to Spenglerism” (to draw on historian of science Paul Forman’s phrase) in the 1920s and 1930s and the mystical scientists of the twentieth century. Numerous observers from the 1960s on commented on the closure of science, the evolution of science into a church, and in general on the trap of the reigning rationalities. My own conclusion was that the getting over the routinized logics and rationalities involved moving toward a secular, no-warranty, evolutionary, emancipatory

epistemology. More recently I have come to think in terms of the end of epistemology and the end of traditional philosophies in the wake of the emergence of a neo-natural philosophy. I want to now call this “natural inquiry,” understood to be a general version of what Karl Marx called “human science.” Human science is the science – or more generally, culture of knowledge – that would arise in a technologically advanced society of equals that can be variously conceived as fulfilling Marx’s vague socialist and communist visions, a fully democratic society, or an anarchist society based on the views of Kropotkin and his followers. The objective is to figure out if it is possible to sustain or raise the adaptive/transformational potential of our forms of life while old ways of knowing and doing are collapsing and/or being intentionally destroyed or abandoned.

The liminality of our era reaches to most of the fundamental categories and classifications that have guided human cultures for millennia in some cases and for the last few hundred years in the case of industrial societies. This liminality is driving some of the most significant and influential intellectual movements of our era. Nature-society, human-machine, male-female, person-fetus, “man”-“God,” and life-death are among the powerful dualisms that have become dramatically problematic. Some taken for granted trichotomies are also at risk, notably “believer/agnostic/atheist,” and “brain/mind/body.” My personal approach to escaping these classical divisions was to introduce the term *gnower*, taking the “g” from the term *Gnostic* but eliminating the Christian associations. The *gnower* is no slave to opinions and beliefs. S/he is an anarchist with no gods or masters, neither a leader nor a follower. The very idea of science (along with those “good” terms rationality, truth, and objectivity) has been embraced by this liminality that threatens all of our values, goals, and gods. Traditional dichotomies have given way to complexities; non-linearities; and chaotic, fractal, and multi-logical ways of thinking, speaking, and seeing. We have encountered new phenomena across time and space on and off the planet; engaged new ideas, experiences, and values from east to west and north to south (politically, economically, and culturally); and endured enormous leaps in our knowledge about how the world around us works. The result is that we have been forced into new epistemological and

ontological territories. Nonetheless, it is important not to ignore the cultural inertia that sustains classical dichotomies. The “we” that I refer to here is a narrow band of humanity unfortunately. And that is part of the problem we face.

Our liminal era is producing hybrid ideas and concepts and monstrous entities on a new scale. One day we are accosted by cyborgs, the next day by robosapiens; cloned sheep march with “natural” (i.e., domesticated) cows and horses; mice are patented; some women sell their eggs, some men donate their sperm; and now human-manufactured six-letter DNA competes with evolution’s four-letter DNA.

Postmodern scholars and intellectuals concerned with the liminality problem have been exploring new ways of reworking our systems of categories and classifications and at once documenting the changes in worldview our emerging human ecologies are calling forth. Such efforts, now as in all liminal eras, necessarily strike us as awkward, counter-intuitive, and obscure to different degrees. This book itself as a participant in this movement necessarily has its moments of awkwardness, obscurantism, and counter-intuitiveness. In a world of hybrids, monsters, and uncertainties, it should not surprise us that the theorists of liminality have produced theories and concepts that are themselves hybrids, monsters, and embodiments of uncertainty.

As we approached the second millennium, the flux of categories and classifications and the proliferation of hybrids and monsters increasingly came to dominate our everyday lives and the horizons of humanity. These are times that require great courage and imagination to engage real problems, so it is not surprising that only a few thinkers rise to the occasion. We find interesting and unlikely convergences in this arena of innovative thinking. Bruno Latour, on the one hand, has slowly turned away from sociology and science to metaphysics while quantum physicist David Bohm came to view contemporary liminal dynamics through the very lenses that Latour is seeking to change. Bohm even championed a verb-based language as one way of coordinating language and reality.

Our discourse exists in a discursive space that has been opening up for a new age of thinkers who have been leading the revolt against the disciplining of the disciplines. Even those who, like the “new age” thinkers of this and earlier ages, have taken us down dead end paths

have helped to rattle the old ways to open up new possibilities. We are increasingly faced with problems of survival on a planetary scale that cannot even be formulated in the terms of our reigning and routinized rationalities. In the twentieth century, in the most advanced technoscientific nations, we reached the limits of our categories and classifications. And whatever we could borrow from other contemporary and historical cultures and civilizations has often proven to be too embedded in localities to be immediately useful. At the same time, the encounter with the Others in their multicultural localities has been a catalyst for emerging hybrid categories and classifications that are – or must be if we are to survive – the ingredients of new worldviews, new rationalities, and new modes of knowing, thinking, and action. In technical terms, and from a physical perspective, we could say that our narrative unfolds in a Bohm space of infinities of things in becoming. A translation into a commensurable Hegel space (recalling that Bohm was influenced by Marxist and Leninist dialectics) gives us a narrative defined not by an aim but by a carrying out of an aim. The result (the conclusion, the resolution) in this sense is not the narrative as a whole but rather the result integrated with the process that brings it to fruition. Our brain and mind narratives, our god, math, and logic narratives, are unfolding in this liminal context. These narratives are part of new global narratives of the human condition.

Epilogue: A Final Moment in the Dialogue between Sociology, Philosophy, and Science

This book has unfolded in the shadow of ongoing debates in the academic community about the nature and the very existence of an entity that is at the center of the arguments in this book: society. Is the very idea of “society” rooted in the ideology of a particular class structure? Is “society” at the outset simply a matter of extending our experience of the small group of people we have come to recognize in our own lives? Like most philosophical positions on the nature of society, this idea of society by extension is rooted in cognitive,

psychological, individualistic thinking. This is so alien to how sociologists think that it is hard to find the right standpoint from which to engage this view. The atomistic individual at the center of this philosophy is from the sociological perspective an ontological fabrication. One could imagine stepping back from both sociology and philosophy to argue that both the “individual” and “society” are ideological constructs and not natural kinds. The argument that societies and individuals are too mutable to be natural kinds can be countered in at least two ways: the first is to adopt the Aristotelian notion of a second nature; the second is to view society, culture, and humans as part of nature. The philosophical claim is that socialization arises from drives, interests, purposes, and inclinations. These are all functions of intelligence, and none of these is philosophically a social phenomenon. Methodological individualism drives the idea that each individual generalizes his/her own experiences to arrive at the concept of society. Here, the individual is viewed as a natural kind and society as an artificial construction. In the wake of the new sociology of science, which has demonstrated the dangers of trying to distinguish immutable facts from our descriptions of the world, methodological individualism is doubly problematic. It violates the fundamental perspective that drives sociology, and it ignores the empirical results of the new sociology of science.

We have to ask once again why philosophies of society seem in many cases so reasonable. The reason is that the realm of the social is widely assumed to be transparent to any undisciplined gaze. In fact, it is no more transparent to the non-sociologist than is the realm of quantum reality to the non-physicist. I have no competence as a physicist simply because I can “see,” “feel,” “taste,” “smell,” or “hear” features of the physical world that are the starting point for training, education, and research in physics. So even before the substantive problems addressed by philosophers of society come into focus, we are faced with the problem of what to make of remarks that begin by eliminating the very credibility of the sociological perspective. We are not, as my philosophical interlocutor is, free to invent our own metaphysics. How is it that philosophers can claim to be untutored in sociology “but” take themselves to be qualified students of society? What is more sociologically intriguing than this is that they are taken seriously by others

in and out of philosophy. This “but” is an invitation to an implausible suspension of disbelief. Would such a “but” not sanction a social scientist to follow up the assertion, “I cannot claim to be well versed in physics, but...” with ungrounded, untutored, and incredible remarks on everything from geometrodynamics to tensors and from black body radiation to string theory? And even then we must note that for sociologists, intellectual styles and metaphysics are properties of social networks, social institutions, and cultures, and not of individuals.

I am at a great disadvantage here since every effort I make to correct my interlocutor’s conception of how sociologists understand society and social construction plays directly into his/her critique. The philosopher says X, Restivo says Y, but Y can only reiterate what the philosopher objects to. Given this impasse, is there any way in which such a philosopher can contribute to or reflect almost two hundred years of systematic and cumulative sociological theory and research? This is hardly possible given that philosophers tend to restrict their sociological grounding to a small, non-representative set of social thinkers. Take, for example, my interlocutor who takes his/her classical sociology from Simmel and Schutz who, for all of their brilliance, have long been incorporated or surpassed. S/he then adopts Niklas Luhmann as his/her tutor in modern sociology. Luhmann, one of the most advanced theorists in modern sociology, is hardly the place to go for help if you are not well versed in sociology.

My interlocutor claims are grounded in the sociologically untenable view of the “individual” as a real identifiable entity, something that is independent of society and manifests “subjectivity.” By contrast, I view “society” as an adaptive strategy and a discoverable unit of scientific analysis that emerged on the evolutionary landscape long before humans did. That is, social organization is a mechanism for survival and adaptation, a mechanism already visible in cellular cooperation and grouping behavior in pre-mammalian evolution. When humans “arrived,” they arrived already social, not as a collection of atomistic individuals. Every time my interlocutor uses the term “individual” or “subjective experience,” s/he takes for granted what must be interrogated and what has in fact been made problematic by sociologists (not to mention philosophers such as Nietzsche and Wittgenstein). Sociologists simply do not describe the way we come to conceive “society” in individualistic terms. Marx, as

I pointed out earlier, had the insight that even as scientists we are social creatures. The scientist – and indeed all of us as humans – is given the material of his/her activities, including language as a social product. The key sociological move is to see that our very existence is a social activity. The fact that sociology is a refined and empirically substantive discovery science is witnessed in the works of students of society that include George Herbert Mead, Erving Goffman, Mary Douglas, C. Wright Mills, Randall Collins, and Dorothy Smith, to mention just a small part of the tip of the iceberg of discovery. By virtue of ignorance of this iceberg or dismissal of the iceberg as a delusion or mirage, my interlocutor cannot do justice to the discipline of sociology.

What do philosophers gain and what can they teach us by imposing a “freely chosen” metaphysics onto the sociological landscape? If they want to offer a critique of sociological ideas, shouldn’t they be obliged first to capture those ideas in the native’s own terms? Sociologists do not arrive at “society” by way of individuals but rather by way of social units of analysis such as play, games, rituals, structures, and networks. Consciousness itself appears as a function of networks of social relationships already in the works of the more insightful classical theorists, notably Nietzsche, Durkheim, Marx, and Mead. My interlocutor treats “social constructionism” as one of several possible philosophical background theories in sociology. My own view, supported by many but certainly not all sociologists (and herein may lie a rationale for offering a more congenial assessment of my interlocutor’s position) is that social constructionism is the fundamental theorem of scientific sociology. If one adheres to the lessons of the Durkheimian and Meadian traditions that run through the contributions of modern sociologists and anthropologists such as Douglas, Mills, and R. Collins, then the view I offer here will be at one with at least this tradition. My view can and should be seen, then, as representing one tradition within sociology, but one with an extremely powerful pedigree and with substantial empirical support. Even before addressing this position, my interlocutor might have clarified the distinctions in the relevant literatures that separate various uses of “constructionism,” “constructivism,” “social constructionism,” and “social constructivism.” The significant distinction here is between “constructivism” and “social constructionism.”

Barbara Herrenstein Smith views “social constructionism” as a critically and politically engaged set of views on knowledge and science. “Constructivism” is a broader set of views on the nature of knowledge and cognition. This conception of social constructionism plays into the philosopher’s notion that social constructionism is a philosophical concept. “Constructivism,” as Smith understands it, would clearly make an appropriate foil for a philosopher. The distinction between constructionism and constructivism is more arbitrary. In the science studies and cultural studies literature, these terms are used interchangeably. I prefer “constructionism” because it stresses “making” or “manufacturing,” the “doing” feature of social life. Philosophers are inclined to start this construction process at a psychological level; but it is precisely this level of analysis that has been eliminated by the emergence of sociology. Sociology has demonstrated that the psychologist’s “individual” is in fact a social structure, a set of social relationships. What, then, does it mean to say something is socially constructed? We are forced once again to stress that it does not mean that something – for example, an idea, a concept, a theorem, a law of nature, or an object like the moon – is an arbitrary creation of human beings driven by certain religious, economic, political, ideological, or other similar interests or imperatives. It does mean that there is one and only one way that humans can come to be, to know things, and to build cultures, and that is through their interactions with others in our earthly contexts. This is the great discovery of the nineteenth-century social theorists. Durkheim plays a crucial role in crystallizing this discovery and applying it to clarifying the nature of religion and logic as social constructions. It is at this crucial juncture that sociology begins to separate itself from philosophy. It is in the realization of Durkheim’s agenda in the application of sociological reasoning to scientific knowledge and in his rejection of transcendental and imminent reasoning that we locate the origins of the contemporary sociology of science and mathematics. There is a question whose formulation alone is thought by some philosophers to destroy the sociological enterprise: “How can constructivists speak of social interaction or communication with others, when, as they claim, their experiential world is their own construction?” This is the classical

philosophical way of logically undermining the very idea of the sociology of knowledge; the claim is that the sociology of knowledge is self-refuting. The problem is a red herring and only makes sense if one assumes that because something is socially constructed, it is not “real.” Is the sociology of knowledge as much a social construction as the knowledge systems it analyzes as social constructions? Of course: we have no other way to do things, feel things, or think things than by way of our social interactions in their social and material contexts. For an elegant examination and refutation of the error at the root of the self-refutation argument, see Bloor (1991:17–18). Everything I have written so far is moot, given the most fundamental assumption underlying my philosopher interlocutor’s viewpoint. That is the claim that philosophers stand on a “higher ground” from which they claim jurisdiction over the critical analysis and evaluation of the presuppositions, theories, and methods of all the other disciplines. This once widely accepted conception of the philosopher’s role has become, at the very least, problematic and must be rejected. Untutored social scientists claiming a philosophical or metaphysical “high ground” would find it impossible to publish a treatise on, for example, Bell’s theorem, in any reputable scientific journal. It is clear from various philosophical enterprises that the struggle Durkheim carried out to establish sociology on a scientific footing against prevailing psychological and individualistic assumptions continues to require due vigilance and action.

Is it possible to imagine a resolution of the differences that separate sociology and philosophy? Restivo and von Glasersfeld, Restivo and Bringsjord? (See the bibliographical epilogue for this chapter.) Can this be done in a debate, in a series of conjectures and refutations, by refining the logics of our positions, or in some other reasonable manner? I do not think that any resolution is possible in these terms. The reason is, and here I follow the paradigm for comparing philosophical systems proposed by Clifford Hooker (1987), that our positions hide entire worldviews; it is those worldviews that must be compared, contrasted, and criticized – element by element – not sociology and philosophy, and not one metaphysics versus another. And if it is indeed worldviews that are at stake here, we may be early witnesses to the demise of one or both of these two disciplines.

Bibliographical Epilogue for Chapter 9

This book is the grandchild of my *The Social Relations of Physics, Mysticism, and Society* (New York: Springer, 1983). The key authors cited in this chapter are referenced in that book. My key philosophical interlocutors have been Selmer Bringsjord (see the Coda in [Chapter 8](#); I don't specifically mention Bringsjord but he shadows this discussion); and Ernst von Glasersfeld (see "Society, Social Construction, and the Sociological Imagination," invited commentary, *Constructivist Foundations* 3(2), 2008, 94–96).

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Appendix 1

Moments in the History of the Science of Society

There is a cumulative robust science of society that is unfortunately a narrow band of research and theory in the history of sociology. That history has been one of a fragmented community that has not been able to build a community of consensus to anything like the levels achieved in physics, chemistry, and biology. I write about sociology in this book from within that narrow band that has built the foundations of a community of consensus. In this appendix I draw attention to some of the pillars of that foundation. I do this selectively and with respect to specific issues that people have with sociology as a science and with social science in general.

There is a cumulative robust science of society that is unfortunately a narrow band of research and theory in the history of sociology. That history has been one of a fragmented community that has not been able to build a community of consensus (objectivity community) to anything like the levels achieved in physics, chemistry, and biology. I write about sociology in this book from within that narrow band that has built, if not a community of consensus, the foundations for one. In this appendix I want to draw attention to some of the pillars of that foundation. I do this selectively and with respect to specific issues that people have

with sociology as a science and with social science in general. I can't say how many sociologists will agree with my reading of sociology as a science. I defend my reading based on an understanding of the nature and history of the sciences seen through the eyes of an interdisciplinary sociologist of science.

1. Emile Durkheim, *The Elementary Forms of Religious Life* (1912).

Like any great contribution to science, this one can be picked at for flaws. It is, nonetheless, the crystallization of a major discovery in the history of humanity. It should be read as a milestone that draws on prior theory and experience and provides significant resources for firming up the crystallization of an answer to the God question. God is a symbolic creation that arose in the crucible of human culture. The human condition gives us everything we need to explain God without recourse to transcendental, supernatural, and a priori ideas, concepts, and assumptions.

2. Social Science Experiments

The fact that sociology and social science in general have experimental options has long been established in the hybrid field of social psychology and in psychology. For many years, along with other social scientists, I taught students about what seemed to be a milestone in this history of experimenting with human subjects. The Milgram experiment had all the appearance of a classic scientific experiment; it produced significant results with implications for understanding the human condition; and it raised serious issues about the ethics of research on human subjects. For the details of the study, see S. Milgram, *Obedience to Authority: An Experimental View* (New York: Harper Perennial Modern Classics; Reprint edition, 2009; orig. publ. 1974). Summaries of the experiment can be found online and in the references that follow. In the wake of Gina Perry's *Behind the Shock Machine: The Untold Story of the Notorious Milgram Experiments*, the experiments have come under renewed scrutiny. The book was originally published in Australia by Scribe, Brunswick in 2012. A revised edition was published in the United States by New Press of New York and London in 2013. There are reasons to question the extent to which Perry's book breaks the back of the original experiment. See, for example, the *World Street Journal* review, <http://online.wsj.com/news/articles/SB10001424127887323324904579040672110673420>. For a more positive view of Perry's claims, see the review that appeared in

the *Los Angeles Review of Books*, <https://lareviewofbooks.org/essay/psych-lies-and-audiotape-the-tarnished-legacy-of-the-milgram-shock-experiments>. There have been efforts to replicate Milgram's work and the results tend to support the most general interpretation of Milgram's original study: most people do what they are told by people with what they perceive as legitimate power and authority. For a review of the replications, written before the appearance of Perry's book, see <http://www.rit.org/authority/futureobedience.php>. The fact of the Milgram experiment deserves our continued critical reflection.

You can find brief summaries of the most significant experiments in social psychology here (including the Milgram and Zimbardo studies which are presented without attending to the controversies that surround these studies in particular): <http://www.spring.org.uk/2007/11/10-piercing-insights-into-human-nature.php>. For more on classical experiments in psychology and social psychology, see *Great Experiments in Psychology*, by H.E. Garrett (New York: Irvington Publishers, 1981); and for a general overview of significant studies in psychology, see *Forty Studies that Changed Psychology: Explorations into the History of Psychological Research*, by R.R. Hock (Upper Saddle River, NJ: Prentice-Hall, 2004). All of this research falls under the general rubric of social and behavioral science and is rarely psychological in a strictly individualistic sense.

Many of the results of these studies have entered the public imagination. Many, if not all, of you will have learned about the Milgram experiments or encountered them in mass media documentaries and fictional scenarios. These studies of "obedience to authority" involved subjects shocking a confederate of the experimenter in what they were told was a study of teaching and learning. The shock generator never delivered any actual shocks. Milgram designed various configurations in which the learner (confederate) and subject were brought into closer and closer physical proximity. Milgram found a straight-line relationship between proximity and the willingness of subjects to shock the learner; the greater the proximity, the lower the tendency to administer shocks. This makes sense even in the wake of the criticisms of the experiment. Other studies reported in the above links gave us insights into (to mention just a few of the studies reported in those links) the "halo effect" (the educational psychologist Edward Thorndike coined the term

and carried out the first empirical studies that demonstrated this form of cognitive bias in the second decade of the twentieth century), cognitive dissonance (associated with the studies carried out by Leon Festinger and his colleagues in the 1950s), Muzafer Sharif's Robbers Cave experiment (reported in 1961), Zimbardo's Stanford Prison experiment (reported in 1971), false consensus bias (based on studies conducted by Lee Ross and his colleagues in the 1970s), and the bystander effect (reported by Darley and Latane in 1968; their study was prompted by the murder of Kitty Genovese in 1964, perhaps the most publicized example of bystander apathy in American history).

Social science does not have a good record of commitment to cumulative research. One of the first efforts to assess where we stand in the science of human behavior was B. Berelson and G. Steiner's *Human Behavior: An Inventory of Scientific Findings*, published in 1964 (New York: Harcourt, Brace & World). The authors begin by reviewing the basic methods of inquiry in the behavioral sciences and then present research findings in the areas of behavioral development, perceiving, learning and thinking, motivation, the family, small groups, organizations, institutions, social stratification, ethnic relations, mass communication, opinions-attitudes-beliefs, society, and culture. For each section, the authors provide a set of definitions followed by a list of findings in sub-areas of the particular category. The findings are stated in the form of causal propositions. For example, under the category of social stratification, you will find propositions (linked to confirming evidence) such as (a) people in small communities are more likely to agree on who ranks where than are city people; and (b) the rate of generational mobility is currently about the same in all highly industrialized societies (a generalization that contributed to undermining the concept of American exceptionalism). In 1973, when Randall Collins published the most comprehensive introduction to causal sociology at that time and to today, he did not reference the Berelson and Steiner volume. His *Conflict Sociology: Toward an Explanatory Science* (New York: Academic Press) was an extraordinary effort to consolidate a generalized sociology. He develops an extraordinary systematic theoretical crystallization of what sociologists know about the world in terms of stratification, microsociology, deference and demeanor, sex and age,

organizations, state-economy-ideology, wealth and social mobility, and the organization of the intellectual world. Collins' approach is to begin with a set of postulates and then to develop his propositions. In the case of his analysis of occupational class cultures, his postulates include (1) each individual constructs [his/her] own subjective reality; and (2) individual cognition is constructed from social communications. There are six other postulates. The first proposition is: experiences of giving and taking orders are the main determinants of individual outlooks and behaviors; the second is: the more one gives orders, the more [s/he] is proud, self-assured, formal, and identifies with the organizational ideals in whose name [s/he] justifies the orders. As you read through efforts like those undertaken by Berelson and Steiner and by Collins, it is important to keep in mind that for science to get a foothold on reality and to begin its cumulative climb, early on it may be important to state things that may seem obvious but must nonetheless be empirically grounded and theoretically informed. As research traditions grow, such statements will become more formal and be absorbed by axioms and postulates. Science only works as a process, not as a set of facts.

Randall Collins has, in my view, done more to establish foundations for a cumulative explanatory sociological science than anyone else. In addition to the propositional compendium, *Conflict Sociology*, he has also given us *The Sociology of Philosophies* (Cambridge, MA: Harvard University Press). Key findings from this study are reported in [Table 2.1](#), and see his *Interaction Ritual Chains* (Princeton: Princeton University Press, 2005). Collins has produced some of the most important contributions to sociological science in twentieth-century sociology. The fact that we do not yet see other sociologists following in the steps of Collins' explanatory science of sociological realism doesn't change the fact that Collins has given us every reason to begin that trek. There is plenty to criticize in Collins' work, but that is the nature of science. The fact that critics found fodder in the works of Newton and Einstein doesn't change the significance of their contributions.

Collins has led the way in demonstrating the explanatory power of sociology at the introductory level, notably in his *Sociological Insight: An Introduction to Non-Obvious Sociology*, 2nd ed. (New York: Oxford University Press, 1992), and most impressively in his article on "The

Future Decline of the Russian Empire.” The article was published in Collins’ collection of his essays in *Weberian Sociological Theory* (Cambridge: Cambridge University Press, 1986). What impresses about this article is that the basic work and write-up were completed many years earlier. Theoretical power is predictive power, and for theory to be predictive it must be constructed on a solid empirical foundation. The power of Collins’ theories rests on his enormous command of the sociocultural landscape. This should be where people turn when they want to experience the robustness of sociology as a science.

POINT: “Sociology is among the hardest sciences of all – harder than the proverbial rocket science,” Dalton Conley stated upon becoming the first sociologist to be awarded the National Science Foundation’s Alan Waterman Award. In 2005, the NSF recognized Conley as one of the nation’s top young sociologists. “Imagine a science where you can’t do controlled experiments – the . . . staple of most bench science,” he said, perhaps implicitly explaining why this is only the second Waterman Award recognition of a social scientist. Commiserating with zoologists and paleontologists, who he said “share the difficulty of having to piece together observational data without . . . experiments,” Conley explained that sociologists are forced to “impute causal processes, not just describe or classify the world,” all while accommodating the multiple levels of analysis that constantly and integrally interact.

An additional thorn in sociologists’ professional lives is “the complication that . . . reality changes as you study it, and by virtue of the fact that you study it,” analogous to Heisenberg’s uncertainty principle in quantum mechanics, said Conley. “Our basic units of analysis, like the family, and our conceptual frameworks, like race and class, are ever-shifting as we study them.” To top off sociology’s formidable list of investigational obstacles, Conley noted that “many of the topics we study (e.g., gender and sexuality, race and class, family life) are, by design, the most politically charged and most personally sensitive topics one could address. That doesn’t make research easy. When you’ve got all those together then you’ve got the challenges of sociology . . .” Conley is Professor of Sociology and Public Policy at New York University and Director of NYU’s Center for Advanced Social Science Research. He is also Adjunct Professor of Community Medicine at Mount Sinai School

of Medicine and a Research Associate at the National Bureau of Economic Research.

COUNTER-POINT I: F. Stuart Chapin (1917), "The Experimental Method and Sociology," *The Scientific Monthly*, Vol 4, Issue 3, pp. 238–247. Chapin began this paper by noting the notable achievements physical scientists had reached through the use of the experimental method.

He raised the question of whether this method could be used in sociology. Sociologists had already observed natural experiments such as the isolation of Inuit populations and the operation of Malthus' law in China. Chapin wondered about whether sociologists had even undertaken to construct a true experiment. Social reformers in his time as in our own era are faced with objections to their plans that stem from moral and ideological objections and superstitions; it is difficult to assess such plans in terms of their intrinsic potential for positive change. Chapin was already witness to the resistance to animal experimentation in spite of clear evidence that they had contributed to human welfare. Chapin concluded that society was the only legitimate and official social experimenter. Utopian communities (e.g., New Harmony, Brook Farm, and the North American Phalanx) can be viewed as small-scale social experiments. They did not lead to conclusive results because they failed to meet the scientific criterion of isolation. State socialism in Germany and England in his time were cited as good examples of sociological experiments (I would call them social experiments). The problems with small-scale or societal experiments is that they are not systematic enough to identify and control all the relevant conditions and variables. Chapin understood the experimental method as a two-stage process. In physics or in sociology, there has to be a trial and error stage followed by more systematic experimental designs. Physics has passed thought the trial and error stage, he said, but sociology was still at that stage. In general, social and cultural adaptations unfold in a trial and error context, and the adaptations are subject to a process analogous to natural selection. Social selection proceeds by individual exclusion or extermination; societal selection involves constraint and control. Both social and societal selection are forms of collective experimentation by the trial-and-error method. Legislative actions occur in the context of the inconclusive trial-and-error method. Chapin predicted that we would eventually in principle identify all the conditions and variables relevant to social problems

using the trial-and-error method. That would set the stage for introducing the true experimental method into sociology. In his time as today complexity and variations in society and culture seemed to set a limit on the use of the true experimental method. What to do? The statistical method, Chapin claimed, can be used to analyze complexity and variability, and it bears to the scientific method in sociology the analogous place of the experimental method in the physical sciences.

COUNTER-POINT II: Experiments are usually set up so that the scientist controls the introduction of possible independent variables. The experimental method is used more by psychologists than sociologists (e.g., see Milgram and Zimbardo). Notice, however, that such experiments (the Milgram experiment is exemplary) are sociologically relevant because they often involve manipulating social variables. We are used to the use of laboratories in the natural and physical sciences, but the social and behavioral sciences have a long history of laboratory studies. For reviews of the basic considerations in contemporary sociology regarding experiments, surrogate experiments such as the comparative method and field studies, see <http://revisionworld.com/a2-level-level-revision/sociology/research-methods/primary-data-collection/experimental-method#sthash.5jKDKUCw.dpuf>. This site offers guidelines and reviews for British students studying for their A-levels (exams).

COUNTER-POINT III: Although the Milgram, Zimbardo, and other experiments were carried out by psychologists, the studies were in fact experiments in social psychology and thus in essence sociological experiments (as a review of the dependent variables and independent variables used readily reveals). See <http://listbattle.com/187-top-7-social-experiments>, summarized below:

Ten Major Social Science Experiments

10. Robbers Cave Experiment (http://www.age-of-the-sage.org/psychology/social/sherif_robbers_cave_experiment.html).
9. Milgram Experiment (https://en.wikipedia.org/wiki/Milgram_experiment).
8. Carlsberg Social Experiment (<https://prezi.com/1ikerxucrifu/carlsberg-social-experiment/>).

7. The Monster Study (https://en.wikipedia.org/wiki/Monster_Study).
6. Conformity Elevator Experiment (<http://www.brainpickings.org/2012/01/13/asch-elevator-experiment/>).
5. Little Albert Experiment (https://en.wikipedia.org/wiki/Little_Albert_experiment).
4. Stanford Prison Experiment (https://en.wikipedia.org/wiki/Stanford_prison_experiment)
3. The Asch Experiment https://en.wikipedia.org/wiki/Asch_conformity_experiments
2. Bobo Doll Experiment https://en.wikipedia.org/wiki/Bobo_doll_experiment
1. "Seating Arrangement and Leadership Emergence," Howells, L.T.; Becker, S.W. *The Journal of Abnormal and Social Psychology*, Vol 64(2), Feb 1962, 148–150. Abstract: Based on the proposition that seating position effects the flow of communication which, in turn, affects leadership emergence, twenty groups of five subjects performed a problem-solving task and then rated the group members on exhibited leadership. The seats were arranged so that two Ss were opposite three Ss. A greater number of leaders than would be expected by chance emerged from the two-seat side of the table, thus, lending support to the hypothesis.

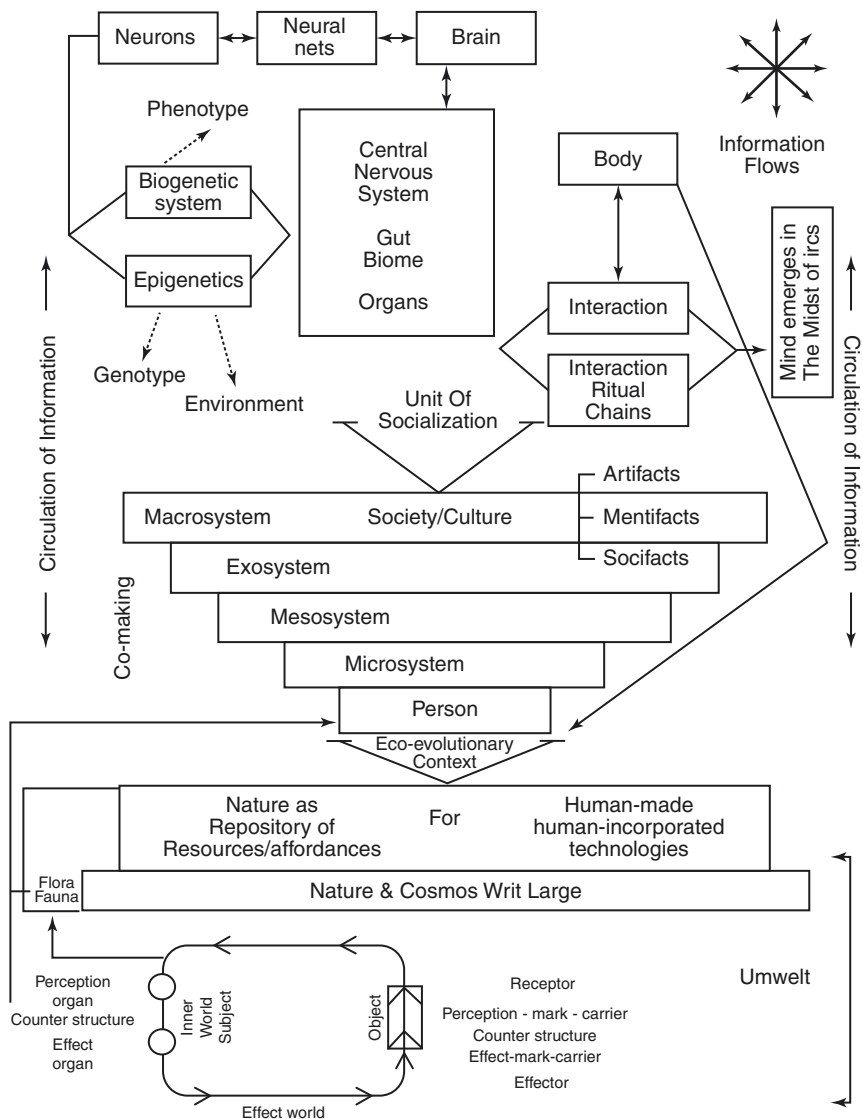
Major figures in the history of experimental social science: Solomon Asch, Stanley Milgram, Philip Zimbardo, Leon Festinger, Muzafer Sharif, and Albert Bandura. For an overview, see *Opening Skinner's Box: Great Psychological Experiments of the Twentieth Century* (New York: W.W. Norton, 2005) by Lauren Slater; *Laboratory Experiments in the Social Sciences*, 2nd ed. (London: Elsevier, 2014), edited by Murray Webster and Jane Sell; and see Robert Freed Bales, *Interaction Process Analysis: A Method for the Study of Small Groups* (Oxford: Addison-Wesley, 1950). Also see William R. Shadish, Thomas D. Cook, and Donald T. Campbell, *Experimental and Quasi-Experimental Designs for Generalized Causal Inference* (Boston: Houghton Mifflin, 2002). A quasi-experimental design has the "look" of an experiment but does not rely on random assignment. See <http://www.socialresearchmethods.net/kb/quasiexp.php>, authored by William M.K. Trochim who studied under Donald T. Campbell.

NOTE: There are methodological and ethical issues associated with all of these studies and, in particular, the Milgram obedience experiment and the Zimbardo prison experiment. They nonetheless demonstrate the viability of the experimental method in social science, demonstrate important facts about human behavior, and offer insights into the nature and limits of the scientific imagination.

Appendix 2

Modeling the Social Brain: Updated Version of the Restivo-Weiss Model of the Social Brain

In this appendix I present the latest iteration of a model of “the extended brain” designed to represent Clifford Geertz’s concept of “culture/mind/brain-brain/mind/culture.” It also models a solution to perennial problems and paradoxes in brain and mind studies. This model updates the original model developed by Sal Restivo and Sabrina Weiss and published in Sal Restivo, Sabrina Weiss and Alexander Stingl, *Worlds of ScienceCraft* (Routledge, 2016: 69). This amended version includes a delta function for each element describing its temporal dynamics and a dialectical sign indicating the extent to which the element contains the seeds of its own internal change, not shown in the graphics. The rationale for the model and the basic principles guiding its construction are discussed in [Chapter 4](#). The next stage is to formally construct the information model adumbrated here. Recent research demonstrating that the immune system can influence social behavior is an implicit prediction in this model (<http://www.nature.com/nature/journal/v535/n7612/full/nature18626.html>). The model also may help explain how people can live with large parts of their brains missing – since behaviors we tend to assume are fully localized in the brain are in fact functions of the entire system (<http://www.bbc.com/future/story/20141216-can-you-live-with-half-a-brain>).



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