

INVISIBLE
FORCES
—AND—
POWERFUL
BELIEFS

GRAVITY, GODS, AND MINDS

THE CHICAGO SOCIAL BRAIN NETWORK

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Publishing as FT Press Science
Upper Saddle River, New Jersey 07458

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Printed in the United States of America

First Printing October 2010

ISBN-10: 0-13-707545-6

ISBN-13: 978-0-13-707545-4

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Preface



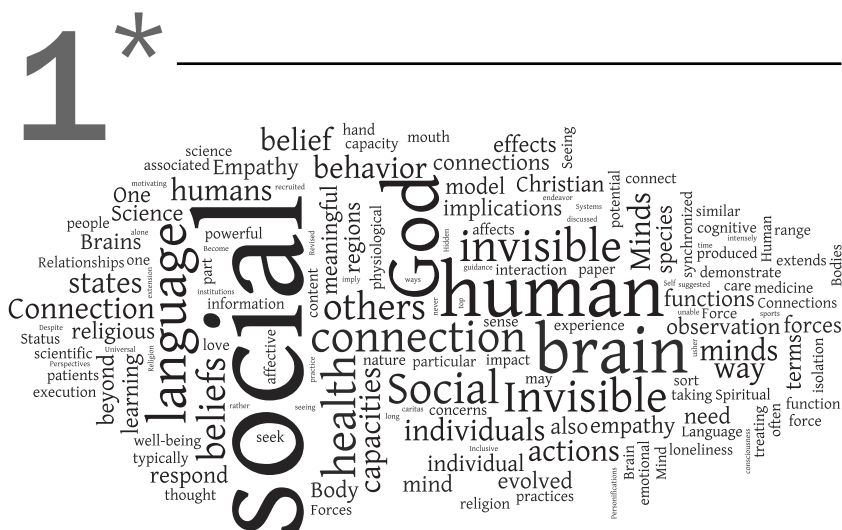
We view our past through a reverse telescope, making it seem like contemporary events are a much larger part of our history than they are. Hominids have been estimated to have evolved about seven million years ago, with our species having evolved only within approximately the last 1% of that period. The human brain was sculpted by evolutionary forces over tens of thousands of years, whereas the human achievements we take for granted, such as civilizations, law, and art, have emerged only during the past few thousands of years. A mere 300 years ago, theology and philosophy were the principal disciplinary lenses through which the world was viewed and from which explanations and instruction were sought. Advances in science over the past 300 years have transformed how we think, act, and live. Nearly every aspect of human existence, ranging from agriculture, commerce, and transportation to technology, communication, and medicine, has been transformed by contemporary science. We have no hesitation to accept scientific explanations of physical entities being influenced by invisible forces such as gravity, magnetism, and genes. But when human cognition and behavior are the objects to be explained, deterministic scientific accounts seem less satisfying for many.

For some people, science and modernity are akin to the apple in the Garden of Eden, responsible for our fall from grace. For others, theology and religion represent little more than the stuff of superstition, with no place in an educated society.

About six years ago, we had the opportunity to create a most unusual group of scholars to examine questions about the invisible forces acting on, within, and between human bodies. Superb scholars who individually had made major contributions to their own disciplinary field—fields as divergent as neuroscience and medicine to philosophy and theology—were invited to form an interdisciplinary network of scholars to consider such questions. The development of these discussions even over the first few meetings truly astonished us all. We decided to share what we learned in this book, which represents a different perspective, in which our understanding of human nature is enriched by serious insights and scrutiny that each perspective has to offer. Theology and religion have always relied on unseen forces as the basis for explanations of human behavior and experience. Science has been able to explicate those forces even if along different lines than originally conceived. As we start to consider some of the more complex aspects of human nature, science and theology may be able to work together to shed light on some of these complexities.

We begin this preface and each chapter with a word cloud produced using Wordle, at www.wordle.net. In the case of this preface, the word cloud illustrates key concepts found in this book. In the case of the chapters, the word cloud in each provides a visualization of the key terms and ideas expressed in that chapter. Each chapter, in turn, represents a contribution led by a particular member to the network, but broadened to reflect the interactions of the network on that topic. Perusal of the word clouds across chapters makes the flow of ideas more visible. Together the chapters speak to who we are as a species and the nature of the invisible forces that make us such a unique species. For instance, humans seem to strive for social connections in a variety of ways, from friendships, to identification with groups, to religious affiliations. A major thesis of this book is that we are fundamentally a social species and that this journey is less a march toward isolation and autonomy than it is a march to competence, interdependence, coordination, cooperation, and social resilience. Guiding us through this journey are our social brains, which have evolved to create anything but a blank slate at birth.

We owe a debt of thanks to many for their contributions and support over the years. But we owe special thanks to Barnaby Marsh for approaching us with the idea of forming such a network and for his many contributions to the network, and to the John Templeton Foundation for its support and encouragement to pursue questions, ideas, and conclusions of our science, regardless of where they led.



Invisible forces operating on human bodies

We may believe we know why we think, feel, and act as we do, but various forces influence us in ways that are largely invisible to our senses. Gravity is an invisible force that holds us to the surface of the Earth, and magnetism is an invisible force that we use in everyday life. The fact that gravity and magnetism are invisible to us does not place them beyond

* The Chicago Social Brain Network is a group of more than a dozen scholars from the neurosciences, behavioral sciences, social sciences, and humanities who share an interest in who we are as a species, and the role of biological and social factors in the shaping of individuals, institutions, and societies across human history. The scientists and scholars in the Network differ in background, epistemologies, beliefs, and methods. After five years of working together, we found that a common set of themes emerged in our work despite the differences among us. These themes, which provide a different perspective on how we might think about human history, experience, and spirituality, are examined here and explored in more detail in subsequent chapters.

scientific scrutiny. Similarly, a host of forces have emerged over the course of human evolution to influence our thoughts, emotions, and behaviors. Because many of these forces are elemental, we are dealing with an area of human behavior that has also been addressed for centuries by various religions. Among these are forces that compel us to seek trusting and meaningful connections with others and to seek meaning and connection with something larger than ourselves. The story of these invisible forces speaks to who we are and what our potential might be as a species. In short, it is the story of the human mind.

The mind can be thought of as the structure and processes responsible for cognition, emotion, and behavior. It is now widely recognized that many structures and processes of the mind operate outside of awareness, with only the end products reaching awareness, and then only sometimes. But clearly we know a great deal about the mind from what we experience through our senses. It is common sense that we know the shape or color of an object from simply seeing it.

Or do we? It is obvious that the tops of the tables depicted in the top panel of Figure 1.1 differ in size and shape. You may be surprised to learn that your mind is fooling you—the tops of the table are precisely the same size and shape. If you don't believe it, trace and cut a piece of paper the size of one tabletop and then place it over the other. Self-evident truths can sometimes be absolutely false.

The science of the mind is not unique in this regard. As the historian Daniel Boorstin noted¹:

Nothing could be more obvious than that the earth is stable and unmoving, and that we are the center of the universe. Modern Western science takes its beginning from the denial of this commonsense axiom.... Common sense, the foundation of everyday life, could no longer serve for the governance of the world. When "scientific" knowledge, the sophisticated product of complicated instruments and subtle calculations, provided unimpeachable truths, things were no longer as they seemed.

And just as the observation that we roam on stable ground led to the incorrect inference that we are the center of the universe, the observation that we look out onto the world and onto others fosters the mistaken notion that the human brain is a solitary, autonomous instrument whose connections with other brains is of no real import.

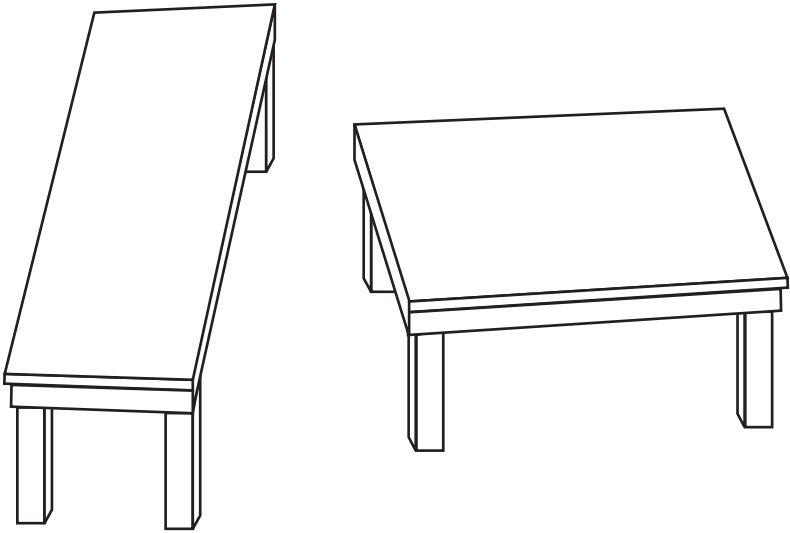


FIGURE 1.1 The two seemingly differently shaped table tops are, in fact, identical in the picture plane. This illusion arises because our visual system provides depth interpretations of the two-dimensional drawing. Table illusion from *Mind Sights: Original Visual Illusions, Ambiguities, and Other Anomalies* by Roger N. Shepard. Copyright © 1990 by Roger N. Shepard. Reprinted by arrangement with Henry Holt and Company, LLC.

The human brain, the organ of the mind, is housed deep within the cranial vault, where it is protected and isolated from others, so it may seem obvious that the brain is a solitary information-processing device that has no special means of connecting with other brains. But we are fundamentally a social species. Faces, expressive displays, and human speech receive preferential processing in neonatal as well as adult brains. When people feel rejected by others, their brains show the same pattern of activation as when they are exposed to a physically painful stimulus. Permit people to cooperate with others, and their brains show the same pattern of activation as when they are given a rich reward such as delicious food or drink. We may not be aware of it, but human evolution has sculpted a human need for social connection, along with neural circuits and hormonal processes that enable and promote communication and connection across brains. As we shall see in the chapters to follow, our sociality is an important part of who we are as a species, and it plays an important, although often invisible, role in the operations of our brain and our biology. Among the questions we examine is whether our social brain also contributes to the ubiquitous human quest for spirituality.

The Chicago Social Brain Network

For hundreds of years, theology and philosophy were the hub disciplines of scholarship, and other fields of inquiry orbited around this dyad and were tightly constrained by it. Over the past three centuries, the sciences have come into their own, displacing theology and philosophy at the center of the academic universe. In so doing, they have produced extraordinary advances in everyday life. People may reminisce about the good old days, but thanks to science and technology, the amount of total income spent on the necessities of food, clothing, and shelter dropped from 80% in 1901 to 50% in 2002–2003. Yet there remains an inchoate sense that something is missing in our lives, something intangible and elusive. Science has improved our material lives, but improvements in material life may not be enough to optimize human well-being.

Can these two very different ways of seeing the world be used synergistically to shed new light on the human mind? To explore this question, in fall 2004, we established an ongoing network of more than a dozen scholars unbounded by disciplinary precincts, geographical borders, or methodological perspectives to set aside antagonisms that had grown up between science and humanities. These Network scholars hail from disciplines as disparate as psychology, neurology, theology, statistics, philosophy, internal medicine, anthropology, and sociology. Each of these scholars was well known in his or her own field and was busy with other obligations, but the opportunity to achieve a deeper, more comprehensive discussion of the human mind made it worth the time and effort required to be part of the Network.

Although various members of the Network interact on a daily or weekly basis, the entire Network convenes twice annually for a four-day retreat to discuss each other's research, critique each other, and learn from one another. Scientific analyses characterized by rigorous experimental designs and data analytic strategies are interlaced with rich philosophical, theological, and historical analyses of the same questions about invisible forces that act on us all. The dialogue between the Network scientists and the scholars from the humanities and theology is bidirectional. For instance, the beliefs and behavior described in the humanities and theology are rich in hypotheses that can now be tested empirically, and the measures and methods of the behavioral sciences and neurosciences now permit rigorous investigation of some of these hypotheses. Each of the Network members brings a unique perspective to the study

of the human mind, and the provocative story of the mind that is emerging from the collective efforts of the Network is the subject of this book.

The Network is unconventional in other ways as well. Traditionally, scientists and scholars work together to achieve a common understanding and a consensus position. We quickly learned that we did not need to come to a consensus to benefit tremendously from the dialogue on the capacity and motivation for the ubiquitous human quest for sociality and spirituality. For instance, there is no consensus within the Network on whether there is a God, and we do not seek here to provide the final word on what science and the humanities each have to say to the other about the human mind. Instead, our purpose is to illustrate the possibility and importance of engaging others whose views we may not share in a serious dialogue on such topics. We have learned many lessons as a Network:

1. Some questions about human nature and our social and spiritual aspirations have been asked by humankind for thousands of years. Accordingly, we can gain more from engaging in a collaborative process of thinking about these questions than from demanding simple and immediate answers. We discuss what we see as possible answers to questions about our nature and strivings, but the value in stating these positions is to have clear positions from which to move thinking and research forward. Thus, our purpose in writing this book is to articulate ideas to be shaped and refined, not to provide the final word.
2. One need not agree with a position to perform a deep and thorough analysis of the arguments for and against the position. Objectivity in thought and analysis are keys to reaching a deep understanding of a topic. By taking a position, developing arguments for and against the position, and then taking the opposite position and doing likewise, we develop the capacity to be more dispassionate and powerful thinkers—and gain deeper insight into a topic.
3. One need not reach agreement with someone to learn a great deal from discussions with them or to make significant advances in addressing a complex question. The salve of affirmation can lead us to seek like-minded others and to denigrate and avoid those who disagree with us. Although this may provide temporary comfort, it does little to help address deep divisions or solve problems

that we encounter in an increasingly complex and diverse world. There are inherent tensions between the sciences and the humanities, and these tensions have led to a polarization of views, an “It’s my way or the highway” approach toward those holding divergent points of view. The contents of this book illustrate an alternative possibility. The Network is a very interdisciplinary group, and the perspectives captured in the subsequent chapters reflect some of the same tensions that other scientific and religious books have wrestled with—and from which they have not benefited. The tensions reflect deep and enduring differences in the way in which scholars in the humanities, the social sciences, and the sciences think about theory, methods, and evidence. These differences can test one’s mettle, but if acknowledged, respected, embraced, and pursued, they result in a richer, more innovative and synergistic collaborative effort. In the case of our Network, this was neither easy nor quick, but it was achieved through a mutual respect and exchange of ideas and a shared conviction regarding the importance of the Network’s combination of approaches from the humanities and the sciences. In a sense, our Network is a microcosm of the structure that exists in our society. If these tensions are embraced and used to their full catapultic effect, we can make progress on serious problems, transforming not only how we think about the problem, but also how we think about those who hold different or opposing views.

4. The insights or advances we can achieve need not be our or our opponent’s position, or a less than optimal compromise between the two; they can be truly innovative, building on and transcending both initial positions. The specific forms of such creative and transcendent solutions are difficult to articulate in advance, but there is a thought process—characterized by clarity, openness, constructive criticism, and synthesis—that increases the likelihood one will reach such solutions. All of the perspectives discussed in this book have been transformed through this process.

Background

In pursuing the tandem lines of inquiry of science and the humanities, the Network serves as an example of the human capacities and emergent

processes that can derive from collective social structures and actions. In the chapters to follow, the Network examines the nature and power of unseen forces, ranging from human coregulation to physiological effects of spiritual beliefs. The exchanges across disciplinary perspectives suggest that the “dominion of the solitary individual” is insufficient to understand the human mind or to optimize human health and well-being. To understand human nature and the human mind, one may need to appreciate human needs and capabilities that have not been given due attention.

Homo sapiens are a social species, which means there are emergent organizations beyond individuals that contribute to the ability of our species to survive, reproduce, and care for our offspring sufficiently long that they, too, survive to reproduce. As a consequence, evolutionary forces have sculpted neural, hormonal, and genetic mechanisms that support these social structures. Among the possible consequences explored in this book are that: 1) people are not the entirely self-interested, short-term-thinking, rational decision makers assumed by the mythical creature *Homo economicus* and 2) some of the amorphous dissatisfaction and chronic diseases that characterize contemporary society may be, in part, the consequence of the denial of the differences between the nature of these two beings. Existing scientific studies of religion have established the pervasiveness of religious beliefs and practices and an association between these beliefs or practices and physical as well as mental health. Religious beliefs and practices have also contributed to failures to heed life-saving medical advice and to the horrendous treatment of others. It will be through the serious investigation of such beliefs and practices, not through their denial, that we may ultimately be able to identify which aspects of these beliefs and practices are beneficial, for what individuals and in what contexts, and through what specific mechanisms.

Recent research has made it patently clear that William James underestimated the faculties of human infants when he suggested that their first sensory experiences were a “blooming, buzzing confusion.”² But what James’s sentiment did capture is the overwhelming complexity and uncertainty that exists in the child’s environment, and the inherent difficulty in making sense of that complexity from scratch. Our drive to make meaning is irrepressible—when we do not understand the forces that drive our actions, we invent narratives that make these invisible forces feel more predictable and understandable, even if only in hindsight. But we do not do it alone.

Adults as well as children must explain the uncertainty and ambiguity of natural phenomena (calamities of weather, death, and reproduction) and social phenomena (human agents) to operate effectively. But not all actions are perceived as being equivalent. Forces operating on objects to compel action, as when gravity causes rocks to slide down a mountain, are viewed as external causes. Forces operating on human bodies to produce action, in contrast, are viewed as reflective of purpose, driven not only by external causes but also, more important, by abstract reasons such as goals, aspirations, and destiny. The meaning-making proclivities of humans are so irrepressible that when external forces operate on human bodies to produce a significant impact on humankind, even the causes of the actions of these human bodies tend to be regarded in terms of more abstract purposes and reasons. The anthropomorphic description of hurricanes is a case in point.

Actions of objects have causes, whereas actions of humans have reasons. Invisible forces that operate on humans but that appear to operate independent of human agency have been the subject of religious speculations for centuries. These invisible forces include

- Internal neural and biological forces (such as homeostatic processes and autonomic activity) that exert regulatory forces that are largely hidden from conscious experience or control
- Strong emotions that seem to arise apart from conscious human intention (such as rage, fear, and empathy)
- Phenomena such as dreams or hallucinations that seemingly operate independent from the human will
- Motivations, biases, inclinations, and predilections (such as anthropomorphism, ambiguity avoidance, and preference for simple explanations) whose presence is so universal that, like language, the capacities for their development or expression may have an evolutionary basis
- Individual beliefs (such as the belief that there is a reality outside our head and we are not dreaming)
- The belief in human freedom
- The belief in values (such as equality, and so on), attitudes, preferences, goals, or intentions

- Aggregated beliefs that result in social norms, values, religion, culture, and social movements
- Codified forces such as decrees, rules, alliances, and laws

Before the Enlightenment of the eighteenth century, many scholars believed that thought was instantaneous and that action was governed by an indivisible mind separate from the body. If a palpable cause for a person's behavior could not be identified, the Divine or some counterpart constituted a more agreeable explanatory construct than invisible forces acting through scientifically specifiable mechanisms. Unparalleled advances in the sciences have occurred since the dawn of the Enlightenment, including the development of scientific theories about magnetism, gravity, quantum mechanics, and dark matter that depict invisible forces operating with measurable effects on physical bodies. During this same period, serious scientific research on invisible forces acting within, on, and across human bodies was slowed and underfunded in part because the study of the human mind and behavior was regarded by many in the public and in politics as soft and of dubious validity. The result is that many still regard the mind and behavior as best understood in terms of the actions of nonscientific agents, such as a god or gods, and the manifestations of mental illness as the result of a failure of individual will—a denial of the possibility that invisible forces (forces that are tractable scientifically but of which a person is not normally aware) can affect mind and behavior.

One could try to explain away the gap in scientific knowledge about invisible forces by referring to the conception of science and religion as systems of knowledge that are in opposition. This approach is common and evident in a spate of contemporary books that take the position that science and religion represent competing ways of understanding the world, and that science (or religion) is the one and only valid way of understanding human behavior and the world around us.^{3, 4, 5, 6, 7, 8} For instance, in *The God Delusion*, Richard Dawkins places specific Judeo-Christian theological doctrines under the scrutiny of science, only to find that none passes scientific muster.

The vast majority of people from all educational backgrounds continue to harbor strong religious beliefs that affect their daily decisions and behavior, with both good and ill effects. These religious belief systems most commonly bump into scientific claims around invisible forces.

When science opens up opportunities to improve the human condition by providing a more complete understanding of the causes of events, their measurable effects, and possible interventions—ranging from valid science education to medical advancements based on stem cell research—these opportunities are often threatened by the application of specific religious beliefs to these endeavors. Scientific research to understand religion and religious belief systems may be a more productive response than broad denouncements by scientists of any who hold such beliefs.

Conversely, when religion opens up opportunities for improving the human condition by questioning the emphasis on short-term self-interests at the expense of the collective, providing a more complete understanding of the human need to attribute meaning to events and their effects, and identifying possible interventions—ranging from the provision of tangible support for individuals in need to the promotion of healthy lifestyles and ethical behavior—scientific research to understand these influences may again be a more productive response than broad denouncements by scientists that such beliefs are irrational. Indeed, the question of whether God exists is of much less scientific interest, and of much more questionable scientific merit (how would one scientifically falsify such a claim?), than the question of the causes, consequences, and underlying mechanisms for the observable human behaviors affected by invisible forces—whether they be physical (gravity), social (groups), or *perceived* spiritual (gods).

Contemporary science explains many of these phenomena but also points to the human capacities and emergent processes that derive from collective social structures and actions and, underlying the emergence of these structures, the human need for meaning-making and connecting to something beyond oneself. The dominant metaphor for the scientific study of the human mind during the latter half of the twentieth century has been the computer—a solitary device with massive information-processing capacities. Computers today are massively interconnected devices with capacities that extend far beyond the resident hardware and software of a solitary computer. The extended capacities made possible by the Internet can be said to be *emergent* because they represent a whole that is greater than the simple sum of the actions possible by the sum of the individual (disconnected) computers that constitute the Internet. The telereceptors (such as eyes and ears) of the human brain

have provided wireless broadband interconnectivity to humans for millennia. Just as computers have capacities and processes that are transduced through but extend far beyond the hardware of a single computer, the human brain has evolved to promote social and cultural capacities and processes that are transduced through but that extend far beyond a solitary brain. To understand the full capacity of humans, one needs to appreciate not only the memory and computational power of the brain, but also its capacity for representing, understanding, and connecting with other individuals. That is, one needs to recognize that we have evolved a powerful, meaning-making *social* brain.

Social species, by definition, create structures beyond the individual—structures ranging from dyads and families to institutions and cultures. These emergent structures have evolved hand in hand with neural and hormonal mechanisms to support them because the consequent social behaviors (such as cooperation, empathy, and altruism) helped these organisms survive, reproduce, and care for offspring sufficiently long that they, too, reproduced. From an evolutionary perspective, then, the social context is fundamental in the evolution and development of the human brain.

The observable consequences of these higher organizations have long been apparent, but we are only now beginning to understand their genetic, neural, and biochemical basis and consequences. To fully delve into these complex behaviors, science needs to deal with the invisible forces that shape human life, whether it is in the form of physical, biological, or psychological forces. For instance, anthropomorphism, the irrepressible proclivity to attribute human characteristics onto nonhuman objects to achieve meaning, predictability, and human connection, is beginning to be subjected to productive multilevel scientific analyses. Experimental studies have shown that manipulations that increase feelings of social isolation without the possibility of resolving these feelings through human interaction have the compensatory effect of increasing people's tendency to anthropomorphize, including heightened beliefs in God. This scientific work has implications for understanding claims regarding the success of religious practices, such as solitude, as paths to feeling closer to God. Research on anthropomorphism has now identified developmental, situational, dispositional, and cultural factors that modulate people's tendency to anthropomorphize nonhuman agents, ranging from technological gadgets to animals, to gods, and the neural

mechanisms underlying this transconfiguration of nonhuman objects into humanlike agents are beginning to be revealed.

Guided by the insights from these new scientific theories of anthropomorphism, historical analyses may be worthwhile to determine whether concepts of gods have changed across time and cultures such that the god was created in the image of the believer rather than vice versa. For example, in the sixth century B.C., Xenophanes was apparently the first to use the term *anthropomorphism* when describing the similarities between religious agents and their believers, noting that Greek gods invariably had fair skin and blue eyes, whereas African gods invariably had dark skin and dark eyes (joking that cows would surely worship gods that looked strikingly cowlike).⁹ In 1841, the theologian Ludwit Feuerbach broached the idea of God as a projection of ourselves. Brain imaging research has confirmed that anthropomorphism is associated with the activation of the same prefrontal areas that are active when people think about themselves or project themselves onto others.¹⁰

Conclusion

The study of invisible forces also requires a discussion of the method that successful teams use to work together as they cross disciplinary boundaries. Over the past few decades, there has been a demonstrable shift from the individual genius as the source of scientific and scholarly breakthroughs to interdisciplinary teams. This shift in the production of cutting-edge knowledge has been documented in all fields of scholarly activity, ranging from mathematics and theoretical physics to the humanities. This shift has both made possible and been necessitated by a need to understand complex behaviors. Although this project is primarily about the ways that scientists seek to study the impact of invisible forces, it also reflects the methodologies that these researchers use so that their work is not constrained by common knowledge.

The philosophy of science also looks different when dealing with simple causality (one-to-one relations) than with complex causality. Affirmation of the consequent, a logical error in which a given cause for an effect is inferred based on the observation of the effect, does not lead to a scientific error when there is but a single cause for the observed effect. However, as scientific inquiry addresses increasingly complex phenomena, and increasingly complexly determined phenomena, the philosophy of science needs to become more nuanced.

A core challenge is to develop a “science” of identification and aggregation of these invisible forces at different levels. Related research questions include why they exist and measures of robustness. One of our central goals is to demonstrate not only that considerations of these forces matter, but also that they can matter *a lot*.

Questions of value and ethics also could be implicated: Descriptive knowledge, models, awareness of causal relationships, and so on might not be enough to answer some kinds of questions, especially those related to value and purpose, which are the very energies that animate and invigorate real human systems. Economics comes close, with its proxy measure of value based on the distribution of scarce resources and people’s varying need for these resources. But this theory comes up short in many instances where other values are at play that are beyond markets, such as in assessing the value of a human life or debating whether all lives are of equal value. It is an especially poor model for helping us understand something as simple as the value of sentimental articles, such as family photographs, which may have little or no market value. Thus, how do we best understand the “sentiments” that are important in the real world?

The members of the Network have worked beyond the boundaries of disciplinary borders, geographical precincts, and epistemological comfort zones to develop a rigorous but innovative approach to the study of the human mind, sociality, spirituality, health, and well-being. The Network members represented in this book are Gary Berntson from Ohio State University, Don Browning from the University of Chicago, John Cacioppo (Network Director) from the University of Chicago, Farr Curlin from the University of Chicago Medical Center, Jean Decety from the University of Chicago, Nick Epley from the University of Chicago Booth School, Clark Gilpin from the University of Chicago, Louise Hawkey from the University of Chicago, Tanya Luhmann from Stanford University, Chris Masi from the University of Chicago Medical Center, Howard Nusbaum from the University of Chicago, Gün Semin from the University of Utrecht, Steve Small from the University of Chicago Medical Center, Kathryn Tanner from the University of Chicago, and Ron Thisted from the University of Chicago Medical Center. The biography of each member, along with an explanation for the essay each presents, is provided at the beginning of each of their essays on invisible forces.

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From selfish genes to social brains

The Chicago Social Brain Network was established to examine how science might inform us about our fundamental human nature, including the apparently irrepressible quest for connection with a higher understanding and organization. Science can describe what religion does in rigorous ways that benefit religion, and religion can serve a meaning-making function that science itself disclaims. This is not to say that science can address the existence of God. Our Network instead focuses on the consequences of believing in such a mind and of seeing into that mind.

In the next chapter, “The social nature of humankind,” John Cacioppo, a social neuroscientist, draws on work on evolutionary theory, sociobiology, and evolutionary psychology to examine the implications of the selfish gene hypothesis for *Homo sapiens*. He shows how the notion of the selfish gene has been joined with political theory, consumerism, and economics to produce a dominant modern image of humans, summarized by the phrase “what is best for me is best for the society.” Without rejecting the selfish gene view, Cacioppo shows how it evolves in humans into what he calls the “social brain”—a large cerebral cortex and an interconnected limbic lobule that together are sensitive to the complexities of physical and social environments. Central to this complexity is the long period of dependency of the human infant and the interdependencies of adult humans for survival, especially in hostile environments (such as warfare). For the selfish gene to contribute its DNA to the ongoing gene pool, individuals must not only reproduce, but also cooperate with others to ensure that their offspring grow to maturity and reproduce. This leads to natural selection choosing those genes and capacities that contribute to cooperation, reciprocity, attachments, and generosity. During the millennia of human evolution, this process has created the social brain and made humans a unique social animal.

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