

Mind

What does it mean to be a human person?

Quite a demanding question to address in one book. Many people, including myself, spend their whole lives attempting to answer that question. Do any of us really succeed? Can we do more than piece together a few fragments of living and hope our lives tell a story? Even if one does answer the question for oneself, how can that answer the question for more than the individual?

This book attempts to answer the question. Of course, it remains a partial answer. I weave together snippets I learned from academic work and religious experiences. Threads from computer science, biology, and spirituality depict an image of a human person that thinks and prays in faith. Academically, the book lays out aspects of cognitive science and religion, but an academic answer can only serve as a partial answer. One needs insight into the human person, and according to the early twentieth-century pragmatic philosopher of religion, Josiah Royce:

Insight is knowledge that unites a certain breadth of range, a certain wealth of acquaintance together with a certain unity and coherence of grasp, and with a certain closeness of intimacy whereby the one who has insight is brought into near touch with the objects of his insight. To repeat: Insight is knowledge that makes us aware of the unity of many facts in one whole, and that at the same time brings us into intimate personal contact with these facts and with the whole wherein they are united. The three marks of insight are breadth of range, coherence and unity of view, and closeness of personal touch.¹

No scholarly book provides intimate personal contact, and with a single author the breadth of range remains quite limited, but hopefully I will provide coherence and unity of view over a moderate range of topics that currently appear fragmented in the existing literature.

The insight comes at a cost. One might hope that after examining many partial answers, one could arrive at a single synthesized answer to the meaning of the human person, or at least for *a* human person, namely oneself. But this book systematically describes why no single coherent view of the person can be known or even exists. Understanding the complexity of the human person requires multiple coherent views that unify only in their relationship to each other. The topics of mind, brain, spirit, and soul do cohere in surprising yet unified ways, but one must surrender remnants of overly simplistic nineteenth-century science and overly romantic nineteenth-century religion to unify and cohere knowledge of the person with contemporary findings of

¹ Josiah Royce, *The Sources of Religious Insight* (New York: C. Scribner's Sons, 1912), pp. 5–6.

quantum mechanics, chaos theory, the Human Genome Project, neuropsychology, (post)modernism, and religious plurality.

In the twenty-first century, insight into the human person requires a new question: how does a human person become meaningful?

By shifting questions, one loses static categories of essence to gain dynamic processes of stability. Those stabilizing processes end only when a person's life ends, and thus the dynamic process of becoming underlies the static perception of being. If one searches for a fixed, static essence of the human person, one finds nothing. Slow-moving change results in the appearance of permanence, but only the different rates provide stability. The changes of civilizations and species over centuries and millennia provide stability to the individual life. The changes of a person over years and decades provide stability to a person's daily life. But, conversely, one defines oneself and thus gains "meaning" through the choices one makes in each daily decision. One's daily decisions define the decisions of one's entire life. The decisions of one's life define one's community, and the daily decisions of every person's life in community define what it means to be a human person.

Although one loses a static ground for one's individual life, each individual meaningfully defines an aspect of what it means to be human for all humanity, and with what we know from chaos theory, such as the "butterfly effect," even a very small change can have great impact, and each individual has the potential to significantly influence what it means to be a human person. Before I begin highlighting the individual threads of human cognitive science and religion beginning with the "mind," I close the introduction slightly apologetically, though perhaps appropriately, with a quote from Christian scripture:

For those who want to save their life will lose it, and those who lose their life for my sake will save it. (Luke 9:24, NRSV)

Philosophy of Mind

What is meant by mind? Is mind a human characteristic, natural phenomena, or both? How do religious, philosophical, and theological perspectives on mind along with body and soul identify the human person?

The mind does not exist, at least not in isolation. Cognitive scientists may refer to the mind as embodied, and brain scientists have described many aspects of the mind as embodied in and through the brain.² The human mind exists embodied in one's brain and body and situated in a particular culture, but "mind" isolated from those relationships is an illusion based upon modern interpretations of the seventeenth-century philosopher René Descartes, who wrote of separation between mind (or soul) and body:

² Michael S. Gazzaniga, Richard B. Ivry, and G.R. Mangun, *Cognitive Neuroscience: The Biology of the Mind* (New York: Norton, 2nd edn, 2002); Francisco J. Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge, MA: MIT Press, 1991).

If I had only ceased to think, although all the other objects which I had ever imagined had been in reality existent, I would have had no reason to believe that I existed; I thence concluded that I was a substance whose whole essence or nature consists only in thinking, and which, that it may exist, has need of no place, nor is dependent on any material thing; so that “I,” that is to say, the mind by which I am what I am, is wholly distinct from the body, and is even more easily known than the latter, and is such, that although the latter were not, it would still continue to be all that it is.³

However, scientists and scholars now understand that thinking does depend upon a material thing, namely the brain, and that it also depends upon the categories that one learns from others in one’s culture which one uses in framing and interpreting one’s experience.

How does the human mind exist embodied through the brain and culturally situated?

When approached from the perspective of one’s body, one discovers the brain. When approached from the perspective of one’s experience and one’s cultural interpretation of that experience, one discovers one’s mind. In isolation, both remain incomplete descriptions. The brain by itself cannot explain mental activity, and the mind does not exist without a brain. Neither does culture or the mind exist independently of each other.

Mind–Body Problem

In his book *Mind: A Brief Introduction*, contemporary philosopher of mind John Searle examines the nature of the human mind. How does one give an account of humans as apparently conscious, mindful, free, rational, social, and political agents in a world where some interpret science as telling us reality consists entirely of mindless, meaningless, physical particles? What does it mean to be human, and how do we fit into the rest of the world? Philosophy of mind addresses these questions because mental phenomena form the bridge by which the individual connects with the rest of the world.⁴

In the modern era, philosophy of mind begins with the work of Descartes. In Descartes’ doctrine of dualism, called “substance dualism,” the world divides into two different kinds of substances or entities that can exist on their own: “mental substances” and “physical substances.” Descartes believed that a substance has to have an essence or an essential trait to make it the kind of substance that it is. The essence of mind is consciousness or “thinking”; and the essence of body exists in being extended in three dimensions in physical space, which he called it “extension.” (In Descartes’ Latin terminology the distinction is between *res cogitans* and *res extensa*.) In the seventeenth century, Cartesian dualism seemed to divide up the territory between science and religion and partially diffused the apparent conflict between faith and reason by giving the material world to the scientists and the

3 Rene Descartes, *Discourse on the Method of Rightly Conducting the Reason, and Seeking Truth in the Sciences* (1637), Part IV.

4 John R. Searle, *Mind: A Brief Introduction* (Oxford and New York: Oxford University Press, 2004), pp. 9–13.

mental world to the theologians. Minds were considered immortal souls and not a proper topic of scientific investigations, whereas bodies could be investigated by such sciences as biology and physics. For Descartes, each of us as a self is identical with his or her mind. A living human being is a composite entity, comprising both a mind and a body, but for each person the self, the object referred to by “I,” is a mind that is somehow attached to the body. One knows both the existence and the contents of one’s mind by a kind of immediate awareness, which Descartes summarizes in his famous sentence, *Cogito ergo sum*: “I think therefore I exist.” Gilbert Ryle, a twentieth-century philosopher of mind, satirizes Descartes’ view by calling it “the ghost in the machine.” Each person is a ghost (one’s mind) inhabiting a machine (one’s body). For Descartes the “I” refers to one’s mind, the mental substance that constitutes the essential me. Searle, Ryle and many others argue that Cartesian dualism is not a philosophically acceptable account of the nature of the mind, at least in part because of the arbitrary distinction between mind and body, and the lack of explanation as to how the two realms connect.⁵

If the mind is separate from physical objects, how do the mind and body affect each other? In philosophical terms: how can there be causal relations between the mental and the physical? For philosophers, it seems impossible that causal relations should exist between two completely different realms—the physical realm of extended material objects and the mental realm of mind. How does anything in the body cause anything in the mind? How does anything in the mind cause anything in the body? Yet every time one perceives, the world influences the mind; and every time one decides to act, the mind influences the world. For the dualist, two sets of problems occur: How can anything physical produce an effect inside one’s mind or soul, which is nonphysical, and how can events in one’s mind or soul affect the physical world. The inability to explain these causal relationships forms the “mind–body problem.”⁶

Self, Intentionality, Free Will

For those who reject substance dualism, there is still a serious question left over: what exactly is the self?

Philosophy of mind explores several philosophical issues around the nature of the human person. What is the self, and how does it retain its identity over time and changes? The mind seems different from other physical objects. One’s mind appears to make free choices and can think “about” a variety of real-world and imagined objects. If the mind is only a certain type of physical object, what makes it different from other objects that cannot be “about” something? What does it mean to decide anything?

The early twentieth-century American philosopher and early psychologist William James understood the self as the sum of all that one knows oneself to be and self-awareness as a stream. The self has two aspects: an “I” that experiences continuity and a “me” that is rooted in bodily existence and captures the sum total of

5 *Ibid.*, pp. 13–16.

6 *Ibid.*, pp. 17–18.

the perceived world claimed as part of the self. James considered three dimensions to the “me.” These three dimensions of the “me” are sets of perceptions that filter how we sense the world. The three dimensions are:

1. *Material* “me” is my perception of my physical, body-centered world, such as body, clothes, home, and physical possessions with which I heavily identify.
2. *Social* “me” captures my role in interpersonal relationships, such as family and other people who matter to me.
3. *Spiritual* “me” includes the entire collection of my states of consciousness, such as my thoughts and feelings.

However, James’s split between “I” and “me” does not adequately explain how the continuity and change connect in the self. What are the criteria by which one forms a personal identity? What exactly is the subject, an “I,” to which one attributes these criteria? Contemporary studies of the brain indicate processing related to the self, but much work remains, especially with respect to subjectivity or consciousness.⁷

From a philosophical perspective, the mind–body problem relates to intentionality. *Intentionality* is a technical term used by philosophers to refer to the “capacity of the mind by which mental states refer to, or are about, or are of objects and states of affairs in the world other than themselves.” If one has a thought, it is a thought about some object or state of affairs in the world. The same is true of beliefs, desires, hopes, fears, and perceptions. In each case the state refers beyond itself. Intending, in the ordinary sense in which one intends to do something, is another kind of intentionality among others. How can a mental state refer to or be about something beyond itself? Two related problems of intentionality include: How is intentionality possible at all? And given that it is possible: How is it that intentional states have the specific contents they do have?⁸

Another place the mind–body problem arises is the question of free will. One has experiences of deciding between alternatives or doing one thing, when one could have easily done something else. One takes these as indications of free will. But the question arises: does one genuinely have free will, or is it only an illusion?⁹

How does the physical give rise to the self, intentionality, and free will? When scientists examine the brain closely in a variety of experiments, they learn much about perception, learning, memory, action, planning, and certain other mental phenomena, but not as much about self, intentionality, or free will. What differs between mental phenomena best understood in terms of the brain and those that extend beyond the brain?

7 *Ibid.*, pp. 280–81. S.J. Gillihan and M.J. Farah, “Is Self Special? A Critical Review of Evidence from Experimental Psychology and Cognitive Neuroscience,” *Psychology Bulletin* 131(1) (2005): 76–97.

8 Searle, *Mind*, pp. 28–30 (28). As the book defines several technical terms in a variety of fields, some of which identify core concepts of the book and other which identify a peripheral topic, I distinguish via “quotes” terms only used in the current section and via *italics* terms that will occur in later chapters. Although for the uses later in this book, one can think of intentionality as simply the capacity of thought to be “about” something.

9 *Ibid.*, 23–25.

A better question than trying to locate mind within or outside of brain is: what provides meaning to the self and how do brain processes contribute? The prior question assumes the brain exists as a fixed structure, not a slowly changing process, and although that assumption leads to knowledge about perception in the brain, the knowledge cannot help one gain insight into all mental processes. By considering the brain in the human body and cultural context, one gains insight about self and deeper insight into perception.

Intentionality or “aboutness” captures Descartes’ important observation that the mind, unlike a rock, can think about something else, and free will identifies that people make decisions. They each identify aspects about the mind—a certain type of abstract quality and ability to make decisions—that add meaning to the human person as does the sense of continuity ascribed to the subjective “I.” I will revisit these aspects later in this chapter and throughout the book, and explain that addressing the mind–body problem requires recognizing the biological processing of the brain. Dead bodies do not have minds, and the mental depends upon biological processes, not just static biological structures.¹⁰ However, reframing mind requires re-examining (and reinterpreting) the construct of “soul,” and that requires examining the relationship between science and religion.

Science and Religion

Although many people find questions of the person best framed in philosophy, academically, others turn to religion to frame questions of existence, purpose, and meaning. Christian theologians draw upon both philosophy and the Christian tradition to frame and ask those questions.

Descartes drew insight from the ancient Greek philosopher Plato to separate mental from physical and provided independence for physical sciences from religious entanglement and persecution. However, now that physical sciences have progressed in physical and biological understanding of the person, they bump against the artificial separation created by Descartes. Apparent conflicts between mind and body, and also science and religion occur because of different presumptions. Reconciling those apparent conflicts requires re-examining historical philosophical frameworks in which they arose. Presuming a Cartesian split (i.e., after Descartes) between mind and body leads to a mind–body problem that need not occur in other philosophical systems. Presuming a Cartesian split between body and soul leads to conflict between science and religion that need not occur. I argue that re-examining the thought of Plato’s student Aristotle can bridge the Cartesian gap between mind and body.

¹⁰ John R. Searle, *Minds, Brains, and Science* (Cambridge, MA: Harvard University Press, 1984).

Soul as Form of the Body

When people talk of “soul,” they typically refer to a separate essence of a person that may or may not leave the body upon death. Although a disembodied soul remains very popular as a Christian belief, Christianity has consistently held to belief in the resurrection of the body. Saint Irenaeus of Lyon in the second century wrote against the heresies of the Gnostics, who believed in the elevation of spirit over matter. The Christian Scripture, Roman Catholic Church, Orthodox traditions, and the Protestant Reformers teach resurrection of the body, not a dualistic separation of the soul. However, by interpreting the soul as separate in a Platonic sense, the body as separate in a Cartesian sense, and “separation” in the sense of nineteenth-century physics of mechanisms, twenty-first-century European–American Christians (and those influenced by them) have lost the connection between body and soul that made resurrection central to early Christian belief.¹¹

What ever happened to the Christian body? People often see science and religion as in conflict, especially in contemporary American culture. In a book on cognitive science and religion, one might suppose I would take one side of the conflict and dismiss the other, even if done respectfully and subtly. Although science and religion may prove challenging to reconcile in general, no intrinsic conflict exists between cognitive science and religion. The conflict occurs between cognitive scientists who forget they study cognition, not the physical brain, and Christians who forget they believe in resurrection of the body, that is, like Christ, not a disembodied soul. When one studies cognition in a Christian body, no conflict exists.¹²

Previous attempts to integrate science and religion on the soul often have occurred, such as by the medieval philosopher and theologian Thomas Aquinas who drew upon the Christian Bible; the influential fifth-century Christian, Augustine; the recently rediscovered works of Aristotle and Islamic commentaries brought back from the Crusades; and other sources to articulate what became the Roman Catholic position on the soul.¹³ Thomas Aquinas’ psychology addressed conflicts among his contemporaries between medieval science, philosophy, and religion with the reincorporation of Aristotle, but many of Aristotle’s and Aquinas’ presuppositions have been questioned and some shown incorrect, such as Aristotle’s static universe (by Big Bang cosmology), the unchanging nature of species (by evolutionary biologists), and a priori metaphysics (by the eighteenth-century philosopher Immanuel Kant). Current findings in *cognitive neuroscience*, that is, brain scientists

11 Joel B. Green, “Bodies—That Is, Human Lives: A Re-Examination of Human Nature in the Bible,” in *Whatever Happened to the Soul? Scientific and Theological Portraits of Human Nature* (ed. Warren S. Brown, Nancey C. Murphy, and H. Newton Malony; Theology and the Sciences; Minneapolis, MN: Fortress Press, 1998), pp. 149–73.

12 Brown, Murphy, and Malony (eds), *Whatever Happened to the Soul?; Nancey C. Murphy, Bodies and Souls, or Spirited Bodies?* (Current Issues in Theology; Cambridge and New York: Cambridge University Press, 2006).

13 Thomas Aquinas, *Summa Theologica* I.75 (New York: Benziger Bros., 1947); available online at <http://www.ccel.org/a/aquinas/summa/home.html> (accessed 27 November 2007). For an overview, see Robert Edward Brennan, *Thomistic Psychology: A Philosophical Analysis of the Nature of Man* (New York: Macmillan, 1941).

studying cognition, and in social psychology call into question presuppositions of theology based on prior theories of the human person, such as having separate spiritual powers of will and reason, however other aspects of Aristotle and Aquinas reconcile the Platonic and Cartesian split between body and soul.¹⁴

Aristotle's teacher Plato provided the philosophical context for both Aristotle and Thomas Aquinas. *Platonic form*, or essence, occurred in the realm of Ideas that later Platonists by the second century associated with the mind of God. Aristotle and Aquinas define the soul as the substantial form of a living body.¹⁵ For Aristotle, the *substantial form* is the first principle or act of a natural body, which together with primary matter (or pure potency) comprises a substantial being.¹⁶ Thus a living body requires both a substantial form, which explains what kind of thing it is, and primary matter, which explains its potential for becoming something else. The soul informs the whole substance, and it is through the form that each part of the organized, living being exists.¹⁷ The soul provides the radical source of activity by way of the powers of the soul.¹⁸ For Aquinas, the powers of the human soul included nutrition, growth, and reproduction (like plants); sensation and appetites (like animals); and intellect and will. Rather than essence as Platonic form, essence requires both substantial form and primary matter, avoiding dualism and allowing the form to inform the person, but without all of its power, when separate from the body. (In Chapter 2, I reinterpret form as information that constrains possibilities of existence.)

This book examines the soul as a form of the body for four reasons.

1. A better understanding of the soul as the form of the body may help relate biological, cognitive and theological perspectives on the human person.
2. Scholars are reinterpreting Aristotle's form and causation, especially formal and final causation, to address self-organization and emergence in biological systems and that work may prove useful to understanding the human person.
3. Thomistic philosophy impacts on conservative Catholic thought which impacts on the remainder of Roman Catholicism which in turn impacts on the rest of Christianity and especially ecumenical dialogue and ethics.
4. Biblical literalists claim a separate soul at death but do not address how that soul could interact with the body (the critique of Cartesian dualism). Although Protestant fundamentalists do not draw on Aquinas, Aquinas provides a philosophically sophisticated understanding of the soul that addresses the biblical statements which the biblical literalists value.

As forms were static in substance, they could change, for example, as a seed grows into a tree, but they could not evolve. Evolutionary biology, quantum mechanics,

14 For a thorough survey of the history of soul in Western thought, see Paul S. MacDonald, *History of the Concept of Mind: Speculations About Soul, Mind, and Spirit from Homer to Hume* (Aldershot and Burlington, VT: Ashgate, 2003).

15 Aristotle, *De Anima II* 1.412a20.

16 *Ibid.*, 412b5.

17 Aquinas, *Summa Theologica* I.76.8.

18 *Ibid.* I.5.5; I.80.1.

Big Bang cosmology, and now cognitive neuroscience have demonstrated the fundamental role of change in nature, but have they dismissed form?

Certainly the Platonic notion of form has no toehold in Western scientific thought (though it still has utility in art which captures and communicates the form). Aristotle saw the form as immanent in reality, not separate from it, but retained its fundamental static nature of “being” with change as secondary. But if form need not be static and pre-existent as Plato taught and Aristotle and Aquinas continued to believe, and instead describes the slowly changing or evolving patterns in natural phenomena, then science has falsified Platonic form and clarified Aristotelian form as the information-bearing content of natural systems (examined in Chapter 2).

Barbour’s Typology of Science and Religion

Examining the relationships between human mind, spirit, body, and soul involves insights drawn from both science and religion. The eminent scientist–theologian Ian Barbour describes four relationships between science and religion, which I will use to relate cognitive science and religion: conflict, independence, dialogue, and integration.¹⁹

Conflict occurs between science and religion from the two perspectives of scientific materialism and biblical literalism. *Scientific materialists* believe “all phenomena will eventually be explained in terms of the actions of material components, which are the only effective causes in the world.” Thus, science can explain everything and religion has no purpose. For example, Carl Sagan argues that nature replaces God as an object of reverence; Daniel Dennett defends a strong neo-Darwinist position that humans are the product of a mindless, purposeless process; sociobiologists such as E.O. Wilson argue that one can explain social sciences, including religion, completely in terms of the brain and evolution; Richard Dawkins claims nature uses chance and natural selection only and that God does not exist; and Patricia Churchland argues that neural activity sufficiently explains all mental activity, including philosophy and religion.²⁰

Biblical literalists, on the other hand, hold as inerrant a literal interpretation of Scripture, and thus science is mistaken when it contradicts Scripture. Thus, science may be useful, but it is secondary. Biblical literalists argue against evolution and propose creationism which describes a literal reading of the Genesis creation story. Biblical literalists interpret passages such as “Before I formed you in the womb I

19 Ian G. Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco: HarperSan Francisco, rev. edn, 1997). Scholars have subsequently refined Barbour’s typology, such as introducing confirmation, consonance, or creative mutual interaction to replace integration.

20 *Ibid.*, pp. 78–82, 243. Patricia Smith Churchland, *Brain-Wise: Studies in Neurophilosophy* (Cambridge, MA: MIT Press, 2002); Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe without Design* (New York: Norton, 1996); Richard Dawkins, *The God Delusion* (Boston: Houghton Mifflin Co., 2006); Daniel Clement Dennett, *Consciousness Explained* (Boston: Little, Brown and Co., 1991); Carl Sagan, *Cosmos* (New York: Random House, 1980); Edward O. Wilson, *Sociobiology: The New Synthesis* (Cambridge, MA: Belknap Press of Harvard University Press, 1975).

knew you” (Jer. 1:5) as indicating the existence of a person prior to the body, and they interpret passages such as “the dead were judged according to their works” (Rev. 20:12) as indicating the existence of a person after the death of the body.²¹

Conflict often occurs with the prioritizing of one field and devaluing the other, such as Churchland’s claims that humanity reduces to neural activity, and the biblical literalists’ interpretation of Bible passages about the person as indicating a soul or spirit separate from the body.

Independence avoids conflict between science and religion by viewing the two enterprises as independent and autonomous.²² Each uses its own language and methods to attend each area of life and thought. Independence may function in some areas of science and religion—few church-going scientists struggle between routine experimental methods during the week and the content of liturgies on Sunday. However, independence fails to address issues where overlap between scientific and religious perspectives of the person occur, especially those issues around birth and death, including abortion, stem-cell use, patient-determined death, and removal of feeding tubes.

Dialogue portrays the relationship between science and religion as interacting with each other in conversation; the fields relate more closely than independence, but not as close as integration. Barbour identifies three diverse areas of dialogue. First, science raises “limit questions” or “boundary questions” that the methods of science do not answer, such as ethical issues, Karl Rahner’s transcendence, and David Tracy’s presuppositions of scientific inquiry. Second, science and religion have “methodological parallels” such as paradigms, the effect of the observer on an object of observation, Michael Polyani’s personal participation of the knower in all knowledge, and the role of judgment, theory, and beliefs on observation. A third group describes the experience of a religious dimension in nature, such as Thoreau, more recently Matthew Fox’s creation-centered spirituality, or many environmentalists. Dialogue around consciousness often brings together a variety of scientific and religious beliefs and perspectives, such as the Institute of Noetic Sciences, *Journal of Consciousness Studies*, the Center for Consciousness Studies, and various conferences on consciousness. Dialogue provides a forum for the exchange of ideas from each discipline. For example, John Polkinghorne presents religious and scientific perspectives on the end of the world—a topic neither field can definitively address alone.²³

21 Barbour, *Religion and Science*, pp. 82–4, 243–4.

22 *Ibid.*, p. 84

23 *Ibid.*, pp. 90–98; Matthew Fox, *Creation Spirituality: Liberating Gifts for the Peoples of the Earth* (San Francisco: HarperSanFrancisco, 1991); Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1958); J.C. Polkinghorne and Michael Welker, *The End of the World and the Ends of God: Science and Theology on Eschatology* (Theology for the Twenty-First Century; Harrisburg, PA: Trinity Press International, 2000); Karl Rahner, *Foundations of Christian Faith: An Introduction to the Idea of Christianity* (New York: Seabury Press, 1978); Henry David Thoreau, *Walden* (1854); David Tracy, *Plurality and Ambiguity: Hermeneutics, Religion, Hope* (San Francisco: Harper & Row, 1987); John Polkinghorne, *The God of Hope and the End of the World* (New Haven, CT: Yale University Press, 2003).

Barbour's fourth approach claims *integration* of the content of theology and the content of science. He describes three versions of integration: natural theology, theology of nature, and systematic synthesis. Natural theology begins with science and claims that the existence of God can be inferred from the evidence of design in nature. For example, Thomas Aquinas offered several arguments for a first cause; the Anthropic Principle in cosmology indicates a very narrow range of cosmological constants necessary for life and has been used to support arguments for "fine-tuning"; and Ilya Prigogine and Stuart Kauffman's works on self-organization provide a model for a patient God enabling the emergence of free creatures. A theology of nature begins with religious experience and reformulates traditional doctrines in light of science. Arthur Peacocke suggests God constrains the events of the world without violating its laws; John Polkinghorne and others have proposed that God communicates information to the world; and Teilhard de Chardin suggests a convergence of evolution of greater consciousness toward an "Omega Point."

A third version of integration occurs as *systematic synthesis* if both science and religion contribute to a coherent worldview elaborated in a comprehensive metaphysics. Although metaphysics occurs in the purview of philosophy rather than science or religion, it can serve as an arena of common reflection. Thomas Aquinas provides one such metaphysics, though Barbour argues that process philosophy holds more promise. (I discuss process and pragmatic metaphysics in Chapter 7).²⁴

In both the dialogue and integration, Barbour suggests philosophy should mediate between science and religion.²⁵ In this book, I focus on integration and a systematic synthesis of aspects of the soul where both science and religion lay claim, namely the soul as it inhabits the body, and occasionally indicate other areas where fruitful dialogue might occur. The systematic synthesis requires a pluralistic worldview to understand the variety of relationships comprising the integrative soul. Although integration results in a coherent worldview, its comprehensive and unified metaphysics is intrinsically relational and requires a community of interpretations to comprehend. Specifically, I take a systems approach to science, a pragmatic approach to philosophy with neo-Aristotelian and process influences, and an anthropological approach to theology—terms the remainder of the book explains.

24 Barbour, *Religion and Science*, pp. 98–105, 246–7; P.C.W. Davies, *The Mind of God: The Scientific Basis for a Rational World* (New York: Simon & Schuster, 1992); Freeman J. Dyson, *Disturbing the Universe* (New York: Harper & Row, 1979); Stuart A. Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995); Arthur Robert Peacocke, *Theology for a Scientific Age: Being and Becoming—Natural, Divine, and Human* (Minneapolis, MN: Fortress Press, enl. edn, 1993); I. Prigogine and Isabelle Stengers, *Order out of Chaos: Man's New Dialogue with Nature* (Toronto and New York: Bantam Books, 1984); Robert J. Russell, William R. Stoeger, and Francisco J. Ayala, *Evolutionary and Molecular Biology: Scientific Perspectives on Divine Action* (Scientific Perspectives on Divine Action, 3; Vatican City State and Berkeley, CA: Vatican Observatory, Center for Theology and the Natural Sciences, 1998); Pierre Teilhard de Chardin, *The Phenomenon of Man* (New York: Harper, 1959).

25 See for example, Robert J. Russell, *Fifty Years in Science and Religion: Ian G. Barbour and His Legacy* (Ashgate Science and Religion Series; Aldershot and Burlington, VT: Ashgate, 2004).

Creating a systematic synthesis involves finding coherence and unity in the methods and practices of scientists and theologians. In the desire to understand nature, scientists simplify what they study and run the danger of overly reducing the phenomena they study to impoverished parts. In the desire to understand aspects of faith, theologians attend to the ineffable and run the danger of under appreciating the filters and limitation imposed by the human mind.

Scientific Parsimony

A desire to understand the world drives science; and to understand the complexity of the world, scientists typically simplify it. Simpler explanations of nature tend to more accurately describe nature, in part because the human mind orients toward understanding nature. The medieval philosopher Occam stated what has become known as “Occam’s razor,” that one should strive for the simplest explanation: “Plurality should not be posited without necessity ... One should not increase, beyond what is necessary, the number of entities required to explain anything.”

Those who emphasize the science in science–religion interactions often value the proven benefit of simplicity in explanations. They view religious explanations as needlessly complicated because simpler explanations suffice to explain the observable phenomena. History has often shown that the simpler explanation proposed by those who value science has proven more accurate than the older ideas retained by religious authorities. Examples include Copernicus, Galileo, and Darwin. The emphasis of rationality over religion dates back to the Enlightenment and the eighteenth century, and led to what now appears as an overemphasis on rationality in the nineteenth century. However, at least four problems occur with the position that values the simplicity of science over religion.

The first problem involves misunderstanding simplicity. Science values simplicity, but explanatory simplicity depends upon the presuppositions, theories, models, paradigms, and language used in the explanation. Scientific materialists and others who prioritize the value of physics to explain the natural world assume biology and other disciplines reduce to physics, though the simplest explanations of biology occur using the concepts and theories of the biologist, not the physicist. The word “reduce” means to make smaller, or in this case, to discover the primitive constructs; but “simplify” means to uncomplicate. Scientific materialists (and other “reductionists”) confuse the two terms.²⁶

A second problem occurs with oversimplification. Occam’s razor suggests simplifying as much as possible, but no further. Sometimes people simplify too far and lose necessary aspects of what is studied, leading to impoverished categories inadequate to model the phenomena.²⁷

A third problem happens when scientists ignore alternative principles. Simplicity describes an important principle in science, namely parsimony, though other principles are also important: accuracy, coherence, comprehensiveness, fertility,

²⁶ Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance* (Cambridge, MA: Belknap Press, 1982), pp. 59, 62–3. I investigate reductionism in Chapter 3.

²⁷ Examined further in Chapter 4.

applicability, and predictive power. For C.S. Peirce and other pragmatists (described in Chapter 7), the important principle is how the understanding of nature affects one's ability to use that knowledge in practice. A scientist does not value a simple explanation if it cannot be used to do more science.

A fourth problem arises from a category mistake. In a category mistake, one confuses a property of an entity with the whole, for example, confusing the buildings or faculty of a university with the whole university. In religion one may confuse beliefs about nature or reality as a whole and religious beliefs with some natural property. One may distinguish between religious beliefs that depend upon nature existing in a particular way and scientific models used to explain otherwise independent religious beliefs. Those who value religion over science often value tradition. Some traditions include beliefs that one can now identify as superstitious and discard. Other traditions use nature to help explain beliefs and often involve outdated science, and those explanations need revision, but the beliefs do not change. One should distinguish between invalidating religious beliefs that directly depend upon a particular theory of nature and a better understanding of religious beliefs because of a correction of scientific theories. For example, learning that the earth is round rather than flat invalidated the religious belief of four angels responsible for the four directions, while replacing the Ptolemaic model with Copernican views of the solar system led to a better understanding of humanity in the universe (our world is not the center), and only strengthened a belief in the beauty and majesty of creation. As scientists should have more current views of science than theologians (or anyone else), the updating of religious beliefs involving nature based on recent findings in science is part of a necessary interaction between disciplines, not an invalidation of religion. Similarly, new newspaper stories on scientific findings describe corrections in the presuppositions used in older newspaper stories about science, but they do not invalidate journalism.

Conflict, in Ian Barbour's typology, occurs when non-scientists use terms such as consciousness and quantum mechanics, but ignore the analytical aspects of science. Thus for integration to occur between science and theology on the human person, theology must work within the analytical framework presumed by all current sciences. But, science must also acknowledge an aspect of religion.

Religious Ineffable Possibility

A desire to participate in something more than the individual helps to drive a person's involvement in religion. The twentieth-century theologian Paul Tillich calls a person's faith a person's ultimate concern, and the twentieth-century Roman Catholic theologian Karl Rahner refers to divinity as mystery. Religious language is often limited by the ineffability of concepts such as a God, transcendence, ultimate concern, and mystery, and a commitment to religion in the science-religion dialogue often includes a commitment to ineffability. Although mystics have often tried to describe the ineffable, they also claim those descriptions prove lacking. Theology itself requires a balance similar to the dialectic between science and religion leading to synthesis. In the theologians' desire to understand God's relationships they must constantly reaffirm human inability to understand God. However, God could very

well desire humans to know God more fully, and only our limitation within the relationship causes the appearance of ineffability. The commitment to ineffability as a characteristic of God and spirituality likely has roots in the nineteenth-century romantic turn to the self as a reaction against the overly rational movement that had grown after the Enlightenment. A mistaken commitment to ineffability as a characteristic of God's nature, rather than a commitment to God revealing Godself to humanity, leads to conflict with science's desire to understand the world.²⁸

Developing a unified view of the human person requires honoring both sciences' commitment to understanding the world using the simplest framework possible and religion's commitment to something greater than the natural world. Although science requires a pluralistic view of the person, acknowledging the possibility of the "super" natural religion helps unify them. Scientific explanation and faith are compatible, complementary, and interdependent.

As this book explores in depth later, pragmatic philosophy provides a framework for capturing both the actual entities existing in the world, their general configurations, and the real possibilities, which are not yet actualized (Chapter 7). For example, human blood carries oxygen through the body by binding it to iron in the protein complex *hemoglobin*. The four proteins that comprise the protein complex hemoglobin organize in precise configuration to carry iron molecules between them; however, hemoglobin does not contain iron and thus a reductionist account of hemoglobin could only describe an empty space in the middle of the hemoglobin polypeptide and cannot capture the role that iron plays in filling that space (Chapter 4). Pragmatism describes both the proteins of hemoglobin and the real possibility that iron would fit in their natural configuration. Likewise, the person is constituted such that its material relationships may be understood by science, but the person as a whole cannot be fully understood without reference to religion in general and the soul in particular. Examining the actual relationships constituting the person requires a plurality of theories and methods, but incorporating the real possibilities inherent in those relationships allows for a systematic synthesis and unity of view. The soul, from a natural perspective, appears as an empty space, but without acknowledging the relationships of the soul, the self cannot be fully understood. One may best understand the self by examining the organization of the body in its social, cultural, and spiritual context from a rigorous scientific perspective, and the soul as the apparent empty space within the constraining relationships that enable real possibility (Chapter 8).

The twentieth-century American writer and Roman Catholic monk Thomas Merton has written extensively on the experience of ineffability. Merton describes the apparent emptiness as a fullness of mystery that positively transcends our perceptions. For Merton, the Christian's "true self" finds God in and through simple daily experiences and contact with others. He contrasts the true self with a "false self" rooted in psychological misperceptions and created of egocentric desires that separate the person from God in an illusory, self-proclaimed autonomy.

28 Rahner, *Foundations of Christian Faith*; Paul Tillich, *Dynamics of Faith* (New York: Harper, 1956); Claude Welch, *Protestant Thought in the Nineteenth Century* (New Haven: Yale University Press, 1972).

Relinquishing the perceptions of the objective self to which the false self is attached releases the illusions. Individuality asserts itself in humility. The true self is hidden in (or towards) the mystery and is not knowable; in a way similar to how God is unknowable. Merton writes: “Our reality, our true self, is hidden in what appears to us to be nothingness and void ... the way to reality is the way of humility which brings us to reject the illusory self and accept the ‘empty’ self that is ‘nothing’ in our own eyes and in the eyes of [others], but is our true reality in the eyes of God.”²⁹

Similarly, Paul Tillich, in his discussion of the Christian doctrine of creation from nothing (*creatio ex nihilo*), distinguishes between the absolute negation of being (*ouk on*) and a relative negation of being (*me on*). In Tillich’s theology, out of emptiness, God created a space of infinite possibility before creating the existing world. Similarly, a person’s creation of the self occurs in a place of possibility. Tillich writes: “being a creature means both to be rooted in the creative ground of divine life and to actualize one’s self through freedom.”³⁰

Similar themes of possibility also occur in science. In biology, a “totipotent” stem cell has the potential to become any type of cell, but it does not yet act as a particular cell. In physics, while a classical vacuum is empty, a quiescent quantum field has no existing particles, but has the possibility of particles coming into existence.

This book occurs in the tension between science’s need to simplify and religion’s need to leave open worlds of possibility. Although new options for dialogue between science and theology have become available, prior lessons about dialogue and integration still apply. Philosophy has proven a useful tool for dialogue and integration between science and theology, and the dialogue between cognitive science and religion needs a comparable tool. Luckily, cognitive science provides such a framework with its integration of psychology, neuroscience, and philosophy.

Cognitive Science and Religion

Cognitive Science

In the 1970s, several researchers recognized that different disciplines studied the “representational and computational capacities of the mind and their structural and functional representation on the brain,” however few researchers knew much of the results from other disciplines. The Sloan Foundation commissioned a study to organize the research results; initiate an autonomous science of cognition, called *cognitive science*; and highlight areas of promising research (as the foundation had recently done for neuroscience to improve dialogue among brain researchers). Several

29 Thomas Merton, *New Seeds of Contemplation* (Norfolk, CT: New Directions, 1962), p. 281. In Chapter 8, I draw on Merton to describe the orientation of the soul toward either the true or false self.

30 Paul Tillich, *Systematic Theology* (Chicago: University of Chicago Press, 1951), vol. 1, p. 256.

prominent researchers met and discovered several interactions between philosophy, artificial intelligence, neuroscience, philosophy, linguistics, and anthropology.³¹

Since then, investigators have expanded the social perspective from anthropology to include other social sciences; located artificial intelligence within the broader discipline of computer science; and expanded the interactions between the six disciplines to explore most, if not all, pair-wise combinations of fields. Several projects have incorporated three or more of the disciplines, and although cognitive scientists typically choose methods only from their “home” discipline, the topics have become more integrated.³²

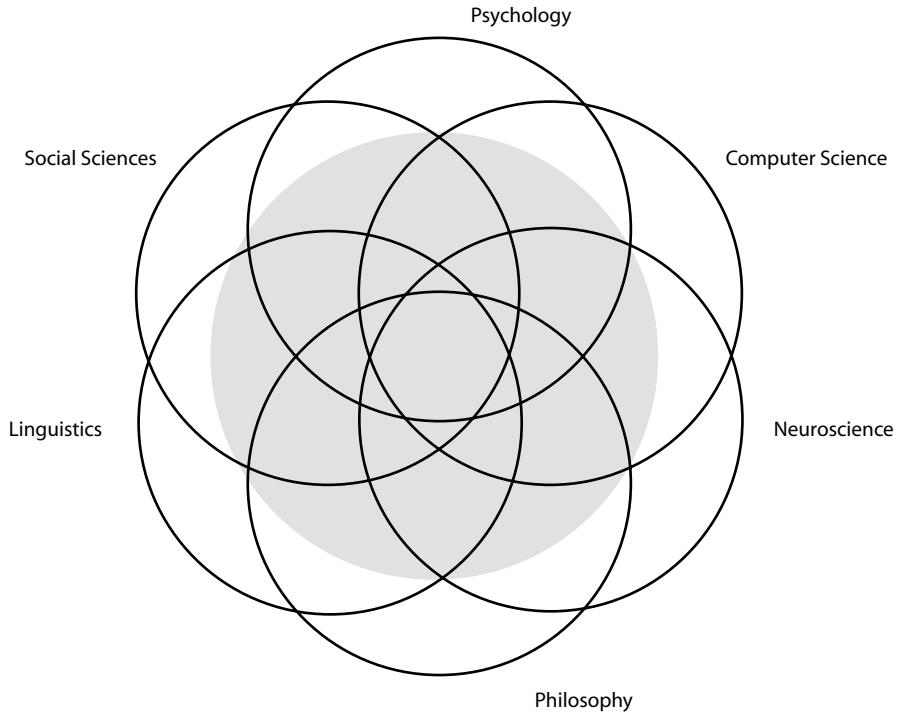


Figure 1.1 Overlap of six disciplines in cognitive science

Figure 1.1 illustrates the six disciplines of cognitive science, some of their pair-wise and more-complex relationships, and highlights the area of overlap called cognitive science. Although a two-dimensional figure cannot illustrate all combinations among the six disciplines, the salient features of the shaded region indicating cognitive science include a small region where all the disciplines overlap;

31 Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution* (New York: Basic Books, 1985); Samuel J. Keyser, George A. Miller, and Edward Walker, *Cognitive Science in 1978* (New York: Sloan Foundation, 1978).

32 George A. Miller, “The Cognitive Revolution: A Historical Perspective,” *Trends in Cognitive Science* 7(3) (2003): 141–4.

various combinations of three, four and five disciplines; some, but not all, of the topics studied by two disciplines; and none of the topics only studied by one discipline.

Cognitive scientists study the mind in the area where these academic disciplines overlap. Cognitive science—as the interdisciplinary study of mind drawing upon psychology, computer science, neuroscience, philosophy, linguistics, and the social sciences—explores the relationship between a person’s mind and brain in its embodied, biological, and cultural context.

Before a brief survey of each of the cognitive disciplines, I comment on the scope of the term “cognition” or “cognitive science.” The eighteenth-century philosopher Immanuel Kant argued for three irreducible faculties of mind: knowledge, feeling, and desire. That categorization tends to separate cognition, emotion, and motivation. However, a clearer understanding of mind informed by neuroscience suggests those faculties are highly interdependent and thus a broader understanding of cognitive science would include study of emotion and motivation. I use the term in the broader sense, though I recognize some authors use it in the narrower sense.

Psychologists study a person’s mental processes and behavior. Mental processes include a person’s cognition, emotion, and motivation. Research psychologists focus on areas such as human development, personality, social relations, abnormal functions, or models of cognition. *Cognitive psychology* refers to the modeling of mental processing typically from an information-processing perspective, such as perception, categorization, memory, problem solving, and learning. Historically, cognitive psychology drew from advances in artificial intelligence, and many of its topics and some of its methods occur in the area of overlap between psychology and computer science. Within psychology, cognitive science primarily draws from the field of cognitive psychology, though practitioners in cognitive psychology tend to emphasize behavioral experiments on human subjects, such as reaction time, while a cognitive scientist would tend to emphasize computational models of the mental processes underlying those behaviors.³³

Computer scientists study the theoretical foundations of computation or information processing, typically as implemented on actual, simulated, or mathematically modeled computer systems. To compute (from the Latin for “to reckon together”) requires the ability to represent abstractions of the real world, such as numbers or symbols, thus one can consider computer science (as well as cognitive science and other sciences of information) as a theoretical science as opposed to an empirical science. Fields in computer science include theoretical computer science, operating systems, databases, programming languages, networking, scientific computing, and artificial intelligence. Cognitive science typically incorporates *artificial intelligence* from computer science which refers to the development of computers (or other artificial, non-natural machines) to exhibit intelligent behavior where “intelligent” remains elusive and incompletely defined. Methods from computer science used in cognitive science include writing programs to model mental processing or

33 Due to limitations of space, I only discuss those aspects of the cognitive disciplines and philosophical methods which are relevant to my argument. See Gardner, *The Mind’s New Science* for a historical perspective; for a more recent overview, see Paul Thagard, *Mind: Introduction to Cognitive Science* (Cambridge, MA: MIT Press, 2nd edn, 2005).

experimentally test human subjects. In the next chapter, I draw upon the historical foundations of computer science in systems theory and cybernetics to suggest a more general modeling framework.

Neuroscience refers to all the sciences studying the nervous system and brain. Some disciplines occur within medicine and biology such as, neurology, the branch of medicine concerned with the nervous system, and neurobiology, the study of the cellular and molecular biology of the nervous system. In particular, *cognitive neuroscience* focuses on how the brain enables mental activity. Other sub-disciplines of neuroscience also interact with other disciplines of cognitive science. Neuropsychologists study the relationship between behavior and brain function. Computational neuroscientists develop programs to simulate neural activity for study by neuroscientists and others, and in computer science, connectionist models provide a computational model similar to the associative networks of the brain. Philosophy has long explored the mind and has focused in particular on the mind–brain problem and more recently on neural correlates of consciousness. Neurolinguistics studies the relationship between language and the brain. Although anthropology does not have a single field that studies the brain, biological anthropologists investigate the evolution of the human brain and mental capabilities, and medical anthropologists explore the cultural aspects of health, illness, and health care. In Chapter 6, I draw upon cognitive neuroscience and the application of systems theory to neurobiology and neuropsychology to examine perception, memory, learning, and decision-making.

Philosophy as a discipline originated with the ancient Greeks, significantly Plato and Aristotle, and refers to the systematic, critical, rational thought about thought, action, and reality. Fields include metaphysics (study of reality), ontology (study of being), epistemology (study of knowledge), ethics, logic, philosophy of mind, philosophy of nature, and aesthetics (study of beauty and form). Cognitive science typically includes philosophy of mind from philosophy. The method chosen by a philosopher depends upon a school of thought, jointly developed by historical communities of philosophers who share interpretations of earlier philosophers' writings. Schools include analytic philosophy, logical positivism, pragmatism, and continental philosophy. Minor schools described later include process philosophy and Thomistic philosophy.

Linguists study language and its structure, meaning, and use. Linguistics began with the scholar from India, Panini (eighth to fifth century BCE), who described Sanskrit grammar and much later influenced Ferdinand de Saussure, a founder of modern (Western, twentieth-century) linguistics. Although linguists study individual languages in their cultural and historical context, the comparison between languages provides insight into the general structure, meaning, and use of language. Its fields include syntax (grammatical structure), semantics (meaning), and pragmatics (use of utterances in communicative acts). *Semiotics* (or semiology) generalizes human language to any medium or sense modality and examines the process of meaning formation through an organism's apprehension of the world through signs. Cognitive linguistics examines the mental processes of human language, either its syntax or how human language and thought interact in determining meaning. Cognitive science primarily draws from the study of how language and thought interact to

determine meaning in cognitive science, and I use semiotics (from the tradition of C.S. Peirce) to examine meaning.

In cognitive science, social sciences initially included anthropology and especially the study of culture in cultural anthropology. More recently, researchers in education and sociology have become included in cognitive science as have certain economists and political scientists. An early classic cognitive science study occurred in linguistics and anthropology in the work of Brent Berlin and Paul Kay who examined over a hundred languages for color terms (hues) and found only 11 basic colors in very specific combinations.³⁴

Interactions between these six disciplines form cognitive science, but although those interactions have led to fruitful research, the cognitive-science area itself has not formed a coherent field of study. Although the lack of methods across the cognitive disciplines has limited its cohesiveness, I suggest that an additional discipline, if incorporated, would cause a coherent and unified field of study to emerge.

Incorporating Religion

Religion already interacts with four of the six cognitive disciplines of philosophy, social science, linguistics, and psychology—through theology, religious studies, biblical studies, and religion and psychology, respectively. Ancient philosophers, such as Plato and Aristotle, did not separate their love and study of truth from religion, and not until the Enlightenment could one conceive of philosophy as separate from religion. Religious studies has explored comparative approaches to religion using the methodologies of cultural anthropology, sociology, and other social sciences.³⁵ Linguistics, like philosophy, grew as a secular discipline out of roots in religious traditions dealing with sacred texts and their translations, and initial efforts in modern philosophy and linguistics attended to creating separations from their religious roots or—some might argue—chains, though interactions continue in philosophy of religion and hermeneutics. Modern psychology finds its roots in Freud and Jung, each with views of religion, and William James's *Varieties of Religious Experience*, and modern psychology distinguishes itself from religious views of the person yet continues to interact with religion in pastoral counseling and psychology of religion.

In addition to interactions between religion and the four cognitive disciplines of philosophy, social science, linguistics, and psychology, those interactions are expanding to develop critical models of a person's mind, brain, and spirit incorporating neuroscience and computer science. In particular, neuroscience provides a biological foundation for examining the individual and social aspects of religious experience,

34 Brent Berlin and Paul Kay, *Basic Color Terms: Their Universality and Evolution* (Berkeley: University of California Press, 1969).

35 The new fields "cognitive science of religion" and "scientific study of religion" typically grow out of the social sciences, and use the methods from social science. However, only using methods from social science to study cognition misses the significant contributions available from the other cognitive disciplines.

interpretation, and practice; and computer science provides powerful models and contemporary metaphors through systems theory and artificial intelligence.³⁶

Figure 1.2 shows the addition of religion as a seventh discipline in cognitive science. By expanding interactions between religion and the other cognitive disciplines, not only do more fruitful combinations appear, but also, I argue, a coherent field of study appears at the center where all the disciplines can contribute to study cognition in the information processing and systematic organization of the whole person—currently conceived as separate body, mind, and spirit.

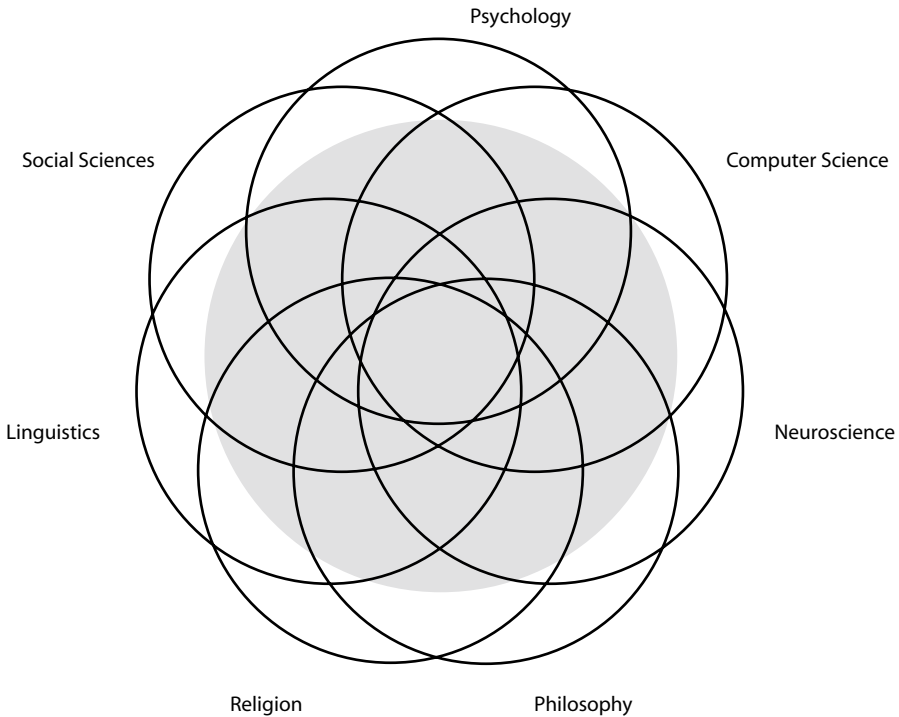


Figure 1.2 Overlap of seven disciplines in cognitive science and religion

Until the 1990s a lack of scientific understanding on how the brain worked limited conversations between science and religion on the topic of the self or soul. Although neuropsychology, the study of patients with brain injury, animal experiments, and examination of brain structure under a microscope provided perspectives on the brain, no one knew enough to begin developing an integrated scientific framework of how the brain works. But beginning in the 1990s with improved non-invasive technology to examine the functioning brain, early progress in the Human Genome Project, and the NIH (National Institutes of Health) Decade of the Brain research

³⁶ For a survey of several research areas in theology and cognitive science and a readable introduction see Gregory R. Peterson, *Minding God: Theology and the Cognitive Sciences* (Minneapolis, MN: Fortress Press, 2003).

initiative,³⁷ progress in the study of the brain in neuroscience and human cognitive neuroscience began providing an integrated scientific framework that could be used for dialogue and integration with religious perspectives.

As science provides new, interdisciplinary theories of how the person's mind is embodied, connects those theories to neuroscience, and replaces older philosophical and psychological theories of the mind with theories grounded in neurobiology, new opportunities arise for theology to more closely connect aspects of *theological anthropology*, that is, theological study of the human person, to the cognitive sciences. Although some theological theories may prove invalid, other theories may receive evidence from science and can then interact with science to integrate a person's spiritual nature and religious experiences into scientific theories. A theological theory of the soul as the form of the body, which science appeared to dismiss, may prove a fertile basis to adapt for a coherent, complete, and accurate understanding of the person.

Neuroscientists have recently begun providing detailed, biological frameworks of a person's characteristics traditionally attributed to a person's soul or spirit—such as moral decision-making, personality, reasoning, consciousness, and emotional health. Neuroscience has progressed sufficiently since the 1990s to enable explorations of religion by neuroscientists,³⁸ explorations of neuroscience by religious scholars,³⁹ and fruitful interactions between neuroscientists and religious scholars.⁴⁰

Computer science contributes a systems approach to the person that influences other cognitive disciplines, and that approach may increase critical methods for religious scholarship but needs to incorporate important spiritual qualities of a person to avoid what otherwise might become dispassionate reductionist models. Computer scientists have explored religious themes, especially within artificial intelligence. Noreen Herzfeld examines the relationship between the Christian belief that humans were created in God's image and the human desire to build artificial intelligent systems in our image. Anne Foerst uses her work in robotics to highlight conflicts between work in artificial intelligence and Christianity.⁴¹

37 <http://www.loc.gov/loc/brain/> (accessed 27 November 2007).

38 Andrew B. Newberg, Eugene G. D'Aquili, and Vince Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2001); Andrew B. Newberg and Mark Robert Waldman, *Why We Believe What We Believe: Uncovering Our Biological Need for Meaning, Spirituality, and Truth* (New York: Free Press, 2006); Michael S. Gazzaniga, *The Ethical Brain* (New York: Dana Press, 2005).

39 Kelly Bulkeley, *The Wondering Brain: Thinking About Religion with and Beyond Cognitive Neuroscience* (New York: Routledge, 2004).

40 Brown, Murphy, and Malony (eds), *Whatever Happened to the Soul?*; Robert J. Russell et al., *Neuroscience and the Person: Scientific Perspectives on Divine Action* (Berkeley: Vatican Observatory Foundation, Center for Theology and the Natural Sciences, 2002); Kelly Bulkeley, *Soul, Psyche, Brain: New Directions in the Study of Religion and Brain-Mind Science* (New York: Palgrave Macmillan, 2005).

41 Anne Foerst, *God in the Machine: What Robots Teach Us About Humanity and God* (New York: Dutton, 2004); Noreen L. Herzfeld, *In Our Image: Artificial Intelligence and the Human Spirit* (Theology and the Sciences; Minneapolis, MN: Fortress Press, 2002).

When cognitive science draws upon computer science, it draws upon artificial intelligence, algorithms, and systems. Much of what contemporary philosophers draw from computer science in philosophy of mind has roots in general systems theory and cybernetics. In this book, I highlight aspects of systems used in computer science and present them in a way to facilitate their use by other cognitive disciplines. I then show how one can use a systems view of the person for insight into religious understandings of the person.

Typically in computer science one wants to draw upon the most recent research, not revisit its roots. However, before one can incorporate the real “computer science” into the study of cognition, one needs to separate the computational methods from their default philosophical interpretations, such as logical positivism and instrumentalism, and from the remnants of nineteenth-century rationalism. Although it may appear a step backwards when later in the book I use philosophers from the early 1900s to interpret theories from the 1940s, I actually am making progress in the field by eliminating presumed theories from the 1700s and 1800s.

In drawing from seven, large, complex disciplines several of which themselves have an interdisciplinary component, I select a combination of approaches that unify and cohere with each other. Other combinations might also work, but many potential combinations do not cohere, even among predominant views in each discipline. In particular, I focus on topics of self, mind, decision-making, memory, and learning from psychology; systems theory from computer science; emergence and form from a pragmatist perspective in philosophy of nature with some application of metaphysics; systems neurobiology in neuroscience; semiotics in linguistics; the organization of communities and sociology of knowledge in social sciences; and from religion, the human soul.

Coherence and Unity of View

To summarize, four of the six cognitive disciplines have histories of interacting with religion as long as those disciplines have existed. Those studying neuroscience and religion have interacted academically since about the 1990s, but that dialogue is growing rapidly. Only preliminary interactions between computer science and religion have occurred, and that has occurred within artificial intelligence. As far as I know, this book presents the first scholarly attempt to relate religion and computer science other than artificial intelligence. Drawing upon systems theory and recent advances in neuroscience, I select the philosophical school of American pragmatism to explore religious views of the person as that appears the most applicable for studying those new developments and their relevance for cognitive science and religion.⁴²

Although cognitive scientists have begun to understand the importance of affective, motivational, social, and cultural aspects of the mind (or cognition), they typically have not yet acknowledged the importance of spiritual or religious aspects

42 Cf. Bulkeley, *The Wondering Brain*. Bulkeley, beginning with social science and comparable recent advances in neurosciences, uses continental philosophy to explore similar religious views of the person.

of the person. However, Christian theologians from Augustine and Thomas Aquinas to Sören Kierkegaard, Hans Kung and Paul Tillich have emphasized the importance of the religious context to understand the human person, and Buddhist psychology has long recognized the significant role of mind. The mind involves religious feelings, goals, desires, and motivations of the individual as well as communities in religious practices and rituals. Religious scholarship contributes to cognitive understanding of one's value, purpose, aesthetics, ethics, and belief. Likewise, one cannot understand the cognitive aspects of faith, wisdom, loyalty, or ultimate concern, for example, without understanding how the human mind functions. If one takes both religion and cognitive science seriously as contemporary academic disciplines, then the findings of theologians and religious scholars must be incorporated into cognitive science. That integration can occur weakly or strongly. In a weak type of integration, one notices the significant aspects of religious constructs in cognition, such as faith, ethical reasoning, or religious experience. In a strong type of integration, one recognizes that one cannot understand the human person without understanding the person in relationship to God, as many theologians argue. Rather than just add yet another discipline to the cognitive-science mix, cognitive science and religion forms a more coherent field of study than the attempt to understand how one thinks while excluding what one believes. Only when one examines cognitive and spiritual aspects of the self in relationship to the other can either be fully understood.

The unity and coherence of cognitive science and religion organizes the approach to cognition and spirituality presented in the remainder of the book. Within computer science, information theory underlies the modeling of relationships as constraints; systems theory organizes the networks of physical, biological, psychological, and social/cultural relationships constituting the human person; and cybernetics describes the function of those systems. Within philosophy, pragmatic philosophy categorizes the possible, actual, and general relationships to describe the real possibility inherent in relationships of emergence and dynamic forms. Within psychology, the concepts of mind, self, perception, learning, memory, and decision-making capture mental processing in thinking and spirituality. Within linguistics, semiotics describes the relationship between the mind and nature (the "aboutness" or intentionality of mind) and also the relationships between the relationships intrinsic to mind and nature themselves. Within social science, the pragmatist Josiah Royce describes the formation of communities through individuals interpreting each other's minds (Chapter 5). Within neuroscience, the biological processes of synaptic plasticity and long-term potentiation (described in Chapter 6) underlie the psychological processes of memory and learning. However, the broad range of topics just mentioned—modeling systems of relationships as constraints; categorizing real possibility in dynamic forms; relationship between individuals as community; and using semiotics to relate natural and mental relationships, especially learning, memory, and decision-making and their underlying biological basis in the brain—might not unify. But they do unify, and like the five blind people each trying to describe an elephant by touching one part, they unify by each providing a perspective on religion's contribution—the human soul.

Although the remainder of the book explains the terms, there is a correlation between systems, dynamic forms, and communities, which each describe the whole.

The whole consists of components that enable the shift of the whole over time, and for the human mind, those gradual shifts occur through processes of learning, memory, and decision-making. Semiotics and the informational capacity of the soul capture the connection between the whole person and the variety of parts that relate to constitute the person.

Mind, Self, and Nature

What is one's self?

Although “person” is an older term dating back to Greek and Latin words, the first-person “self” is a relatively recent word. Descartes assumed a thinking self as the first principle of his philosophy, and Kant distinguished between the phenomenal self, which can be known, and the noumenal self, which can only be inferred. For the early nineteenth-century philosopher Hegel, the self as a whole was revealed through differentiating the self from the non-self in a dialectic process of synthesis, and one reaches self-consciousness by self-externalization. William James understood the self as the sum of all that one knows oneself to be and self-awareness as a stream with two aspects: an “I” that experiences continuity and a “me” that is rooted in bodily existence. For twentieth-century psychologists including self psychologists and object-relations theorists such as Heinz Kohut or D.W. Winnicott, the self is understood to develop in the context of interpersonal relationships.

I use “self” as a psychological concept that refers to the person with which one identifies. With exceptions in some psychological disorders, every human adult has a concept of themselves—albeit incomplete. That concept forms from one’s experience and other conceptual knowledge gained about people in general. One’s personal concept of self exists as one of many concepts represented by the brain yet forms the nexus of a person’s experience as *that* person’s subjective experience. The concept of a person’s self defines the meaning of that person to that person. Although possible to become caught in an apparently circular definition of self and subjectivity, considering the person in a broader context of society and the world facilitates meaningful definition.⁴³

Philosophers and cognitive scientists recognize the apparent disconnection between mind (and the realm of ideas, language, and thought) and the body (and the realm of the physical world, including the biological processes of the brain). However, one can overcome that limiting conception of mind and brain by incorporating two contexts in which they occur: a person’s social, linguistic and cultural context of mind and the effect of biological evolution on the brain.

Expanding cognitive science in these two directions strengthens its foundation in the social sciences and neuroscience. Societies have a reality to them that influences

43 For self as conceptual knowledge see John F. Kihlstrom and Stanley B. Klein, “The Self as a Knowledge Structure,” in *Handbook of Social Cognition* (ed. Robert S. Wyer and Thomas K. Srull; Hillsdale, NJ: L. Erlbaum Associates, 1994), vol. 1, pp. 153–208. For a survey of the self’s distribution across brain systems see Gillihan and Farah, “Is Self Special?”

the individuals that comprise them. Without locating the brain in its biological context—as a highly distributed and interconnected process adapted to specific functions—one overly limits the platform upon which mental activity occurs.

A person's concept of self depends upon that person's mind, and that person's mind depends upon a person's broader social context. If one takes an individualistic view of the person, one slips into a nihilistic spiral as the mind has no definition outside the person. However, allowing for definition of the self as a social construct, one gains the possibility of a communal foundation for subjectivity. Without the concept of other, the concept of self has no meaning.

Social Mind

George Herbert Mead studied under William James and Josiah Royce at Harvard and originated social psychology, as detailed in his posthumous *Mind, Self, and Society*. For Mead, interaction within a group or community creates the self. The group precedes and enables the emergence of the individual self. Social interaction creates the self by communicating meaning to the emerging self through symbolic linguistic acts. The individual social self creates itself initially through appropriation of the community's shared values and ideals. As the self emerges, it interiorizes the social environment in which it lives. The developing self may shift itself or reform the institutions which give it initial shape. Mead envisaged the transformation of the self in society as a dialogue between what he called the "I" and the "me" which function as dimensions of the emerging social self. Mead defined his "I" and "me" in response to William James as follows: "The 'I' is the response of the organism to the attitudes of others; and the 'me' is the organized set of attitudes of others which one assumes. The attitudes of others constitute the organized 'me', and then one reacts toward that as an 'I'."⁴⁴

Mead proposed a social-psychological construct of the human self, and distinguished between the self and its body. While the self has itself as an object, the body does not. The reflexive character of the human self makes it simultaneously into both a subject and an object. As a subject it has itself for a conscious object. The human self, then, experiences itself as having and using its body at the same time that it experiences itself as more than just a body. Social communication creates self-awareness, and the significant signs of language structure social communication.⁴⁵

Language not only creates the human mind, it also creates the human self who has a mind. Mead put it this way:

The self is not so much a substance as a process in which the conversation of gestures has been internalized within an organic form. This process does not exist for itself, but

44 George Herbert Mead, *Mind, Self and Society from the Standpoint of a Social Behaviorist* (Chicago: University of Chicago Press, 1962), p. 175. For an appreciation of Mead, I am indebted to Donald L. Gelpi, *The Gracing of Human Experience: Rethinking the Relationship between Nature and Grace* (Collegeville, MN: Liturgical Press, 2001), pp. 234, 238, 240.

45 Mead, *Mind, Self and Society*, pp. 112–78; cited by Gelpi, *The Gracing of Human Experience*, pp. 239–41.

is simply a phase of the whole social organization of which the individual is a part. The organization of the social act has been imported into the organism and becomes then the mind of the individual.⁴⁶

For Mead, the term “mind” designates the way in which one organizes one’s meaningful responses to one’s physical and social world. Social interchange creates the human mind and shapes the modality of its existential response to its world. Consciousness exemplifies a functional, relational reality, not a substantial one, and it engages neurological activity, but consciousness cannot be located in the brain, because human thinking always engages the person in its environmental rootedness and social relationships.⁴⁷

Language depends upon the relationship between people that speak the language, and also their relationships to those who spoke the language before them and directly or indirectly passed the language on to them. Language, thought, and self each depend upon the relationship a person has with others. Modern linguists have recognized the relationship between thought and language. The twentieth-century American linguists Benjamin Whorf and Edward Sapir hypothesize that the structure of a particular language influences the habitual thought of its speakers.⁴⁸ A more general understanding of language occurs in the study of signs, or semiotics.

Society influences the construction of the mind, and human society occurs in a natural world that influences the people comprising the societies. From an evolutionary perspective, one would expect the nervous system to adapt to increase the survival of the organism and thus the brain and rest of the nervous system would provide a clue to the structures of nature.⁴⁹ In that case “mind” would be not only a human characteristic, but also a natural phenomenon.

Mind and Nature

In what way does nature influence the relationships of the mind?

Nature has a quality that many scholars describe as relational. Since the work of Immanuel Kant in the eighteenth century, scholars have begun to realize that one cannot know reality directly, but only through one’s senses, and those senses distort reality by emphasizing one aspect over others. One approach (as described in Chapter 7) is to consider the most likely metaphor for reality and test that hypothesis using

46 Mead, *Mind, Self and Society*, p. 178.

47 Gelpi, *The Gracing of Human Experience*, pp. 239, 241.

48 The contemporary cognitive linguist George Lakoff argues for the important role of metaphor in structuring thought, and the computer scientist Jerome Feldman has developed a computational theory of language rooted in a biological foundation for metaphor. George Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (Chicago: University of Chicago Press, 1987); Jerome A. Feldman, *From Molecule to Metaphor: A Neural Theory of Language* (Cambridge, MA: MIT Press, 2006).

49 If one prefers (for non-scientific reasons) to believe in aspects of the human person created by God, other than through evolution, then hopefully a non-cruel God would create those structures to minimize pain and suffering, rather than confuse and overwhelm.

scientific evidence as it becomes available. Hopefully, a good hypothesis will gain evidence and perhaps suggest fruitful avenues for further scientific investigation. However, that approach presumes that reality is not only relational, but that it is rational, and rational in a way that humans can understand. Although that poses a significant problem for philosophy in general, scientists can focus on understanding the aspects of reality that humans can understand and leave the non-understandable aspects to other scholars.

The founder of pragmatic philosophy, Charles S. Peirce, wrote in response to Darwin's evolution and against the lack of realism in nineteenth-century, Cambridge, Mass., transcendentalist intellectual thought, and he believed that nature had a rational, logical quality he called "mind-like." Some confusion exists over Peirce's use of "mind." He did not imply that nature had a consciousness or acted with volition, but believed humans attempt to understand nature using what the human mind can conceive. Science and religion both depend upon nature having a structure that humans can understand. One might imagine the alternative as pure chaos in which random processes prevent any discernable patterns from occurring.

According to Peirce, every thought is a sign that interprets a prior sign. These signs provide a structure to interpret information in the relationships comprising them. Peirce developed several organizations of signs; the simplest organization of Peirce's semiotics consists of three kinds of relations to objects in signs: icon, index, and symbol.⁵⁰ An *icon* signifies by resembling its object like a painting or a map. It possesses a quality that resembles or duplicates those of the object. An *index* represents its object through an existential connection between itself and the object. For example, a fingerprint not only resembles the ridges of a fingertip, it signifies the existence of a particular finger. An index may also signify by physical action (action and reaction), such as a thermometer or weathervane. A *symbol* represents its object through a convention that governs how the symbol will be used. For example, the word "cat" is connected to an animal through conventional English usage, and thus one can categorize human language as "symbolic language."⁵¹

A "relationship" itself cannot be defined descriptively; one cannot "know" reality directly. However, one can use one of Peirce's insights to redefine "meaning" and capture the aspects of reality and relationship as we understand them. Peirce argued that if an aspect of reality has no conceivable practical effect, then it has no meaning. Thus, meaning can only refer to what one can conceive (under any circumstances, at any time). Although that may appear limited to some, if his *pragmatic* argument holds true, then that is the best we can ever do, and humans can only ever know what we can possibly ever know. If one finds that limitation acceptable, and I expect

50 Peirce also developed taxonomies of signs into 10 groups and 64 groups, but he did not complete his overall semiotic project.

51 Kelly A. Parker, *The Continuity of Peirce's Thought* (Nashville: Vanderbilt University Press, 1998), pp. 156–7. A more complete organization considers the category of the "interpretant" and sign itself (described in Chapter 7). Note, Paul Tillich and Carl Jung define symbol and sign differently from Peirce: for them, a symbol partakes of the reality to which it points and a sign simply points to it.

many scientists do, then one can use pragmatism as a philosophical foundation for science.⁵²

However, there remain in science vestiges of *essentialism*, which holds that things in nature have an “essence” which one cannot know directly, and *nominalism*, which argues that one cannot know anything of reality, but only name concepts one imagines exist. No scientist (who spend their life investigating the empirical) wants to hold those philosophical positions of essentialism or nominalism, but those positions hide beneath the surface and skew one’s interpretation of scientists’ investigation of nature.⁵³

In the pragmatic hypothesis that I describe in this book, nature consists of relationships that change over time where some relationships change more slowly than others and provide the appearance of stability. Although one cannot know the relationships of reality directly, one can observe an aspect of how they conceivably could exist by investigating the effects of their change over time and appearance of stability in nature. Although scientists have invented many tools to examine the relationships of nature, one natural tool has also developed to explore those relationships—namely, the mind itself.

The anthropologist and systems thinker Gregory Bateson examined human mind across cultures and described six criteria of natural processes he believed were captured in mental processing:⁵⁴

1. A mind is an aggregate of interacting parts or components. Mental processing occurs as a sequence of interactions between parts. The parts themselves, such as atoms, do not form minds, but their interactions lead to the appearance of complex processes.
2. The interaction between parts of mind is triggered by difference, and difference is a non-substantial phenomenon not located in space or time. Although in the material world, one can talk of “cause” as an event of some force or impact, in the realm of ideas, it requires a relationship between two spatial or temporal components to activate a third component, and that relationships is one of difference or change. For Bateson, *information* consists of “differences that make a difference.”
3. Mental process requires collateral energy. Although mental processes are triggered by difference, that difference is not energy and usually contains no energy. But the processes (from which the differences occur) require energy.
4. Mental process requires circular (or more complex) chains of determination. For survival, an entity resists change. The resisting of change requires not only collateral energy, but some type of circular flow of information. That flow of differences that make a difference provides an internal stability that

52 Karl Popper used pragmatism to develop his notion of “falsifiability” in science, which philosophers of science have since criticized, but that indicates a pragmatic need to revise a pragmatic approach to philosophy of science, not a repudiation of the approach.

53 Described further in Chapter 7.

54 Gregory Bateson, *Mind and Nature: A Necessary Unity* (New York: Dutton, 1979), pp. 85–119 (92).

allows the system to respond to external changes. (Cybernetics studies these feedback mechanisms.)

5. In mental process, the effects of difference are to be regarded as transforms (i.e., coded versions) of events which preceded them. The rules of such transformation must be comparatively stable (i.e., more stable than the content) but are themselves subject to transformation.
6. The description and classification of these processes of transformation disclose a hierarchy of logical types immanent in the phenomena.

These criteria of mental process occur in the natural world, and for survival, an organism with a mind learns to represent these relations and their processes. Humans and other animals make decisions to survive and thrive in the natural world.⁵⁵

What relationships in the natural world do human minds attempt to represent in order to make decisions about their behaviors?

Consider any major life decision: who to marry, what career to pursue, where to live. When in time and where in the brain is that decision made exactly? Although one may locate small decisions in time and location, larger decisions are distributed over time and space. With whom one spends one's life depends upon decisions one made years earlier, decisions one's parents and other ancestors made, genetic factors that influence one's temperament and attraction to others. One cannot locate that decision and the mental factors that influence it solely in the brain of one person at one moment in time. The mind expands broadly—the decisions one makes, what one thinks about, and the mind itself transcend one's self and occurs in a cultural and spiritual context. For both social and natural reasons, mind—and its change and decision-making—result from processes more broad than the individual. The next chapter explores the relational processing of mind and nature in terms of information and systems.

To summarize: cognitive science and religion examine the human mind using methods from seven academic disciplines. It forms a coherent field only through the incorporation of the category of soul from religion which connects otherwise incompatible perspectives on the person. Those perspectives remain incompatible because they describe phenomena on different “levels” of human existence, as explained in Chapter 3, namely the biological level and the psychological level (referring to all aspects of the individual mind). By expanding the biological foundation of mind to recognize the slowly shifting processes in adaptation to the relationships of the natural world, and by expanding the individualistic conception of mind to include the social and cultural formation of mind, one can recognize additional levels of human activity and existence—each of which constitutes a coherent description of the human person. Chapters 3 and 5 will also identify two

55 In philosophy of science, the view that mind (and brain) adapted to understand the world is called “evolutionary epistemology.” In particular, according to Bradie’s categorization, the view here corresponds to evolutionary epistemology of mechanism, i.e., that the brain evolved. Michael Bradie, “Assessing Evolutionary Epistemology,” *Biology and Philosophy* 1 (1986): 401–459; Donald T. Campbell, “Evolutionary Epistemology,” in *The Philosophy of Karl Popper* (ed. Paul Arthur Schilpp; La Salle, IL: Open Court, 1974), pp. 412–63.

additional levels of subatomic interactions and transcendent spirituality that also inform human existence, but frequently are not considered in study of cognition.

The next chapter describes mathematical, computational, and philosophical constructs for modeling the relationships of nature at each level, and Chapter 4 describes how the systems at one level emerge from the lower levels and inform them. However each level of human existence by itself remains incomplete. To unify the plurality of perspectives that inform the human person, requires acknowledging the constellation of informing relationships across all levels, in other words, the form of the person, namely the human soul.