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Can Virtue Be Taught? Neuroscience and Moral Formation

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Introduction

Phineas Gage was a twenty-five-year-old railroad worker known for his hard work and affable personality. He was especially adept at the dangerous job of placing the charges necessary to blast away the granite rock of the Vermont mountains where his crew was working in the summer of 1848. However, a moment's distraction resulted in a tragic accident when a mispacked explosion drove a seven-inch iron spike through Gage's jaw, his left eye, the front part of his brain, and out the top of his head. Despite a devastating open head wound and an ensuing infection, Gage miraculously survived with only the loss of eyesight in his left eye. But, the Phineas Gage who emerged from his convalescence was not the same affable young man admired by his supervisors and peers. Before his injury, friends described Gage as well balanced, energetic, a smart businessman, and one who was persistent in executing his plans. Following the injury, his physician described him as if the "equilibrium or balance, so to speak, between his intellectual faculty and animal propensities had been destroyed." For thirteen years, Gage lived an irresolute life, unable to keep a job, traveling from place to place, and continually getting involved in fights and brawls. He died at the age of thirty-eight, apparently from intractable seizures.[1]

For most of history, intangible human qualities such as intellect, language, emotions, and importantly moral bearing were thought to be functions of a non-material soul. However, if our "self"—who we truly are—is wholly a spiritual manifestation, what explains the complete change of personality that occurred in Phineas Gage? How do we make sense of the substantial alterations in character and moral compass that affect unfortunate people who have suffered a stroke or the development of a neurologic disease? What explanation is there for these types of observations if the brain is not in some way responsible for generating our consciousness, our sense of self, and even our ability to distinguish right from wrong?

For the Christian who takes the Bible's authority seriously, any theory of moral formation must be consistent with Scripture. However, a persistent faith-reason divide makes many believers suspicious of possible scientific explanations for phenomena usually classified as spiritual. Seeking to rectify this divide, Dallas Willard has asserted that our body is the primary resource for religious life, suggesting that we are designed to be spiritual, and that is how our brains work. The way we are is precisely the way it is supposed to be.[2]

The purpose of this article is to explore the nature of "the way it is supposed to be." Recent discoveries in neuroscience give us insight into how God has created human brains to incorporate knowledge and undergo moral formation. First, I will describe some of the exciting developments in neuroscience that give insight into how our brains generate consciousness and cognitive behavior. The second half of the paper will utilize Exemplar Moral Theory (EMT) to advance a model of moral formation.[3] In the end, we will see that, in opposition

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to a detached immaterial understanding of personality and moral formation, scientific evidence suggests that God has created the human brain to embody these realities.

Neuroscience and Understanding

What is the mind? Is it equivalent to the brain? Is it consciousness? Can a person's mental processes be reduced to merely chemical or physical events? What is the difference between an animal and a human being's consciousness? Is there something beyond the physical brain—a soul? Philosophers have pondered these questions for centuries. Descartes postulated that the mind and body were different substances (substance dualism). At the other extreme, hard reductionists state that the human mind is nothing more than a series of complex chemical and mechanical processes—there is no soul.

Over the past several decades, neuroscientists have made great strides in explaining the nature of human consciousness. However, because of a push to reductionism, Christians are often hesitant to incorporate scientific knowledge in answering the question "What is man?" Nonetheless, theologian Marc Cortez points out in *Theological Anthropology*,

> We should develop our understanding of the human person in dialogue with contemporary science. . . . there is widespread agreement that our understanding of human ontology should be informed to some degree by modern science; no theory can simply ignore these findings and operate in a theological or philosophical vacuum. [The] adequacy or inadequacy [of a theory of anthropology] will be established at least partly on the basis of how convincingly it can articulate a way of dealing with this [scientific] information.[4]

Human beings are part of God's creation. As such, we have continuity with other animals and life forms. But we are also discontinuous with other life forms in that God has chosen to create us in such a way that he can establish a relationship with humankind.[5] Made in God's image, humans think at a higher level, make decisions, use language, and relate meaningfully to others and God. As this paper will seek to demonstrate, high-level mental capability may indeed arise, not from an immaterial soul, but from the created biological processes endowed within humans by God at creation.

Neural Anatomy and Physiology

This paper asserts that God created the human brain to function as it does with higher-level consciousness, spiritual, and moral functions. If this is true, a basic understanding of neuroanatomy is foundational in understanding consciousness and moral formation. The human brain, weighing about three pounds, is, without a doubt, a complicated and fantastic creation.[6] The outer, cerebral cortex layer is highly developed in humans (more so than other mammals) and contains about one-third of the total 100 billion nerve cells (neurons) that compose the brain. Just below the cortex is the thalamus, which serves as the relay center for the brain. Each neuron can form multiple connections (synapses) with other neurons throughout the brain, and there are an estimated one million billion such cortical and corticothalamic connections.[7] According to Gerald Edelman in *A Universe of Consciousness*, "If we counted one synapse per second, we would not finish counting for 32 million years. If we considered the number of possible neural circuits, we would be dealing with hyperastronomical numbers: 10 followed by a least a million zeros. (There are ten followed by 79 zeros, give or take a few, of particles in the known universe.)"[8]

Scattered throughout the brain are hundreds of specialized areas, each containing tens of thousands of neuronal groups. While these neuronal groups are functionally specific, they interconnect in a vast three-dimensional meshwork of synapses allowing them to work together. The neurons are so tightly connected that "any perturbation in one part of the meshwork may be felt rapidly everywhere else. Altogether, the organization of the thalamocortical meshwork seems remarkably suited to integrating a large number of specialists into a unified response."[9] The input of sensory perceptions and experiences occurring over an individual's life form these connections (synapses) between neurons and neural groups such that "no two brains are identical, not even those of identical twins. . . . in each brain, the consequences of both a developmental history and an experiential history are uniquely marked."[10] With repeated use, these pathways simplify and bypass conscious control except in situations that require a definitive choice or a change in plan.[11]

The term neuroplasticity describes the constant, moment-by-moment remodeling occurring in neural pathways in response to environmental stimuli. Neuroplasticity stands in contrast to the older idea that the physical structure of the brain is fixed at a fairly early age. Consequently, it provides a biological basis for "knowing."[12] In other words, the acquisition of knowledge continually changes brain structure. Further, accumulating knowledge and practice strengthens the neural pathways so that they become highly efficient and often activated without conscious thought. Neuroplasticity suggests that the brain is continually changing physically in response to experience.[13] Considering moral formation, such pathways may help explain the permanent nature of virtuous (and vicious) character. The more one chooses to act or think in an upright manner, the more one naturally and eventually subconsciously behaves in that manner.[14] Neuroplasticity can also explain the process as one consciously seeks to change their behavior by "rewiring" pathways laid

down by habitual practice. Paul encourages his readers to not be conformed to this world, but to be transformed. How are they to accomplish this? By renewing their mind.

A Model for the Integration of Knowledge to Understanding

Now that we have briefly surveyed some of the essential neuroscientific concepts, we can incorporate them into a biblical model for knowledge acquisition, wisdom, and moral formation. This model is based on Linda Zagzebski's work in virtue ethics and epistemology, as well as concepts regarding ritual put forward by Dru Johnson and James K.A. Smith.[15] Further, many of the scientific ideas discussed in the first part of this paper provide a neuronal basis for the transformation of facts to understanding and moral formation.

Facts and Learning

In this model, "facts" are incoming data, perception is the process by which that data enters the neural system (e.g. sight, hearing, etc.), and emotions modulate these perceptions. Emotions are intimately connected to our bodies—from intricate facial expressions to that feeling in the pit of the stomach when things are not going well. Neuroscientist Antonio Damasio asserts in *Self Comes to Mind* that feelings are our perceptions of the bodily changes wrought by emotions.[16] Emotions are critical for the maintenance of life. Consequently, an infant reliably acquires them early in their development. While emotions tend to be universal, they are also highly influenced by previous experience.[17] Thus, neuroplastic changes in an individual brain secondary to life experiences introduce significant variation in the expression of emotions. Further, emotions will often operate in the background, at the subconscious level, and trigger an action or a feeling without one being aware of the causative emotion. Thus, a long-forgotten traumatic incident early in childhood can have lasting effects on an adult's moral decisions and behavior.[18] The brain carves these perceptions into perceptual categories, stores it in widely dispersed neural groups, and creates neural synapses that integrate the information between neural groups.

Learning occurs as the pathways between neural groups become "hard-wired" through repetition. Rehearsing information "thickens" these neural pathways and tightly associates the information. As these pathways become stable, they also become automatic and subconscious. Conscious control becomes essential only when a definitive choice or change in plan is necessary.[19] Consistent with neuroplasticity, the more a person pursues an action—be it beneficial or destructive, virtue or vice—the more set that pattern becomes. When people seek what they want or desire, "it becomes habitual, which means that the body shapes itself in the direction of the pursuit, reinforcing itself in an increasingly impenetrable cycle of addiction."[20]

Knowledge, Understanding, and Wisdom

In *The Dynamic Heart in Daily Life*, biblical counselor Jeremy Pierre provides a functional definition of knowledge as "the ability to see a situation more clearly."[21] By the model, multiple data points lead to low-grade knowledge. Low-grade knowledge includes the organization of facts into general concepts and principles. From the perspective of human personality and behavior, low-grade knowledge would be all the explicit and implicit experiences a person has encoded over their life. Low-grade knowledge becomes high-grade knowledge as synthetic and evaluative processes occur. A person who has developed high-grade knowledge in a field can use learned facts, concepts, and principles to evaluate new or unique situations. Recurrent use of high-grade knowledge can lead to an intuitive understanding. Understanding is the ability to see the bigger picture, to make judgments, and to act in a manner that appears automatic or intuitive. When a skill is involved, understanding appears as expertise. There is a constant feedback loop as the agent uses understanding to evaluate and synthesize new incoming data. For example, a skilled doctor who has understanding can evaluate a complex and confusing medical situation and intuitively know the most probable diagnosis and treatment plan. A concert pianist with thousands of hours of practice under her belt can perform the Rachmaninoff Third Piano Concerto flawlessly, not thinking about finger movement but about interpreting the music.

The final level of integration is wisdom—a matter of grasping the whole of reality. In many ways, wisdom can equate with worldview. As such, wisdom carries biblical significance. Cornelius Plantinga, Jr. describes biblical wisdom as "the knowledge of God's world and the knack of fitting oneself into it."[22] Given that God designed the human brain to function as it does, biblical wisdom demands people to center their knowledge about the world and themselves on what God says about it. Faith allows the believer to appropriate this God-encompassing worldview. In the model, faith acts as a prism that focuses various lines of understanding

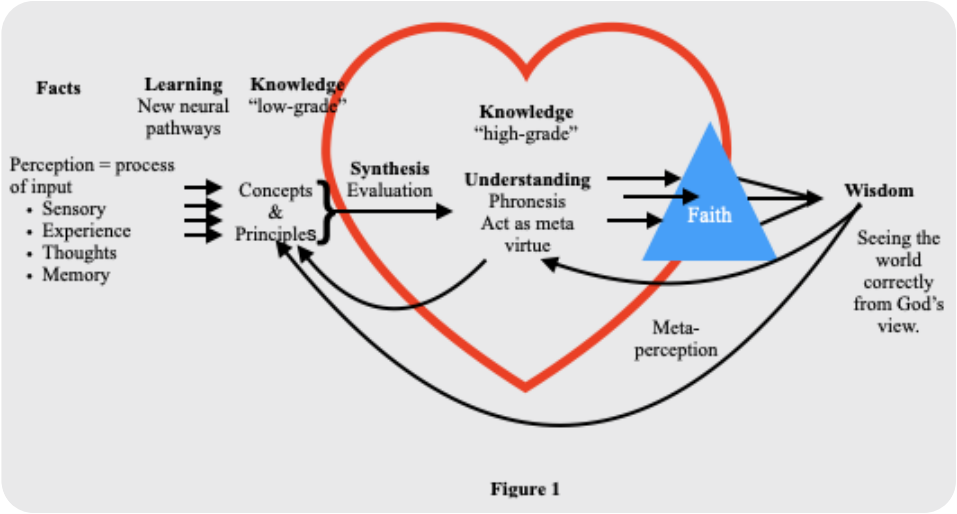

Figure 1

into a single, comprehensive way of seeing the world as God sees it.

Although it does not use scientific language, the Bible describes human behavior using similar concepts. Scripture uses the term "heart" to describe the center of conscious thought. The Bible also depicts the heart's functions as occurring largely beyond the level of intentional behavior.[23] In addition, the Bible indicates that knowing God's Word is the best way to ensure godly behavior. As biblical truth is perceived, acknowledged as true, and incorporated into one's conscious thinking, it then becomes hidden deep in the heart where it subconsciously affects a Christian's understanding and behavior in response to their world and situations.[24] Therefore, what one experiences, puts in their heart, and meditates upon not only affects the way they think but also has a dramatic effect on the way their brain processes new incoming information.[25] This reprograming may be spiritually positive (Ps 119:9–11), or it can have dire spiritual consequences (Rom 1:21–32).

Exemplar Moral Theory

Historically associated with Aristotle and Thomas Aquinas, virtue ethics focuses on the person making the moral decision, the agent, and how they develop good (or bad) character. Virtue ethics looks at people asking, "What is the underlying trait that motivates this behavior?" However, it tends to skirt the question "How did they become virtuous?" Exemplar Moral Theory, a branch of virtue ethics, addresses moral formation.[26]

The foundation of EMT is the concept of an exemplar—a person who, on close observation, is admirable in all or at least most of their acquired traits.[27] One may identify exemplars through intimate personal experience, narrative, and even empirical studies (such as research into the lives of holocaust rescuers). The essential factor is that one acquires a deep (high-level) understanding of the exemplar's character rather than a superficial (low-level) knowledge of personality.[28]

Alfred North Whitehead insightfully noted, "Moral education is impossible without the habitual vision of greatness."[29] Exemplars provide a vision of greatness that others seek to emulate, and admiration is the emotion that drives EMT. Behavior that is admired by others typically is other-centered, coming from a deep part of the exemplar's psyche—it comes from the heart. The problem is that one can have misplaced admiration. Thus, exemplary action needs to be evaluated by an objective standard. God's revelation in Scripture and ultimately in Jesus Christ, the incarnate Son of God, serves as the authoritative source of exemplary behavior.

An exemplar's actions set a standard for virtue. Thus, one sees admirable behavior in the exemplar, and by emulation, they imagine themselves to have that behavior. They then set out to enact, or simulate, this self-image.[30] When tied to admiration, simulation allows us to imagine, and eventually incorporate, the traits and virtues we admire in the exemplar.

Virtues become habit through imitative repetition and practice, thus laying down and solidifying neural pathways. Aristotle notes that "virtues arise in us . . . and are made perfect by habit."[31] Dru Johnson points out that both "the Hebrew Bible and Christian Scriptures presume a thoroughly ritualed life for the sake of knowing correctly."[32] As practice leads to habit, moral formation occurs whereby proper motives, emotional states, and actions are integrated into one's character. From a physiologic perspective, through neuroplasticity, the habitual practice of virtuous (or godly) behavior increases the chances that such behavior will occur in the future. Eventually, it becomes an instinctive understanding of the way one should be in the world.

Model for Moral Formation

While this model seems to make intuitive sense and is certainly compatible with what we hypothesize is occurring in the brain, for the Christian, the vital question is whether this system is consistent with Scripture. Does the model present a scriptural picture of moral formation? Indeed, the Bible presents exemplary modeling as a mode of moral formation. In 1 Corinthians 4:15–17, Paul encourages the Corinthian believers to imitate his own emulation of Christ. In 2 Thessalonians 3:7–9 Paul states, "For you yourselves know how you ought to imitate us, because we were not idle when we were with you, nor did we eat anyone's bread without paying for it, but with toil and labor we worked night and day, that we might not be a burden to any of you. It was not because we do not have that right, but to give you in ourselves an example to imitate" (ESV). The author of Hebrews exhorts his readers to be "imitators of those who through faith and patience inherit the promises" (6:12).

The Sermon on the Mount also presents an exemplar model for moral formation. Matthew presents Jesus as the perfect exemplar, setting the example for his disciples as they establish a community of character.[33] Matthew makes every effort to ensure that his readers understand that Jesus' authority comes from above and that he is the supreme exemplar. The introduction to the Sermon concludes with a call for the believing community to be salt and light in the world (Matt 5:13–16). Consequently, from the start the Sermon puts the disciples on notice that

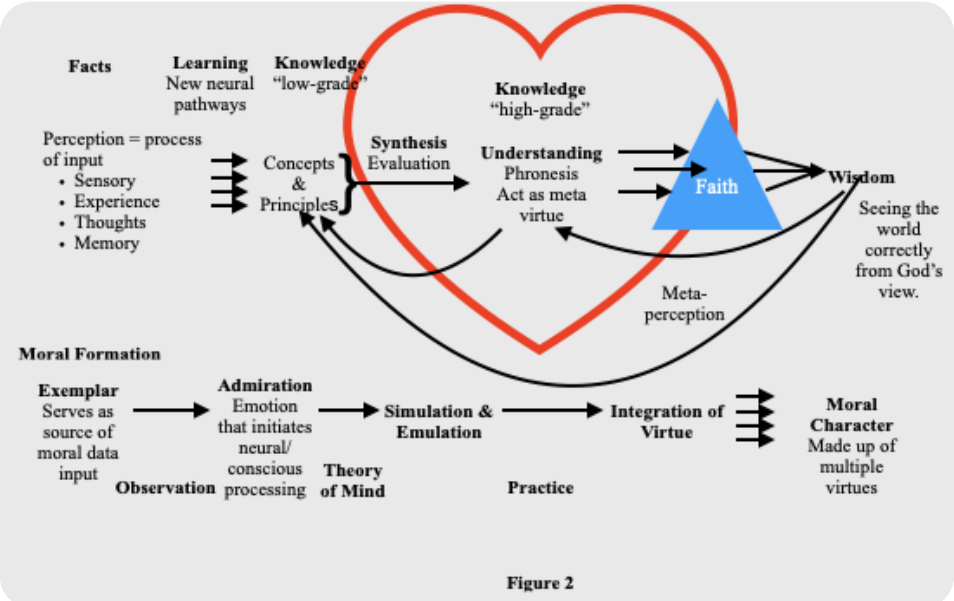

Figure 2

the world is observing them. By following Jesus as the supreme exemplar, they are now the exemplars for the Kingdom. In using the metaphors of salt and light, Jesus points out the admirable and desirable qualities of the disciples' way of living before the world. Matthew goes on to develop the theme of an expectation of greater righteousness in the main body of the Sermon (Matt 5:17–7:12). However, the pinnacle of this expectation occurs in 5:48, where the exemplar is God, the Father, who defines greater righteousness. Thus, even as Jesus is presented as the perfect exemplar, his disciples are to emulate him and become exemplars of greater righteousness.

Conclusion

In Plato's *Phaedrus*, Socrates ponders the question, "Can virtue be taught?" This paper has sought to demonstrate that God not only created humans to perceive and comprehend the world in such a way as to generate a moral understanding of it but that he created our brains to carry out the process of acquiring virtue. I took a brief look at some of the neuroscientific discoveries over the last few decades that provide insight into how the brain produces consciousness and incorporates moral thinking. I then developed a model for the incorporation of knowledge based on the neuroscientific data. Building on that model, I proposed a similar ethical formation model using exemplary moral theory as a framework. Finally, I demonstrated that the idea of learning by emulation is biblical. In fact, the Sermon on the Mount presents Jesus as the supreme exemplar, the one upon whom his disciples should model their behavior, consequently serving as models of moral conduct for other believers, and indeed the watching world.

We learn by watching, admiring, emulating, practicing, and integrating desired behavior into our character. The Bible promotes this pattern of moral formation, and neuroscience indicates that this is precisely how our brains work. Thus, we see that God, in his infinite wisdom, has created humans to perceive, comprehend and understand the world from a moral framework, and he has created our brains to carry out that task. Indeed, we are fearfully and wonderfully made.

1. Adapted from Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: Penguin, 2005), 3–19. Quotation from J. M. Harlow, "Passage of an Iron Rod Through the Head," *Publications of the Massachusetts Medical Society* 2 (1868): 327–47.
2. Dallas Willard, *The Spirit of the Disciplines: Understanding How God Changes Lives* (New York: HarperOne, 2009), iv.
3. EMT is a form of virtue ethics that depends on the concept of a moral exemplar—someone who is paradigmatically good, not only in action but also in motive. In contrast to traditional virtue ethics, EMT asks, "How did this person become virtuous?" and "How can we learn from their example?" Thus, EMT addresses moral formation.
4. Marc Cortez, *Theological Anthropology: A Guide for the Perplexed* (New York: T&T Clark International, 2010), 71.
5. In the Genesis account of creation, God uniquely communicates with humankind using language. He specifically gives them a job and a moral mandate. Also, in expanding on the creation of the woman, the author of Genesis seems to be emphasizing the relational nature of humanity. Psalm 8 also gives humanity a special place in God's creative order. The psalmist notes God's special care and relationship with humans (8:4). While humans may be created lower than the heavenly beings, the psalmist states that they are over the rest of creation. In fact, the whole arc of scripture proclaims the unique place humans hold in creation.
6. All anatomical and physiological information, while widely available, comes from Gerald M. Edelman and Giulio Tononi, *A Universe of Consciousness: How Matter Becomes Imagination* (New York: Basic Books, 2001), 28, 45, 47 unless otherwise noted.
7. Douglas Axe, *Undeniable: How Biology Confirms Our Intuition That Life Is Designed* (New York: HarperOne, 2017), 126.
8. Edelman and Tononi, *A Universe of Consciousness*, 28.
9. Edelman and Tononi, *A Universe of Consciousness*, 45.
10. Edelman and Tononi, *A Universe of Consciousness*, 47.
11. Edelman and Tononi, *A Universe of Consciousness*, 58.
12. Both Johnson and Pierre discuss the bodily basis for cognitive function. Dru Johnson, *Scripture's Knowing: A Companion to Biblical Epistemology* (Eugene, OR: Cascade Books, 2015), 14; Jeremy Pierre, *The Dynamic Heart in Daily Life: Connecting Christ to Human Experience* (Greensboro, NC: New Growth Press, 2016), 66.
13. Louis Busacca, Angela Sikorski, and Bill McHenry, "Infusing Neuroscience within Counselor Training: A Rationale for an Integrally-Informed Model," *Journal of Counselor Practice* 6, no. 1 (2015): 36, https://www.journalofcounselorpractice.com/uploads/6/8/9/4/68949193/busacca_et_al._vol6_iss1.pdf.
14. Linda Trinkaus Zagzebski, *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical Foundations of Knowledge* (New York: Cambridge University Press, 1996), 116.
15. Dru Johnson, *Knowledge by Ritual: A Biblical Prolegomenon to Sacramental Theology*, Journal of Theological Interpretation Supplements 13 (Winona Lake, IN: Eisenbrauns, 2016); Johnson, *Scripture's Knowing*; Dru Johnson and Craig G. Bartholomew, *Biblical Knowing: A Scriptural Epistemology of Error* (Eugene, OR: Cascade Books, 2013); James K. A Smith, *Desiring the Kingdom: Worship, Worldview, and Cultural Formation* (Grand Rapids, MI: Baker, 2009); James K. A. Smith, *Imagining the Kingdom: How Worship Works*, Cultural Liturgies 2 (Grand Rapids, MI: Baker Academic, 2013).
16. Antonio Damasio, *Self Comes to Mind: Constructing the Conscious Brain* (New York: Pantheon Books, 2010), 110.
17. Edelman and Tononi, *A Universe of Consciousness*, 128.
18. Damasio, *Self Comes to Mind,* 125.
19. Edelman and Tononi, *A Universe of Consciousness*, 58. The act of learning a skill illustrates the automatic behavior characteristic of neuronal pathways. Anyone who has learned to drive a stick-shift transmission can attest to the thought processes that go into learning the proper way to engage the transmission without stalling. Initially, the student driver must consciously think through every action. Eventually, with practice, releasing the clutch and pressing the accelerator become so automatic that the driver can listen to the radio, carry on a conversation, and drive in traffic, yet never stall the vehicle. Only when one must make specific decisions does the process surface to the conscious level—for instance, when one finds themselves at a stoplight on a steep hill.
20. Pierre, *The Dynamic Heart in Daily Life*, 81.
21. Pierre, *The Dynamic Heart in Daily Life*, 45.
22. Cornelius Plantinga, Jr., "The Sinner and the Fool," *First Things* 46 (1994): 24–25, https://www.firstthings.com/article/1994/10/the-sinner-and-the-fool. Emphasis in the original,
23. Pierre, *The Dynamic Heart in Daily Life*, 34–35.
24. Pierre, *The Dynamic Heart in Daily Life*, 33.
25. Pierre, *The Dynamic Heart in Daily Life*, 39.
26. Linda Trinkaus Zagzebski, "Exemplarist Virtue Theory," *Metaphilosophy* 41, no. 1/2 (2010): 54.
27. Gregory R. Peterson et al., "The Rationality of Ultimate Concern: Moral Exemplars, Theological Ethics, and the Science of Moral Cognition," *Theology and Science* 8, no. 2 (2010): 145.
28. Linda Trinkaus Zagzebski, *Exemplarist Moral Theory* (New York: Oxford University Press, 2017), 68.
29. Alfred North Whitehead, "The Place of Classics in Education," in *The Aims of Education and Other Essays* (New York: Free Press, 1929), 69, quoted in Zagzebski, *Exemplarist Moral Theory*, 129.
30. Zagzebski, *Exemplarist Moral Theory*, 136.
31. Aristotle, *Nicomachean Ethics*, l. II.1.1103a19–25.
32. Johnson, *Scripture's Knowing*, 66.
33. Richard Hays, *The Moral Vision of the New Testament: Community, Cross, New Creation* (New York: HarperOne, 2013), 96.