Bioethics and Transhumanism

DOI: https://doi.org/10.56315/PSCF9-23Guerrini

EXPERIMENTING WITH HUMANS AND ANIMALS: From Aristotle to CRISPR, second edition by Anita Guerrini. Baltimore, MD: Johns Hopkins University Press, 2022. viii + 208 pages. Paperback; $28.95. ISBN: 9781421444055.

There has been a haunting thought ever since I began to use live mammals for my research in neurophysiology: "Will my descendants accuse me of cruelty towards animals as much as we do to the scientists under the Nazis?" A number of neurophysiologists have been threatened and attacked to stop their research, and, as a consequence, there are few neurophysiologists left using rhesus monkeys along the West coastline of the US and Canada. Research with rats is increasingly of concern to some, and mice might be the next subject of attention. Research staff and students, who are required to remain on budget with their projects, are put under increasing pressure and stress in order to take better care of their laboratory animals without receiving compensation or support. In the meantime, almost nobody seems to care to know how many animals were sacrificed to develop the celebrated COVID-19 vaccines. Are we, biomedical researchers, ever going to have a resolution to this ethical tension around us? Are we going to be viewed by future historians as the heroes of science—or as abusers of living creatures?

Anita Guerrini's *Experimenting with Humans and Animals: From Aristotle to CRISPR* does not answer the question. As the author states in the beginning of her book, her objective is to tell the history of "trial and error, prejudice and leaps of faith, clashing egos and budget battles," to help us evaluate "the value, and the values, of Western science," and to "influence the future." In other words, the purpose of the book is not to make ethical arguments or to appraise a certain aspect of historical development, such as the progress of ethical care for human and animal subjects. It is, rather, to reveal the reality that ethical views and sentiments have changed, collided, merged, and contradicted each other across time and political landscapes.

This text poses questions, implicitly and explicitly, to enable us to address some of the issues and challenges we are facing at present. A first question arises from the history of vivisection (chap. 1). Vivisection refers to experimenting with (mostly dissecting) live animals, and sometimes even humans. This appears for the first time in recorded history back in ancient Greece, meaning it was practiced for two millennia without anesthesia, a discovery not made until the eighteenth century. More strikingly, vivisection was done as part of "edutainment" shows in ancient times. Criticism of the practice was not necessarily about the cruelty but rather about the usefulness of the knowledge obtained from dying or dead animals. The rights or well-being of animals were not much of an issue in the ancient age as human dominion was a firmly held belief. Such an ethical view continued to be dominant until early Modernity (seventeenth-century Europe) when human and animal bodies alike were viewed as machines, and animal experimentation began to be accepted as a cardinal method for biomedical sciences (chap. 2). At that time, ethical concerns on the use of animals did arise, but the concern lay rather in the human virtues of kindness and compassion rather than the rights of animals.

Eighteenth-century Europe slipped into a new stage of biomedical science after Queen Mary II of England died of smallpox, from which experimentation with humans becomes central (chap. 3). Inoculation, adopted from the Eastern world with initial suspicions, was slowly gaining credibility through parents who were unwilling to put their children at the risk of falling ill to smallpox. The validation of its effectiveness eventually came about upon testing with the socially marginalized, including prisoners, orphans, patients, and slaves. Yet criticisms around the "science" of inoculation were not made for using the marginalized as test subjects but rather for superseding God's authority to cause one to be ill or healed. While an increasing number of animal experiments were conducted routinely, and mathematical descriptions of the body became of greater interest to scientists, the emerging utilitarian ethics began to awaken Europeans, especially the British, to the suffering of animals. While elevated sensitivity to animal suffering led to "antivivisection" movements in England, experimental medicine and physiology were established as scientific fields. During this period nation-states also began to be involved in science. This was also the time when anesthesia was discovered, and pain perception became an important topic in physiology. Eventually, common beliefs about racial or sexual differences in pain perception were also tested, by experimenting with women and black slaves.

In the late nineteenth century, animal experimentation made a strong comeback as the germ theory of disease was solidly validated by scientists such as Pasteur, Koch, and Ehrlich (chap. 5). As scientists began to conquer many diseases such as anthrax, rabies, syphilis, and tuberculosis, the victory of science quenched the antivivisectionist movement. A number of animals, including rabbits, guinea pigs, dogs, and monkeys, were used to test theories, vaccines, and drugs during

this period. At the same time, human experimentation begins to be regulated by states, but the regulation was so elementary that practices were allowed that would not be tolerated in our time. Concerns with animal experimentation reemerged in the twentieth century when polio research, strongly advocated by Franklin Roosevelt, a victim of polio himself, claimed a striking number of rhesus monkey lives (chap. 6). As an example, in the 1950s, the United States imported from India 200,000 rhesus monkeys per year for polio research. Despite the polio vaccine's success, primate research appalled the public, especially when behavioral research on primates revealed the emotional depth and social intelligence of these animals. Animals came to be seen no longer just as machines, but as our cousins who, like us, have consciousness.

The last chapter begins by depicting the Nuremberg War Crimes Tribunal of 1946, which led to the first written set of guidelines for human experimentation. Up until this time, there had been little consensus or regulation in using humans for experiments, let alone with the requirement that they must be mentally competent, uncoerced, and fully aware of possible consequences. It is hence not surprising that scientists under the Nazis defended themselves against charges of abuse and euthanasia of human subjects by paralleling their conduct with the practices of contemporary American scientists. American practice was exemplified by the Tuskegee Study of Untreated Syphilis in the Negro Male, conducted from the 1930s to the 1970s, in which the United States Public Health Service left four hundred black syphilis-infected males untreated, without telling them that their treatment had been stopped, in order to study the natural development of untreated syphilis. More than one hundred died as a result. Inconsistency in research ethics can also be found in the case of Japanese scientists, who, in contrast to Germans, were pardoned for their research conduct during World War II in return for providing information to the United States. Nonetheless, through the twentieth century until today, the level of public awareness and national regulations on the use of animal and human subjects has been progressively elevated. Yet, accelerated advances in research technology, including the latest breakthrough of gene editing, and expansion of research fields, continue to add complexity to ethical discourses.

I was impressed by Guerrini's vast knowledge of the historical development of biomedical science, including the events that matter to ethical issues around use of animal and human subjects in research. At the same time, she manages to make the book concise. While the book concerns the ethics of animal and human experimentation, it is certainly not an ethics or philosophy book but rather a story book. That is, while the book raises ethical questions in an unbiased manner, the chronological organization of this story does not conveniently lend itself to efforts to systematically examine or establish ethical principles on these matters. Nonetheless, a deeper understanding of the historical background to the different perspectives encountered in these stories enables one to make more-informed assessments of present-day perspectives. The book can be particularly helpful for those who do not have a biomedical background but wish to engage in contemporary ethical discourses, as well as for those who have rarely thought about the issues at all, often under the assumption that science has justly treated human or animal subjects. Finally, reading these accounts from ancient to contemporary times will certainly help one realize that what is the norm today was not necessarily the norm in the past, nor will it be in the future. Therefore, scientists like me need to humbly accept that we will someday be judged; I believe this knowledge will help us use our best conscience in the present.

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DOI: https://doi.org/10.56315/PSCF9-23Lorrimar

HUMAN TECHNOLOGICAL ENHANCEMENT AND THEOLOGICAL ANTHROPOLOGY by Victoria Lorrimar. Cambridge, UK: Cambridge University Press, 2022. 300 pages, bibliography, index. Hardcover; $120.00. ISBN: 9781316515020.

In her introduction, Victoria Lorrimar states that

> The goal of this book is to deepen our understanding of human creativity from a theological perspective, and to resource Christian theology (and more broadly the church) for reflecting on the possibilities for enhancing human capabilities through (plausible or far-fetched) technologies. (p. 8)

Given the contemporary relevance of this topic, and that she writes "within an (assumed) understanding of salvation as effected by God and not by us" (p. 6), her work will be of special interest to a number of readers of this journal.

Lorrimar addresses the movement known as transhumanism and major themes associated with it: radical life extension, hedonic recalibration (replacement of pain and suffering by an abundance of "good" feelings), moral enhancement by technological or pharmacological means, and mind uploading. She notes that there is considerable diversity of aims within the transhumanist movement, and that not all those that endorse some of these enhancements would identify as transhumanists.

So how should Christian theology respond to technological enhancement of human beings? Lorrimar argues

that the key is an understanding of human creativity in the context of the doctrine of creation, under the metaphor of "co-creation." She rejects the view prevalent in many Christian circles that human technological enhancement constitutes "playing God" and should therefore be dismissed out of hand. Instead, she explores two broader models that might assist with developing an appropriate theological response.

The first model she discusses is the "created co-creator" model proposed by Philip Hefner. After explicating the model through citations from Hefner's works, she observes that "his particular model contributes enormously to contemporary accounts that explicitly address questions of human technological enhancement" (p. 133). Yet, while acknowledging the fruitfulness of Hefner's model, Lorrimar also notes a number of places where Hefner's model diverges from traditional Christian understandings regarding God and the nature of sin and evil. She also critiques his model for "an overemphasis on rationality and neglect of the imagination" (p. 134).

Lorrimar devotes a chapter to the importance of the imagination, and also refers to fiction works—especially science fiction—throughout her book. She contends that because "the imagination takes a central place in … transhumanist visions of the future … a theological response will require attending to the imagination also" (p. 135), and later states "the central question of the present work is to consider how a greater focus on imagination might equip and expand current theological responses to the challenges of human enhancement" (p. 169).

She then proceeds to discuss a second theological model by drawing on the writings of J.R.R. Tolkien, who created imaginative worlds within a framework which regarded each person as a "sub-creator." Lorrimar contends that this model provides a foundation for addressing questions that are rarely addressed in discussions of human enhancement such as "What is the good life?" and "What ought human flourishing to look like?" At the same time, the use of Tolkien's model is complicated by his overall negative view of humanity's preoccupation with technology, seeing it as tending to destroy virtue (exemplified, for example, by a character like Saruman in the *Lord of the Rings* trilogy). She cites with approval the assessment of Gregory Peterson:

> To sub-create is to imitate or to work on what has already been thought out. It may imply initiative on the local level, but it reminds us that the master task always belongs to God. The implication of co-creator, however, is radically different, for it suggests that we are as much in control or responsible for creation as God is. It suggests that there is no blueprint for the future; the future is open, not determined. (p. 201)

In the last part of the book, Lorrimar develops a synthesis which draws on the strengths of both models as well as the work of others. "If a theology of humans as co-creators is to contribute to reflection on human enhancement technologies, it must be embedded within a context that attends to virtue" (p. 217). Lorrimar calls this synthesis "a vision of moral co-creation," which she develops in the form of ten commitments (stated in summary fashion on p. 297):

1. Humans are products of a creative "evolutionary" process.
2. Creativity is central to human agency and responsibility.
3. Human creativity is modeled on divine creativity.
4. Scientific insights should be respected and incorporated into an understanding and description of what it means to be human, without reducing theological and philosophical claims to scientific ones.
5. Technology is a legitimate exercise of human co-creativity.
6. Humans are storytellers and myth makers at their core, with narrative central to the way in which we understand the world.
7. The formation of the moral imagination requires our attention, including the diversity of stories which shape our moral imaginary.
8. Embodiment is crucial for imagination and understanding.
9. Technology must not instrumentalize non-human nature.
10. Elements of the vision of transcendence inherent in transhumanist thought can be reclaimed as central to a Christian imagination.

She then applies this synthesis to the various themes listed earlier that arise from human enhancement technologies.

This book grew out of the author's doctoral research under Alister McGrath at Oxford University, and that is arguably the source of a major weakness for the general reader. Of necessity, a doctoral dissertation must interact broadly with existing literature in the field; but for the reader who is not a specialist this can obscure the central ideas—at least that's what I found when reading the book, and one which I suspect other readers would be likely to experience as well. That having been said, the general question the book addresses is an important one, and Lorrimar's exploring of issues foundational to the development of a fruitful theological approach would likely be relevant to someone wishing to develop

a theological response to some aspect of human enhancement. In my opinion, the Christian public would benefit more from a second book by this author that seeks to make the central ideas more accessible to the nonspecialist, perhaps drawing on emphases in her first and final two chapters.

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DOI: https://doi.org/10.56315/PSCF9-23Godde

REACHING FOR IMMORTALITY: Can Science Cheat Death? A Christian Response to Transhumanism by Sandra J. Godde. Eugene, OR: Wipf & Stock, 2022. 98 pages. Paperback; $18.00. ISBN: 9781666736748.

This short book considers what it means to live in a world in which transhumanism has taken root. Written from a Christian perspective primarily for a general Christian audience, it is nonetheless also for others who, the author hopes, will be "inspired by the invitation of Christ to find true and everlasting life in him" (p. xiv).

Exploring the importance of embodiment (especially from a biblical perspective), the nature of personhood in the technological future, as well as the convergences and divergences between transhumanist and Christian visions, Sandra J. Godde—an artist and lecturer in Christian Studies at Christian Heritage College in Brisbane—takes up the following guiding questions: "Will cybernetic immortality ever trump the Christian hope of resurrection from the dead and the life of the world to come?," and "Is [transhumanism] desirable for human flourishing, or consistent with faith in biblical redemption?" The overall objective, here, is "to resource Christians to think deeply and respond to the transhumanist agenda regarding death and immortality" (p. 6) as advances in technology continue to form us as human beings (pp. 18–19).

The author begins with a quick and very general overview of transhumanism, summarized as "man improving himself by merging with technology" (p. 2). Godde pays particular attention to technological immortality and to the larger question of what, exactly, we ultimately desire for ourselves as individual human beings and, collectively, as a species.

In the first chapter, Godde speaks to how transhumanist ideas have infiltrated popular culture, "endowing technology with a religious-like significance bordering on worship" (p. 8). As cases in point, the author goes on to highlight a number of movies and literary pieces, hardly any of which are favorable depictions of technological use by human beings. In the chapters that follow, she goes on to compare and contrast Christian and transhumanist worldviews, looking primarily at the nature of humanhood and creatureliness, the value (or not) of being limited, eschatology, deification, the concept of the *imago Dei*, and the necessity (or disposability) of the body.

This last point frames much of the discussion. The Christian tradition's affirmation that "we are our bodies" (with emphasis here on the centrality of the body in Christian teaching on the Incarnation and the Resurrection) is completely at odds with the transhumanist quest to technologically transform the biological body (or, very simply, to do away with it altogether). Working toward a more perfect, as it were, expression of the *imago Dei* is quite different, the author notes, from striving to become *Homo cyberneticus* (p. 19).

Although the penultimate chapter ("Towards a Christian Ethical Framework") does not really take up the constructive, balanced, or critical ethics discussion that I was hoping for (the title itself suggests that the chapter was meant to be preliminary), it offers a helpful list of those aspects of human nature that we ought to preserve and defend. This is great fodder for Christian readers, who will want to continue mulling over the question of what is valuable and indispensable about being human.

The overall brevity of the book (there are only about 73 pages of text), which is punctuated by some degree of repetition, means that the author does not dive into a rigorous analysis of the pressing and important questions that she asks throughout. For example, I would have liked to read a more nuanced representation of the diversity that exists in transhumanist thought regarding a number of issues raised here; I would have liked a deeper engagement with how transhumanists handle the concept of the "transcendent and intangible soul," especially if it is, as the author says, "the essence of who we are" (p. 10); and I would have liked to learn more about Godde's understanding of how, in the Incarnation, Christ validates "the good design" of the unenhanced human body (p. 26).

The author's aim, here, is to introduce Christian readers to the conversation, which she does in an insightful and accessible way. In the end, she wants to help equip the Christian reader to think about the big, existential questions that are brought to the fore in the pursuit for immortality that is shared by Christians and transhumanists alike. Although Godde is unreservedly critical of transhumanism, I very much appreciated her perception of transhumanists as a "new breed of fellow travellers who also see a promised land" (p. 2).

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Divine Action

DOI: https://doi.org/10.56315/PSCF9-23McCall

THE GOD OF CHANCE AND PURPOSE: Divine Involvement in a Secular Evolutionary World by Bradford McCall. Eugene, OR: Wipf & Stock, 2022. 156 pages. Paperback; $24.00. ISBN: 9781725283831.

Bradford McCall is a young but prolific scholar, having completed his PhD in 2022 at the Claremont School of Theology, yet having published five books and about fifty articles. In this slim volume of six chapters, McCall proposes the elements of a complementary relationship between science, particularly evolutionary biology, and Christian faith. His proposal is rooted in a panentheistic theology of God that I will consider further below. On a first reading, I confess that I often lost the thread of McCall's argument amid his dense prose and fascinating tangents. On my rereading of the book, I distilled from the concluding chapter an outline of McCall's argument, so as to maintain a sense of direction throughout chapters 1–5.

The relation between science and theology is broadly considered in chapter 1, using the typology of Mikael Stenmark. McCall then proposes that science and theology overlap in terms of both social practice and subject matter. A metaphysical monist, he does not distinguish between mental and physical processes. This connects with the assertion (via Arthur Peacocke) that there is no "causal joint" to look for, either in solving the mind-body problem or in a theory of divine action. McCall is influenced by process philosophy and proposes panexperientialism—the idea that everything, from people to fundamental particles, has experience, a "subjective interiority." This is not to say that electrons think, nor does McCall tend toward anthropomorphism, but his is not the disenchanted universe of Jacques Monod. His theology of God is "intermediate between the omnipotent God of classical theism and the absentee god of deism" (p. 9). God, in this view, is "persuasive, not coercive" toward the creation. McCall views complex phenomena as emergent, invoking John Haught's notion of "layered explanations" that operate simultaneously without conflict.

The second chapter offers a consideration of evolutionary thought and the philosophy of biology—common ancestry, selectionism, adaptationism, and units of selection. Subtle controversies are investigated, such as the falsifiability of adaptationism, pluralism as an alternative, and the concept of spandrels introduced by Stephen Jay Gould and Richard Lewontin. This was deep and informative reading. In some ways, it was my favorite chapter; yet it seems disconnected from the thread of McCall's overall argument.

McCall's third chapter is entitled "The God of Chance," but oddly contains no discussion of God. Rather, he investigates how scientific thought has developed the idea of chance. As a twenty-first-century scientist, I take statistical reasoning for granted. It had never occurred to me that biologists in Darwin's time would lack this category of reasoning. Let me digress for a moment to make a connection with physics, since that is my own area. The theory of statistical mechanics developed rapidly between 1857 and 1905. In 1859, the same year Darwin published *On the Origin of Species*, James Clerk Maxwell presented a paper in which he described the random motions of gas molecules with the distribution that now bears his name. This history is well summarized in a 1997 paper by Dieter Flamm.[1] It should therefore not have surprised me to learn from McCall that, in Darwin's time, statistical thinking had as yet gained no purchase in the biological sciences.

Darwin introduced chance as shorthand for undirected variation within a species, the raw material upon which selection acts. He used the word "chance" 67 times in *On the Origin of Species*. Darwin's writing reflects an inner struggle over how to conceptualize random phenomena. Like the pre-quantum physicists, Darwin did not think of chance as a cause in itself; rather, it reflected the ignorance of a human observer attempting to describe a dauntingly complex natural world, with too many moving parts to track—be they molecules or finches. Nevertheless, in many places Darwin appears to ascribe causal power to chance. This is an apparent break with the thinking of his contemporaries. By the time Gould and Niles Eldredge articulated the theory of punctuated equilibria, random processes were commonplace in all the sciences.

Relying heavily on Grant Ramsey and Charles Pence,[2] McCall summarizes the development of thought about chance, contingency, probability, and the variability (or fixity) of species. Working from Democritus to Aristotle and up to Darwin's time, he sketches the context in which Darwin's ideas took shape. Darwin's innovation was to show how selection bridges from what seems purposeless (chance variation) to what seems purposeful (adaptation). In this regard, Darwin's writing over time increasingly appropriated the language of purpose. Nonetheless, Darwin adopted the agnosticism of Huxley, and he resisted the attempts of Asa Gray to pull him toward natural theology.

From Darwin, McCall traces the outlines of the modern synthesis in the first half of the twentieth century and thence to Gould. Contingency, operating at a host of levels from large environments to small populations and microscopic mutations, has played a growing role to the present day. McCall raises the question of

whether chance is "fundamental and irreducible," but he addresses this question more through the lens of twentieth-century philosophy than twentieth-century science, quoting, for example, Bertrand Russell's 1913 essay "On the Notion of Cause." To me, this was a surprising choice. Critiques of the sort raised by Russell and others have exerted little influence on scientific discourse, as a search for recent mentions of causal(ity) in contemporary journals will show. McCall seemingly returns to a more typical picture of causation in chapter 5 (e.g., in the conclusion of his discussion of teleology on p. 113).

In chapter 4, McCall invokes Philip Clayton and Jürgen Moltmann to set forth a scientifically informed theology of God. The journey begins with the question of how God relates to the universe. McCall adopts panentheism, in which the universe is within God, but God is more than the universe. God's role as creator argues for the universality of what scripture teaches. The monist approach of panentheism entails that God works in and through the creation. On this view, natural law is divine action by which the universe is sustained. Yet McCall acknowledges the need for a theory of divine action, at least to account for miracles. Some have proposed that randomness (quantum or classical) leaves room for a "bottom up" style of divine influence in the world. McCall eschews any such "causal joint," preferring to "leave the notion of divine involvement in the world ambiguous, nebulous, and indefinite." He prefers "top-down causation," à la Arthur Peacocke and Jaegwon Kim. I longed for a deeper dive into why McCall rejects divine omnipotence and why he posits that God works exclusively through secondary causes. I perceive unresolved tension between these assertions and McCall's acknowledgment of miracles and his expressed eschatalogical expectation of re-creation.

This chapter may aim at an audience already immersed in Philip Clayton's work, which I am not. I found myself repeatedly puzzled. For example, quoting Clayton, arguing for panentheism: "The infinite may without contradiction include within itself things that are by nature finite, but it may not stand outside of the finite" (p. 99). A counterexample sprang immediately to mind: the (infinite) set of rational numbers is outside the finite set {π, e}. Perhaps infinite is here understood to mean entirely comprehensive, containing everything; but on that interpretation, Clayton's words would be a definition of panentheism rather than an argument for it.

Traditionally, Christian theology has employed a dualist metaphysics in which God is distinct from creation. Faced with McCall's adoption of a monist panentheism, one might wonder how created beings who are part of God have freedom or moral agency. Do scriptural themes such as sin or judgment belong in a universe that is conceived as a strict subset of God's being? McCall does not address such potential inconsistencies. The answers may depend on what McCall (via Clayton and Moltmann) actually means by panentheism, a category that has perhaps expanded beyond its original definition. See, for example, Roger Olson's perceptive essay on panentheism and relational theology.[3]

McCall turns to natural theology in chapter 5. Following Alister McGrath, the task of natural theology is to read nature from a Christian theological perspective. Natural theology should engage in constructive "sense-making," not to convince the unbeliever, but to perceive the divine within and behind nature. McCall articulates but peremptorily dismisses Aquinas's teleological argument for the existence of God from regularities in nature. This form of natural theology and its modern analogues McCall abruptly denigrates as "notoriously ambiguous, conceptually fluid, and imprecise" (p. 105). This illustrates a shortcoming of the book: McCall revels in intellectual history, but his assessment of the ideas is frequently unclear or incomplete.

There follows a detailed summary of McGrath's *The Open Secret*, but this summary makes too little contact with McCall's argument. Better is his engagement with *Darwinism and the Divine*, which leads into a critique of Paley's natural theology and a contrast with T. H. Huxley. Often quoted as a categorical denier of purpose in evolution, Huxley saw incontrovertible teleology in some "primordial molecular arrangement"—an initial condition from which the present state of the world would inexorably develop. McCall likens this to Ernst Mayr's observation that "the occurrence of goal-directed processes is perhaps the most characteristic feature of the world for living systems" (p. 113). The thread of natural theology is then reintroduced, proposing a picture in which divine purpose manifests in the world through natural processes. I was left wanting a deeper consideration of this idea. For example, when viewed through a Christian lens, what specific purposes are implicit in the evolutionary process, and how does natural history resonate with the character of God revealed in scripture? Finally, considering that McGrath sees no conflict with orthodox Christian theology, why should the reader opt for McCall's monist panentheism?

Chapter 6 seemed too brief a conclusion. I wanted to see the implications drawn more clearly from the first five chapters, and their integration into a coherent picture. For example, how does the foundation laid in chapter 4 for a theology of God connect to the importance of chance investigated in chapter 3? Do the imperatives for natural theology that emerge in chapter 5 support the

theology of God proposed in chapter 4? The work also makes scant contact with scripture, leaving important themes and obvious questions unconsidered. The form of the conclusion colors this work as a project proposal, rather than the project itself. Nevertheless, the book was thought provoking, made connections with a galaxy of important thinkers, and gave me a host of provocative ideas to follow up. This made it worth my (repeated) engagement.

Notes

[1]Dieter Flamm, "History and Outlook of Statistical Physics," paper presented at the Conference on Creativity in Physics Education, on August 23, 1997, in Sopron, Hungary, https://arxiv.org/pdf/physics/9803005.pdf.

[2]Grant Ramsey and Charles Pence, "Chance in Evolution from Darwin to Contemporary Biology," in *Chance in Evolution*, ed. Grant Ramsey and Charles Pence (Chicago, IL: University of Chicago Press, 2016), 1–11.

[3]Roger E. Olson, "Relational Theology Yes; Panentheism No," The Patheos Evangelical Channel, September 26, 2022, https://www.patheos.com/blogs/rogereolson/2022/09/relational-theology-yes-panentheism-no/.

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DOI: https://doi.org/10.56315/PSCF9-23Silva

DIVINE AND HUMAN PROVIDENCE: Philosophical, Psychological and Theological Approaches by Ignacio Silva and Simon Maria Kopf, eds. New York: Routledge, 2022. 156 pages. Paperback; $52.95. ISBN: 9780367632267.

This volume of nine essays seeks to clarify the meaning of divine providence by employing the analogy of human providence, understood here as the prudent execution of deliberation and planning. Although the contributors cover fields as diverse as philosophy, natural and social sciences, and theology, this review covers only the chapters that engage with contemporary scientific research.

In the fourth chapter, Ignacio Silva is concerned with the ways in which contingent events provide a challenge to our conceptions of divine providence. He develops the thought of Aquinas in contrast to those who locate God's providential acts in the causal gaps in our current scientific understanding of creation (e.g., in quantum mechanics and evolutionary theory). The latter view is taken by those who subscribe to an approach called NIODA (non-interventionist objective divine action). An example of the NIODA approach to divine providence is Thomas Tracy's view that God acts through the structures of nature "non-miraculously," a view which Silva thinks effectively renders God as one cause among countless other causes. Another example of the NIODA approach is Robert Russell's view that at the quantum level God may be seen to act as a cause of both general features and specific events alongside purely natural causes. Silva's primary critique here is that it compromises God's transcendence by making God's causal activity ontologically indistinguishable from natural causation.

To draw out what he thinks are the implications of Aquinas's view of contingent events for our understanding of divine providence, Silva first clarifies Aquinas's understanding of contingency. Indeterminism exists because of the hylomorphic composition of being—that is, matter establishes the range of possibilities for how it will be integrated by the organizing principle called "form," even though the intelligibility of form is irreducible to the material it integrates. Silva provides a brief but helpful analogy from human providence, showing how contemporary military strategy accommodates contingencies by building the occurrence of both foreseen and unforeseen events (the "material") into the overall battle plan (the "form"). He also finds that Aquinas's understanding of indeterminism is congenial to our new understanding of physical reality. Noting how Heisenberg himself used Aristotle's concepts of potency and act, Silva explains that differently actuated potency explains the existence of indeterminism without the need for complementary (i.e., divine) causation. The indeterminism that permeates the created order is part and parcel of the secondary causes through which God, the primary cause, achieves his intended effect.

In the fifth chapter, Connie Svob examines current findings in psychology on the cognitive mechanisms of memory, judgment, and decision making and how our cognitive (in)capacities might provide a series of metaphors or models for human providence that finds its end in God. Svob begins by highlighting recent psychological research that suggests a great deal of human cognition is irrational (though sometimes beneficially so). Svob summarizes the "dismal picture of the rational human mind" with a list of seven "cognitive illusions"—including over-confidence, magical thinking, and the tendency to reduce probabilities to certainties—and a note on the unreliability of memory. Perhaps the most interesting insight Svob discovers in the research is how both bottom-up and top-down theories of memory contribute to a model of human providence directed toward finding its end in God: the events that shape our sense of identity can reveal God's providential action, while our sense of self can direct us toward specific ends, including the end of friendship with God.

Another possibly fruitful avenue of research is how involuntary and unconscious memory retrieval might provide a model for how the cultivation of virtues such

as prudence can take place even when the subject is not conscious of such cultivation. The tip-of-the-tongue phenomenon provides for Svob an analogy for our dependence on God. Just as we find ourselves helpless when facing the inability to recall a forgotten name and thus must wait upon some external aid, so too we find ourselves helpless in discovering God and so must wait passively upon God's help. Similarly, Svob suggests that as human cognition reaches a limit of self-definition, it may thereby find itself wholly dependent upon God: "to will consistently to live in the truth requires the grace of God" (p. 87). In short, Svob's chapter is peppered with fruitful insights into how the life of the mind in relation to its natural objects provides ample analogies for the life of the mind that has God as its supernatural object.

In the sixth chapter, Emily Burdett approaches divine providence from the perspective of developmental psychology, pointing out that despite millennia of writing on divine providence little attention has been given to how individuals develop their understanding of God's action and providence. Burdett's method is to examine how children develop their understanding of God's involvement in the world, finding that from an early age children conceive of God as engaged in the world in active, responsive, and (possibly) benevolent ways. This research suggests to Burdett the existence of an intuitive notion of divine providence among humans that God should act benevolently in the world. By measuring the time infants look at different animate and inanimate objects, psychologists have been able to verify that infants are able to distinguish between agents and non-agents and can grasp the existence of intention motivating observed acts. By the time the child is 3–5 years of age, they can distinguish between ordinary agents (e.g., a parent) and extraordinary agents (e.g., God). Burdett then shows how children distinguish between human and supernatural agency through reference to a fascinating set of studies on children and prayer, which finds that as children grow older, they tend to place greater restrictions on the types of prayers that are acceptable or answerable. Still further research confirms that children at a relatively young age can discern between human and supernatural agency, including Burdett's own research that children believe God can perform acts that they think impossible for humans. Burdett then describes how research has shown that infants and children are drawn to benevolent actors and are averse to malevolent ones, leading Burdett to hypothesize that children are likely to conceive of supernatural agents as benevolent. Burdett concludes with some intriguing suggestions for further research, outlining potential methodologies for testing the above hypothesis.

As is often the case in volumes that incorporate a wide variety of disciplinary approaches, the editors' promise of a cohesive argument—in this case, that human providence functions as an effective analogy of divine providence—is not entirely met. However, this is not a significant weakness of the volume, as many of the essays are in themselves helpful contributions to an understanding of divine providence. What stands out to this reviewer is that, regardless of disciplinary perspective, both the thought of Thomas Aquinas and the method of analogical understanding continue to be rich resources to mine in the development of our understanding of providence, human and divine.

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General Science

DOI: https://doi.org/10.56315/PSCF9-23Vukov

NAVIGATING FAITH AND SCIENCE by Joseph Vukov. Grand Rapids, MI: Eerdmans, 2022. 179 pages. Paperback; $19.99. ISBN: 9780802879615.

Joseph Vukov, Assistant Professor of Philosophy at Loyola University Chicago, takes on the relationship between sciences and Christian faith in his engaging book *Navigating Faith and Science*. Written for a popular audience, Vukov discusses three models for the sciences-faith relationship: conflict, independence, and dialogue.

Ongoing conversation always takes place in the context of a relationship, and I like to think of the sciences-faith relationship as such an ongoing conversation. Conversation in any relationship can be challenging. Similarly for the sciences-faith relationship. Human conversations are dynamic, full of surprising twists and turns, frustrations, joys, and pains. Similarly for conversations among sciences and faith.

Intellectual arrogance negatively affects sciences-faith conversations. Vukov's helpful starting point in chapter 1 frames intellectual humility as crucial to navigating the sciences-faith relationship. He argues that intellectual humility involves "a cognitive aspect (accurate self-assessment), an emotional aspect (not being caught up in one's own desire to be right), and most importantly, a purposeful aspect (aiming at the truth)" (p. 15). Vukov has insightful things to say about intellectual humility as a human virtue reflecting appropriate appraisal (Rom. 12:3) of our finitude. He rightly points out that a confident faithful Christian "is not intellectually arrogant," but trusts deeply in God's promises and wisdom (p. 25). How does this help with

the sciences-faith relationship? Practicing intellectual humility avoids intellectual arrogance in the sciences-faith relationship.

Vukov discusses conflict in chapter 2, following Ian Barbour in christening a conflict model for the sciences-faith relationship. While Vukov identifies intellectual arrogance as an important source of conflict, this does not explain why conflicts arise. Conflict is possible only on concordance models for the relationship. A concordance model presupposes that along with whatever principles of biblical interpretation we adopt, we also demand that there necessarily must be a correspondence or implication between scientific and faith statements. Think of a jigsaw puzzle, in which scientific and faith statements contribute pieces to the puzzle but also function as constraints for what can fit into the puzzle.

For instance, modern young-Earth creationism presupposes that the statements of Genesis 1 constrain or correct any scientific statements about the age of the earth. In contrast, day-age interpretations presuppose a correlation between the days of Genesis 1 and geological ages. When one reads Genesis 1, assuming that its statements necessarily have correspondence to or implications for scientific statements, conflicts between the sciences and faith arise. The above statement explains why conflict models are concordance models. Concordance models almost always pitch a battle between taking sciences or faith as primary in setting the constraints on what goes into the puzzle. But this is a false forced choice. The concordance assumption demands we choose between what God reveals to us through the detailed study of his good creation and what God reveals to us through the study of scripture.

Vukov claims, "According to the Conflict Model, science and religion compete to answer the questions we have about ourselves and the world around us … science and religion are (more or less) playing the same game" (p. 32). Although he never discusses it, this is the concordance assumption: there is only one puzzle, sciences and faith can contribute pieces to the puzzle, but only one of them can constrain what pieces are acceptable. Every example of conflict Vukov gives turns on interpretation of biblical texts and scientific research and the assumption of necessary concordance between the two.

Note that conflict is a form of relationship and a form of conversation. As the concordance assumption highlights, conflict conversations often take the form of "Our dialogue has to be on my terms, not yours!" or the incessant repetition of "Well, what about this piece of the puzzle …?" Are these productive relationships or good conversations carried out well among conversation partners? No.

Vukov is right that embracing intellectual humility leads to recognizing that all relationships involve incomplete, limited knowledge. In this context, conversation partners are not always open to hearing what the other has to say because they underestimate how incomplete their own knowledge is. Intellectual arrogance leads to stunted conversation: one partner assumes that faith is the best authority on all questions about the natural world while the other assumes the sciences are. As Vukov notes, both parties insist their approach is "right at all costs," and end up undermining "the pursuit of truth that guides both religion and science" (p. 51). Yet, this only happens because of the concordance assumption.

Maybe the best way to approach the sciences-faith relationship is dropping the concordance assumption. But there are better and worse ways of doing this. An example of the latter is the independence model (chap. 3), in which sciences and faith are separate, nonoverlapping domains. Independence models assume that sciences and faith contribute pieces to separate puzzles.

While Vukov's discussion of independence is helpful and engaging, to think that this model is not a form of sciences-faith conversation is too quick. Think of two people saying they will not talk due to irrelevance, lack of interest, or not seeing the point. Indeed, advocates of independence models cannot stop themselves from reiterating that there is no intersection, no relevance to any ongoing conversation between sciences and faith. Often, such advocates will repeat to each other they are both better off having no substantial conversation, repeating their reasons why (e.g., Michael Ruse).

A third way for understanding sciences-faith relationship is allowing that sometimes scientific and religious statements have an overlap. Nevertheless, we never force these connections; instead, we let them arise organically as we continue the work of exploring nature and plumbing the depths of faith. What do we do when overlap is found? We talk it through, hashing out the nature of the overlap and its meanings. This is Vukov's dialogue model (chap. 4). His emphasis on intellectual humility as a Christian virtue pays off most in this chapter because genuine conversation, in which we honestly seek to learn from each other and build relationship, is hard work! But it is necessary work if we are to honor Christ in the sciences-faith relationship aiming to exhibit how everything coheres in Christ (Col. 1:17). It is much easier to invoke the hubris of "I'm

right; you have to agree with me"—concordance; or to tell each other, "Look, we're better off if we stay out of each other's hair"—independence.

These latter approaches assume that the sciences-faith relationship is fixed and settled once for all. Yet, like any human relationship, the sciences-faith relationship is always ongoing and dynamic, involving navigation and renegotiation. Try treating your relationship with your spouse or best friend as fixed and unchanging and see where that leads! The sciences-faith relationship cannot be healthy and growing unless we take the multiple perspectives involved seriously, as contributors to the ongoing conversation of how to do life together. *PSCF* readers interested in pursuing that adventure will be rewarded by a close reading of chapter 4 and its examples.

In chapter 5, Vukov attempts to show that we need the conflict, independence, and dialogue models to do different jobs at different times. But this leads to an incoherence in his discussion. I think taking the ideas of relationship and conversation more seriously could remedy the incoherence. For instance, Vukov critiques the dialogue model by pointing out that some proponents only have dialogue as a goal. But this is a failure to grasp that the sciences-faith conversation is always in service of learning more about each other and growing in how to get along as partners coming to understand God's world. In a marriage, little gets accomplished if partners simply focus on dialogue for the sake of dialogue. Likewise, little gets accomplished if partners engage in conflict or independence. Understanding the relationship, when we can mutually help each other, when it is appropriate to encourage the other to "do your thing!," and how to productively engage those times when we find ourselves in a conflict are all part of working out healthy ongoing relationship. Similarly for the sciences-faith relationship.

If sciences and faith are aiming at truth, as Vukov correctly argues, then the focus should be on developing the healthiest relationship enabling sciences and faith to pursue that aim. Arguing that the relationship is best modeled sometimes as conflict, sometimes as independence, or sometimes as dialogue, undercuts the aim for truth. A marriage or a family would not work well if partners are constantly shifting their relationships among these options. Instead, one always needs to understand how conflicts arise and how to address them within the ongoing relationship of a marriage. One always needs to understand what appropriate forms of independence are in the ongoing relationship of the family. And these understandings always need to take place in the context of humble, open conversation. Good dialogue is central to any healthy human relationship. The same is true for the sciences-faith relationship.

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History and Social Studies of Science

DOI: https://doi.org/10.56315/PSCF9-23Chapman

WHO TO TRUST? Christian Belief in Conspiracy Theories by Nigel Chapman et al. Victoria, Australia: ISCAST, 2022. 164 pages. Paperback; $12.99. ISBN: 9780645067156. ebook/discussion paper. https://iscast.org/conspiracy/.

Conspiracy theories (CTs) have existed for as long as humans have been able to record them for posterity; however, due to the exponential growth of electronic media, the proliferation and popularity of CTs have made them ubiquitous. Western societies have been particularly affected by CTs in recent decades through our ability to communicate unfiltered diatribes at the speed of light, by the seductive influence of CTs as a form of mass entertainment, and by unabashed populists who use them to tar their political rivals. Though they still frequently draw ridicule, conspiracy claims are now a mainstream form of grievance, spread by people—rich, poor, weak, and powerful—across the political spectrum. This is largely why academics in the behavioral and social sciences, concerned by the harmful impact of CTs on public discourse and social behavior, have begun to treat them and the people who promote them as objects of serious study.

Sadly, committed Christians are no strangers to the conspiracy mindset, and not only those who belong to fringe communities obsessed with end-times prophecy and creeping authoritarianism. Hence, learning to identify the common elements of conspiracist thinking and guarding themselves, their relationships, and their faith communities against its corrosive influence, is a timely and urgent issue for those who claim to be followers of Christ.

This short book (or long "discussion paper," as its authors describe it) is the product of fifteen science and theology authors who are committed Christians and associates of the Institute for the Study of Christianity in an Age of Science and Technology (ISCAST), an Australian organization that promotes dialogue on the intersection of faith and science. The central goal of this work is to harmonize the academic research on conspiracy thinking with biblical ethics in order to help Christian leaders and their communities address the

phenomenon of conspiracism in a socially constructive and spiritually uplifting manner.

The book contains five main chapters—two of a theoretical nature and three of a practical nature. The first two summarize the ideas of leading academics (Barkun, Brotherton, Douglas, Dyrendal, Uscinski and Parent, van Prooijen, etc.), with a special focus on political polarization and populism, and the ways these shape, or are shaped by, conspiracy theories. The third chapter examines popular vaccine and COVID-19-themed conspiracy theories in Australia, North America, and Europe, and it highlights the exaggerated suspicions many Christians harbor toward government, media, academia, and other mainstream epistemic authorities. The last two chapters discuss the ethical, psycho-social, and organizational challenges that conspiracism poses on the way Christians live and think, admonishing them—as individuals and faith communities—to examine conspiracy claims in an epistemically responsible, socially constructive, and biblically grounded manner.

This book presents several strong arguments. First, because some conspiracy claims turn out to be true (Watergate, Iran-Contra, etc.), there is need to exercise careful discernment, engage in charitable exchanges, and consult appropriate expert sources when considering the credibility of specific CT claims. Real conspiracies generally turn out to be less ambitious in scope than the more elaborate theories that flourish in alternative media (JFK, "deep state," flat earth, deadly vaccines, etc.) and are usually the product of organized criminal networks, political graft, or fraudulent business deals.

Second, implausible CTs are often promoted by fringe media, non-experts, and subversive political movements, all of whom habitually traffic in speculation rather than hard evidence, blame vague or invisible enemies who cannot be prosecuted, berate official narratives rather than present a consistent counter-theory, ask rhetorical questions that invite the hearer to distrust experts, and make bombastic claims that reinforce anxieties of impending doom, furtive enemies, secret patterns hiding in plain sight, social marginalization, and political alienation.

Third, CTs negatively affect social relations by "building isolation, paranoia, anxiety, or depression in some individuals, […] splitting friends, families, churches," disrupting communities, and "undermining [legal, political, and academic] institutions through cynicism and mistrust" (p. 6). Not only is the impact of strong conspiracy beliefs detrimental to healthy social relationships and responsible citizenship, CTs also undermine the New Testament's instructions not to slander, not to proffer angry judgments and insults, nor to engage in strife and partiality but rather to live in harmony, love, respect, patience, and forbearance in accordance with Christ's example.

Fourth, these considerations should lead Christians who feel drawn to conspiracist explanations to exercise humility in their search for truth, and to nurture a predisposition to healing rather than attacking relationships and institutions. "A Christian conspiracy theorist should understand themselves to be seeking truth and justice" (p. 6), cultivating awareness of the biases and self-victimizing tendencies that especially affect Christians (e.g., through divisive biblical and pseudo-biblical doctrines), and fostering dialogue rather than fractious debate. "Conspiracy theories may be true or false. But if we want to avoid spreading untruths, injustices, and strife, then we must cultivate a reasonable and peaceable impartiality in the way that we assess or discuss them" (p. 114).

Finally, "inoculation is better than cure" (p. 131). By sensitizing believers to the challenges of cognitive biases and disinformation, we can help them guard their hearts and minds against disruptive CTs and the unhealthy behaviors they elicit.

> We should train Christians to hear diverse views; have good conversations; debate ideas; hear from Christians who work as experts or authorities in public life; demand consistent democratic values in public life; and have the emotional maturity to be generous in spirit toward their opponents. (p. 6)

This book/discussion paper serves as a useful and well-rounded survey of academic literature on conspiracism and as a primer for practical discussions on trust, responsible research, and Christian ethics. It contains useful definitions, summaries, and suggestions for further reading that make the text easy to read and to follow. Its language is accessible to most, though its content is less balanced in its accessibility to a mass audience. The information presented in the first two chapters may be complex to those with little knowledge of psychology and political science, while the second half, strong in biblical references, requires the reader to have some level of familiarity with the scriptures and (it goes without saying) a belief in their moral authority. Inversely, well-versed readers may find that the overview presented in the first half of the work lacks depth of analysis. Readers will also notice a lack of cohesion (and some repetition) between chapters, but this is unsurprising in a 163-page discussion paper written by fifteen authors divided into four working groups. Like the old adage that a giraffe is a racehorse designed by a committee, so too does this work end up lacking some

unity. Nevertheless, it still serves as a useful guide for church leaders seeking greater theoretical and/or practical understanding of conspiracy thinking, and for small groups wishing to improve communications, counselling services, and ministry to the politically and socially disaffected within their church or wider community.

If we reformulate the title of this text to "Whom Should Christians Trust?," and distill it through the clichéd but effective rhetorical question "What would Jesus do?," we might then ask ourselves, "Whom would Jesus fear?" The answer to this question, of course, is "no one," because his kingdom is not of this world. This maxim encapsulates the central message of this discussion paper, which admonishes its readers not to fall prey to worldly anxieties but to have—and to guide others toward—the confidence that Christ has already won the battle against all evil plots. His followers need only guard their hearts against despair and pursue the truth with love.

Reviewed by Michel Jacques Gagné, a historian, podcaster, and the author of Thinking Critically about the Kennedy Assassination: Debunking the Myths and Conspiracy Theories *(Routledge, 2022). He teaches courses in critical thinking, political philosophy, and ethics at Champlain College, St. Lambert, QC.*

DOI: https://doi.org/10.56315/PSCF9-23Rhee

ILLNESS, PAIN, AND HEALTH CARE IN EARLY CHRISTIANITY by Helen Rhee. Grand Rapids, MI: Eerdmans Publishing, 2022. 367 pages. Hardcover; $49.99. ISBN: 9780802876843.

> *"The practice of medicine is an art, not a trade; a calling, not a business; a calling in which your heart will be exercised equally with your head."* —William Osler (1849–1919)

Helen Rhee, professor of the History of Christianity at Westmont College, has encapsulated this famous saying in her recent book, *Illness, Pain, and Health Care in Early Christianity* by demonstrating how partially objective medicine as an early science co-evolved with subjective religious thought throughout early Greek, Roman, and Christian history. Indeed, even today, a patient's pursuit of relief from suffering often involves the clinical science of medicine occurring arm-in-arm with spiritual care. Such examples include use of hospital chaplains, visitation and assistance from members of a congregation, and personal prayer. This book is comprehensive in nature and academic in tone, and Rhee has found some fascinating continuing threads of healthcare occurring in these aspects of Western civilization.

The book begins with general ideas of illness in all three cultures. Greek culture considered the importance of the Hippocratic ideas such as humoralism (defined as various body fluids and their effect on human illness) as well as prioritizing an individual's health to be a societal priority. The emphasis placed on one's individual health inherently makes sense when one considers Greek culture's lack of modern medicine, the absence of understanding public health, the high mortality rate of pregnant women and young infants, and the constant presence of death in their society (pp. 1, 2). A Greek athlete was considered the exemplar of health with the expectation that their health attributes, like all humans, would decline over time.

Roman ideas followed, led by Galen, in which each part of the body was defined simply by its usefulness and its ability to work together in concordance with every body part to make up a healthy human. Thus, Galen believed that all human function descended from a divine design; this was in sharp contrast to the ideas of Epicurus who believed nature's design had random underpinnings. This early philosophical debate involving Roman medicine still continues almost 2,000 years later with regard to a potential purpose versus a lack of purpose in biological evolution. Typically, suggestions for changes in diet and exercise were the main Roman recommendations in the setting of illness, in that medicine and public health would not be viable study areas for many centuries. The author brings up the stark reality of terrible sanitation in ancient Rome which exacerbated many of the infectious pandemics. In fact, pandemics often were considered a part of divine punishment possibly for unknown sins. We can consider the parallels of pandemics of our time, such as those associated with HIV/AIDS or COVID-19, which unfortunately have been incorrectly associated with societal sin.

Subsequent early Christian ideas regarding health and illness received significant influences from both Greco-Roman and Hebrew society. Illness was considered more holistic—encompassing both the physical and the spiritual. Specific cultural influences affecting early Christian society's views on health included the importance of caring for others (for example, Deut. 15:10) and the Levitical dietary restrictions which probably had some health benefits (p. 3). A healthy person would benefit from overall shalom; a decline in one's health could be considered demonic. Jesus was seen as the perfect healer through his miracles, and stories of healing in the Gospels were added to the already-present Greco-Roman influences such as the balancing of humors. Mental illness, which is still under-appreciated and considered an individual "weakness" in much of today's society, was evaluated and treated using the entire gamut of early Christian thought: from being a disease of the soul, to being a result of divine judgment, to being a physical problem (perhaps not yet understood during that time period).

The next section of the book contains ideas of physical pain utilized in all these early societies. Greeks used pain as an essential part of determining a physical diagnosis: pain is still an important concept utilized in modern healthcare. Romans expanded such thinking to consider pain as a disruption of the body's natural state; thus, they emphasized the importance of bringing the body back to its natural order. As an example, Galen felt that patients were not able to explain pain well. and this meant that the final opinion of pain resided solely with the medical provider. Such thoughts have had disastrous effects right up to today, when one considers healthcare's role in causing the recent opioid crisis in the United States (p. 4). Written pain narratives in Roman history were extensive and often seem to model the current history and physical examination process taught to modern medical students. Early Christian ideas of pain were somewhat parallel to Stoic belief structures in which human pain could be used as a learning tool. Early Christian writers often considered the imitation of Christ's suffering through the suffering of an individual as a learning, holy experience. Such ideas eventually led to the concept of the "martyr," which the author describes using examples in wonderful detail.

The last section of the book deals with healthcare in the ancient world, and I found this part of the book most fascinating when considering how healthcare is practiced in modern society. Both Greeks and Romans utilized their temples as places of healing, utilizing prayer and purification rituals. Treatments were extremely limited, mainly due to a lack of understanding the scientific method. Dangerous bleeding, purging, and cauterization were common ancient practices. The author points out that the Romans did build hospitals for a time, but the hospitals were used simply for preserving the health of property (slaves) and soldiers.

Early Christians considered medicine as a gift from God, and their building of early hospitals (in reality, often homes to provide rest and nutrition for the sick) during times of recurrent plagues likely marked a significant advancement in early healthcare as such simple but essential therapies do have healing benefits. It is fascinating to see early writers, such as Origen, believe that more spiritual people would be healed by God while not necessarily requiring medical care from a physician. These propositions parallel pseudo-scientific ideas that still percolate in modern society; the rise of the anti-vaccination movement in some religious movements is a good example. Regardless of the writing of early Christian writers, it is understandable that many patients would continue to follow some of the pagan medical therapies of Greco-Roman society, since good treatment options were limited, while the writing of the ancient Greeks and Romans in essence provided a "second opinion" in care.

I have many good things to say about this book. Rhee goes into great detail regarding the writings of healers in ancient Greek, Roman, and Christian societies. Examples of patients and therapies used to heal in these early historical periods are provided in extensive detail. Many of the medical aspects of prevention continue to echo in today's society, including the emphasis on exercise and diet to improve health, using pain to determine a cause of illness, and the building of hospitals to improve care. Unfortunately, there is also the continuation, in some religious systems, of the idea that illness is due to sin in which prayer alone can cure. Such beliefs are unfortunate; a better belief is that God has provided modern medicine as a gift to improve humanity's well-being. I highly recommend this book, not only for people interested in early healthcare in Greco-Roman and early Christian society, but also for people looking at the evolution of healthcare over time as it began to slowly progress into today's scientific, evidence-based, modern medicine.

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DOI: https://doi.org/10.56315/PSCF9-23Adriaens

OF MAYBUGS AND MEN: A History of Philosophy of the Sciences of Homosexuality by Pieter R. Adriaens and Andreas De Block. Chicago, IL: The University of Chicago Press, 2022. 246 pages. Hardcover; $105.00. ISBN: 9780226822426. Paperback; $32.50. ISBN: 9780226822440. Electronic; $31.99. ISBN: 9780226822433.

Pieter Adriaens and Andreas De Block offer a substantive analysis of the science of sexual orientation as it relates to male homosexuality. As a psychologist who has been involved in research[1] in the areas of sexual orientation and sexual identity, I found the concepts in the book helpful in thinking through the evidence for what I believe and why. For example, although I have critiqued animal models as inadequate to explain the complexities of human sexual orientation and behavior, Adriaens and De Block challenge the reader to think more deeply about such a response and how it matches up with existing theories and the scientific support for each theory. They are even handed and largely dispassionate in their accounting of both theories and evidence to support various theories.

The authors note in the introduction that the book will be about male homosexuality rather than homosexuality in general; that is, they purposefully exclude female homosexuality as it has been far less attended to in the scientific literature and what is known suggests female homosexuality appears to be different than

male homosexuality in important ways.[2] The introduction also frames the goals of the authors: speaking of homosexuality, to "increase its familiarity" and, by so doing, "reduce homonegativity" (p. 15). Interestingly, the word "homonegativity" is frequently used by the authors throughout the book although, surprisingly, not as carefully defined as many other terms. The authors prefer the term to "homophobia," which they view as too clinical or psychiatric. Homonegativity captures other negative emotions apart from fear, "such as disgust and anger" (p. 196). This is perhaps a small point, but I find the term too imprecise and frequently wielded against any formed judgment about what is morally impermissible behavior.

Chapter one, "Not by Genes and Hormones Alone," addresses the question of innateness. Psychologists such as myself tend to be rather casual in their use of terms like "innate" and the authors help all of us here by defining terms and examining key findings related to the etiology of homosexual orientation. They are measured and judicious in their treatment of twin studies, direct genetic evidence, the maternal immune hypothesis, and prenatal hormonal exposure. They conclude that male "homosexuality is at least somewhat heritable and somewhat canalized" (p. 41). Indeed, the complexity of the research here leads the authors to conclude that no one theory will account for the variety of experiences even among male homosexuals that exist today, let alone expressions noted throughout history and across cultures. I could not agree more with this conclusion.

Christians may wonder about other theories of etiology that are popular mostly in conventionally religious communities, such as traumatic experiences (e.g., childhood sexual abuse) or the sexualization of emotional deprivations due to a failure to identify with one's same-sex parent. These theories are not directly engaged and, while Freud is discussed, the emphasis in this chapter is on the biological bases of homosexuality, which is where so much of science is today and with good reason; there is insufficient scientific support for these other theories and little interest in psychopathology-based accounts of homosexuality. The authors are more interested in examining the broader essentialist versus constructivist debate and whether or to what extent biological data inform that debate.

Chapter two, "Sham Matings and Other Shenanigans," addresses research on animal homosexual behavior. This chapter content speaks to the title of the book, as the sexual behavior of maybugs, dolphins, sheep, and many other animals is discussed. As I mentioned above, I have been rather dismissive of animal research, but the authors present a more comprehensive and compelling case for animal models that at least has to be engaged and cannot be simply dismissed as irrelevant. I think ultimately the Christian does not look at animal behaviors as being sufficiently complex to be analogous to human sexuality, orientation, identity, and behavior, but there is more research and more thought behind the research; it is important to be familiar with this research for those who work in this area.

Chapter three, "Beyond the Paradox," looks at evolutionary theory and homosexuality. Evolutionary theory is another topic that many Christians might not find particularly compelling when it comes to thinking about sexual orientation. They might be more likely to simply disregard modern homosexuality as largely incompatible with evolutionary theory. This chapter challenges such a maneuver and, again, invites the reader to consider how evolutionary theory may provide a reasonable account of modern male homosexuality.

Chapter four, "Values, Facts, and Disorders," considers the relationship between homosexuality and psychiatric nosology. This was a helpful chapter that provides the reader with more of the history and cultural context out of which homosexuality was viewed as a disorder and how it was viewed prior to that—from crime to disorder, from behavior to instinct—and how views of heredity and other important concepts initially played into early and developing conceptualizations. This chapter also briefly addresses the question of reorientation or conversion therapy.

There is also an epilogue that raises the question of whether there are risks associated with future research on the etiology of sexual orientation. Such questions are tied to prevention and to some extent conversion or reorientation. Interestingly, the mainstream LGBTQ+ community and more conservative Christian communities might actually have a superordinate goal, to not screen or select in utero for sexual orientation preferences because of the contemporary Christian commitment to valuing the *imago Dei* in all persons from conception. The epilogue surprised me the most because it came across as outside of the scope of what the authors had been addressing in the history and philosophy of science. But, again, it was well considered and thoughtful. The authors concluded that the risks should be managed in a way that protects the LGBTQ+ community but also does not preclude such research from taking place. The authors are more concerned with the "morally questionable biases" (p. 191) behind the research. Again, such a statement does not make an argument for ethical conclusions about homosexual behavior, nor does it engage formed judgments that reach conclusions other than those of the authors.

Christians interested in the history and philosophy of science related to male homosexuality will not be disappointed by this book. It is in depth and even handed in its treatment of research and competing theories. I would not describe it as anti-religious in its presentation of ideas and historical context. In fact, the authors do not really engage religion as such; rather, they engage some of the ideas derived from or contemporaneous with religious thought at the time, particularly if those thoughts were evident in science, but, again, they do so in a measured way. They primarily engage arguments and the conclusions derived within science (e.g., genetics, zoology, psychiatry) itself.

Notes

[1]M. A. Yarhouse and D. C. Haldeman, "Introduction to Special Section on Current Advances in the Intersection of Religiousness/Spirituality and LGBTQ+ Studies," [Editorial], *Psychology of Religion and Spirituality* 13, no. 3 (2021): 255–56, https://doi.org/10.1037/rel0000438; and M. A. Yarhouse et al., *Listening to Sexual Minorities: A Study of Faith and Sexuality on Christian College Campuses* (Downers Grove, IL: InterVarsity Press Academic, 2018).

[2]See W. H. James, "Biological and Psychosocial Determinants of Male and Female Human Sexual Orientation," *Journal of Biosocial Science* 37, no. 5 (2005): 555–67, https://doi.org/10.1017/S0021932004007059.

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DOI: https://doi.org/10.56315/PSCF9-23Jordan2

NATURALISM IN THE CHRISTIAN IMAGINATION: Providence and Causality in Early Modern England by Peter N. Jordan. Cambridge, UK: Cambridge University Press, 2022. 218 pages. Hardcover; $99.95. ISBN: 9781009211987.

How should religious conviction shape scientific thought? This is the question many early moderns asked themselves, and which Peter Jordan explores in his book. In a close analysis of prominent early modern English theologians and scientists, Jordan weaves together a coherent intellectual outlook that provides important commentary on the relationship between science and religion.

Jordan's selection of early modern Protestantism will not be new to those interested in the relationship between science and religion. Jordan's PhD advisor, Peter Harrison, who oversaw the dissertation from which this book developed, has left his mark on this topic for the last three decades in books such as *The Bible, Protestantism, and the Rise of Natural Science* (1998), *The Fall of Man and the Foundations of Science* (2007), as well as *The Territories of Science and Religion* (2015). As a consequence Jordan's guiding assumption, that Christian thought created a context within which early modern science was explained, is not anything novel. What is unique is his recognition that early modern theology was not entirely static or homogenous in its relationship to science. By focusing on shifting ideas of the Christian doctrine of providence, what Jordan highlights is the way in which certain thinkers accommodated the doctrine of providence to embrace new scientific developments, such as mechanism and atomism. As a result, this work reminds us that the area of early modern science and religion, while well studied, still has areas of investigation that may bear important fruit.

The book itself, which contains an introduction, conclusion, and five chapters, is organized into four parts. The first part introduces his analytical term of "providential naturalism," by which he means a perspective on the natural world that integrates Christian commitments to providence and explanations of the natural world. It is because he is analyzing the doctrine of providence that his selection of English Protestants makes sense. As he explains in chapter two, English Protestants developed a well-structured formulation of providence, which explained the wide variety of ways in which God acted within the world, activities which could contain—though were not entirely constrained by—the natural world. The important implication of this, which Jordan explores later in the work, is that the newer developments of science, which did not fit the expected patterns of Aristotelianism, and hence of the expectations of how the natural world should function, could nevertheless find an articulation within a world that was believed to be fundamentally controlled and shaped by God.

The second part provides important contextualization for the development of the theories of providence. In a work looking to interrelate theology and science, this section is particularly interesting because it serves as a reminder that the doctrine of providence itself was influenced by unanticipated aspects. The topics he addresses here are chance-based games, such as dice and lots, as well as prodigies. Both games and prodigies provided frequent opportunities for early moderns to develop their definitions of providence. Games of chance became popular in the early modern period; they raised all sorts of questions about how providence related to the natural world, and whether all outcomes, including games of chance, were necessarily providential.

Similar questions about the boundaries of providence show up in John Spencer's thoughts on prodigies, which Jordan analyzes in chapter four. Spencer, a clergyman at the University of Cambridge, became quite critical of the large number of prodigies that were believed to occur on a routine basis within the world. In Spencer's estimation, while it is indeed the case that nature com-

municates the will of God, the supernatural existence of prodigies occurs less frequently than many of his contemporaries assumed. As a consequence Spencer, who assumes that God maintains an ordered universe, is slow to ascribe divine inspiration to prodigies; instead, he looks toward ways in which presumed prodigies could be interpreted with natural explanations.

The third part applies the question of providence to some of the more prominent new developments within science—that of atomism and theories of the earth. As he notes, oftentimes these new scientific developments are heralded as a shift toward a mechanistic and deterministic cosmos. What Jordan contends, however, is that this was not necessarily the case. For instance, with regard to atomism, Jordan analyzes the Epicurean Walter Charleton and shows how Charleton simultaneously upheld atomism and God's providence. Among many important points, Jordan highlights Charleton's view that God providentially moved atoms in creation to establish an order to the universe which operated according to the patterns that God desired. The task of the natural philosopher, then, was to interpret God's ordered universe. A similar emphasis of establishing God's providence in the created order is noticeable in Thomas Burnet's explanation of creation, in which Burnet minimizes the miraculous nature of creation, opting instead to emphasize the providential foresight which God had from the beginning.

In the final part Jordan offers his conclusions. It is here that one clearly recognizes the merit of Jordan's work, as he articulates a significance for the study that locates it not merely within the world of the seventeenth century, but also today. For, as he explains, the explanations of providential naturalism that he analyzed in the early modern period challenge contemporary notions that science and religion exist as two distinct subjects. Instead, as his book argues, naturalistic explanations flow from an understanding of providence, which depends on who God is and how God maintains the world. As a result, this book will prove useful not merely to specialists in the history of early modern science and religion, but also to those interested in the same questions today.

In a book of such merits, and there are many, it is worth noting one important limitation: the scope of the study. As mentioned above, the question of providence and science proves particularly interesting among English Protestants on account of the importance of the doctrine of providence for this religious group. Yet, the world of early modern science and religion was diverse, and it is important to remember that this book provides a window into only one part of this world, but by no means the entirety of it. So, while the topic of providence proved influential in early modern England, it should be remembered that this line of thought does not necessarily represent all early modern thinking on the topic of science and religion. As a consequence, it is hoped that future research will pursue Jordan's framework across geographical and denominational divides to determine the degree to which his general thesis might be extended even beyond early modern England.

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DOI: https://doi.org/10.56315/PSCF9-23Trepanier

MAKING SENSE OF DISEASES AND DISASTERS: Reflections of Political Theory from Antiquity to the Age of COVID by Lee Trepanier, ed. New York: Routledge, 2022. 248 pages. Hardcover; $170.00. ISBN: 9781032053950. E-book; $47.65. ISBN: 9781003197379.

Political theorist Lee Trepanier has assembled a collection of scholars to address the political—and human—questions that arise from what he describes as "liminal events" such as pandemics, natural disasters, and the like. In this book, "disaster" includes not only natural but humanly generated disasters, such as the Sack of Rome. Such liminal events can generate considerable political uncertainty, significant social change, and even political collapse. Trepanier states that "These events offer us lessons about the nature of political order and illuminate what political theory can offer in our understanding about politics itself" (p. 1). How do societies respond to these events? Do these events create (or reveal) solidarity or the lack of it? Do governments gain or lose legitimacy based on how they handle these events? More deeply, what do these events reveal about human nature and human behavior when political structures are under strain or broken? Trepanier and contributors work with an expansive, more classical conception of politics; in this conception political theory explores the broad questions of how we live together and how the political order both reflects and shapes our human nature.

The book is organized into Trepanier's introduction and four sections. Section I, "In the Time of COVID," engages the recent pandemic. Section II, "Modern Solutions, Modern Problems," moves to the early modern period with studies of key figures such as John Locke and Francis Bacon. Section III, "God, Plagues, and Empires in Antiquity," moves to the ancient world engaging authors such as Augustine, Thucydides, and Sophocles. The final section, "Reflections on Surviving Disasters," brings us forward again to the present day with studies of how contemporary authors grapple with early twenty-first century disasters such as the Fukushima Earthquake of 2011 or Hurricane Katrina.

Aside from the introduction, there are twenty chapters. Some chapters are densely written, while others are quite accessible. The authors come at their topics from a variety of methodological angles, such as historical analysis, literature, and post-modernist theory. All chapters are quite short, rendering them as tasters for exploring the ideas in greater depth. A particular point of interest is the extensive use of works of literature as a lens for exploring these liminal events; several chapters use this lens.

One takeaway of the book is that dealing with diseases and disasters is not just a matter of "following the science"—we need to understand the political, social, cultural, and intellectual context of the society in question. Disease and disaster reveal human interconnectedness in its physical, social, and spiritual aspects.

A recurrent theme in the collection is the ambiguity of globalization: not only does globalization enable the spread of ideas, people, goods, and services, but it also enables the spread of disease and the movement of terrorists. Furthermore, given that this is so, how should polities deal with these problems? Are they best dealt with at a more local level or more at the national level?

Arpad Szakolczai's lead-off chapter, "The Permanentisation of Emergencies: COVID Understood through Liminality," may be the most challenging for readers, both in the sense of the difficulty of its prose and in its challenge to what he sees as a pernicious attempt at rule by technocratic "experts." By "experts," Szakolczai does not simply mean those who are knowledgeable about a particular topic, but additionally those who have been intellectually shaped by a problematic conception of nature, a conception that does not adequately grasp what capital-N Nature truly is: a gift. He notes that this does not rule out a God who is doing the giving, but he doesn't explicitly affirm one either. Either way, we receive Nature, but, he claims, the experts fail to respect Nature as a gift; they are actually hostile to Nature and the natural. Szakolczai seems to be gesturing at "technology-as-idolatry" critiques of contemporary society: our experts have been detached from a true notion of the natural. Because of this, the experts see the COVID epidemic as an opportunity to expand their influence. His argument is provocative but extremely compressed and hence to me unclear.

Jordon Barkalow uses James Madison's concept of faction to analyze the varied reactions to government efforts to respond to COVID. A faction as Madison defines it is a group that has an interest or passion adverse to the interests of the whole political community. In "Federalist No. 10," Madison famously argues that a large republic will dilute the power of factions by way of multiplying them.[1] However, Barkalow suggests, "The ability of personal factions to negatively affect national efforts to combat the spread of COVID suggests that the benefits Madison associates with the extended size of a republic might no longer apply to a technologically advanced 21st century" (p. 41). Factions have become national in scope.

Another common theme is that of apocalypse, in the sense of unveiling; diseases and disasters rip away veils and expose aspects of human nature and behavior that ordinarily lie under the surface. The chapters involving literature do a particularly good job of exploring this area. For example, Catherine Craig discusses James Lee Burke's 2007 novel *The Tin Roof Blowdown*, set in New Orleans in the aftermath of Hurricane Katrina.[2] Craig contends that

> the novel shows hope for the possibility of redemption and the presence of goodness even when all established order is brought to chaos. This possibility depends on human freedom to choose and pursue a transcendent good. While this freedom can be fostered or neglected by political institutions, it ultimately precedes and transcends them. (p. 198)

The hardcover edition of this book is unfortunately ludicrously expensive, apparently priced only for library collections. (The e-book version is less expensive.) That being said, I would recommend this book as a source book for beginning to explore the political and social implications of disease and disaster.

Notes

[1]James Madison, "Federalist No. 10," in *The Federalist*, ed. George W. Carey and James McClellan (Indianapolis, IN: Liberty Fund, 2001), 42–49.

[2]James Lee Burke, *The Tin Roof Blowdown* (New York: Simon & Schuster, 2007).

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DOI: https://doi.org/10.56315/PSCF9-23Abbey

IN THE SHADOW OF THE PALMS: The Selected Works of David Eugene Smith by Tristan Abbey, ed. Alexandria, VA: Science Venerable Press, 2022. xii + 155 pages, including a Glossary of Biosketches. Paperback; $22.69. ISBN: 9781959976004.

David Eugene Smith (1860–1944) may not be a household name for readers of this journal, but he deserves to be better known. An early-twentieth-century world traveler and antiquarian, his collaboration with publisher and bibliophile George Arthur Plimpton led to establishing the large Plimpton and Smith collections of rare books, manuscripts, letters, and artefacts at Columbia University in 1936. He was one of the founders (1924) and an early president (1927) of the History

of Science Society, whose main purpose at the time was supporting George Sarton's ongoing management of the journal *ISIS*, begun a dozen years earlier. Smith also held several offices in the American Mathematical Society over the span of two decades and was a charter member (1915) and President (1920–1921) of the Mathematical Association of America (MAA).

Smith is best known, however, for his pioneering work in mathematics education, both nationally and internationally. In 1905, he proposed setting up an international commission devoted to mathematics education (now the International Commission on Mathematical Instruction) to explore issues of common concern to mathematics teachers on all levels, worldwide. He was actively involved in reviving this organization after its dissolution during the First World War and served as its President from 1928 to 1932. Nationally, Smith was instrumental in inaugurating the field of mathematics education, advancing this discipline professionally both in his role as mathematics professor at the prestigious Teachers College, Columbia University (1901–1926) and as an author of numerous best-selling mathematics textbooks for elementary and secondary schools. These texts were not focused solely on mathematical content; they also dealt substantively with teaching methodology, applications, rationales for studying the material, and significant historical developments.

Throughout his life Smith championed placing mathematics within the wider liberal arts setting of the humanities, highlighting history, art, and literary connections in his many talks, articles, and textbooks. For him there was no two-cultures divide, as it later came to be known. While acknowledging the value of utilitarian arguments for studying mathematics (he himself published a few textbooks with an applied focus), he considered such a rationale neither sufficient nor central. For him, mathematics was to be studied first of all for its own sake, appreciating its beauty, its reservoir of eternal truths, and its training in close logical reasoning. But again, for him this did not mean adopting a narrow mathematical focus. In particular, given his wide-ranging interest in how mathematics developed in other places and at other times, he tended to incorporate historical narratives in whatever he wrote.

This interest led him later in life to write a popular two-volume *History of Mathematics*. The first volume (1923) was a chronological survey from around 2200 BC to AD 1850 that focused on the work of key mathematicians in Western and non-Western cultures; the second volume (1925) was organized topically around subjects drawn from the main subfields of elementary mathematics. His *History of Mathematics* was soon supplemented by a companion *Source Book in Mathematics* (1929), which contained selected excerpts in translation from mathematical works written between roughly 1475 and 1875. Smith wrote at a time when the history of mathematics was beginning to expand beyond the boundaries of Greek-based Western mathematics to include developments from non-Western cultures (Egyptian, Babylonian, Indian, Chinese, Japanese, and Arabic), a trend he approved of and participated in professionally.

Smith's interest in broader issues extended even to exploring possible linkages between religion and mathematics. His unprecedented parting address to members of the MAA as its outgoing President is titled "*Religio Mathematici*," a reflection on mathematics and religion that was reproduced a month later as a ten-page article in *The American Mathematical Monthly* (1921) and subsequently reprinted several times. Smith's article "Mathematics and Religion" appearing in the National Council of Teachers of Mathematics' sixth yearbook *Mathematics in Modern Life* (1931) touched on similar themes. These two essays maintain that mathematics and religion are both concerned with infinity, with eternal truths, with valid reasoning from assumptions, and with the existence of the imaginary and higher dimensions, "the great beyond," enabling one to draw fairly strong parallels between them. Thus, a deep familiarity with these facets of mathematics may help one to appreciate the essentials of religion. Mathematics itself was thought of in quasi-religious terms, as "the Science Venerable." Smith's farewell address partly inspired Francis Su in his own presidential retirement address to the MAA in 2017 and in its 2020 book-length expansion *Mathematics for Human Flourishing* (see *PSCF* 72, no. 3 [2020]: 179–81). Su's appreciation of Smith's ideas also led him to contribute a brief Foreword to the booklet under review, to which we now turn.

First a few publication details: *In the Shadow of the Palms* is an attractive booklet produced as a labor of love by someone obviously enamored with his subject. Tristan Abbey is a podcaster with broad interests that include being a "math history enthusiast," but whose primary professional experience up to now has been focused on the environmental politics of energy and mineral resources. This work is the initial (and so far the only) offering by a publication company Abbey set up. Its name, Science Venerable Press, was chosen in honor of Smith's designation for mathematics.

One might classify this work non-pejoratively as a coffee-table booklet. It contains 50 excerpts (Su terms them "short meditations") from a wide range of Smith's writings, selected, categorized, and annotated by Abbey, along with full-page reproductions of eight postcards mailed back home by Smith on his world travels, and

two photos, including Smith's Columbia-University-commissioned portrait. Smith's excerpted writing occupies only 109 of the total 167 pages, nearly two dozen of which are less than half full. The amply spaced text appears on 3.25 inches of the 7 inch-wide pages, the outer margins being reserved for Abbey's own auxiliary notes explaining references and allusions that appear in the excerpt. This gives the book lots of white space; in fact, eighteen pages of the booklet are completely blank. Another nine pages contain 75 short biographical sketches of mathematicians taken from Smith's historical writings; these are unlinked to any of the excerpts, but they do indicate the breadth of his historical interests. Unfortunately, no index of names or subjects is provided for the reader who wants to learn whether a person or a topic is treated anywhere in the booklet; the best one can do in this regard is consult the titles Abbey assigns the excerpts in the Table of Contents.

The booklet gives a gentle introduction to Smith's views on mathematics, mathematics education, and the history of mathematics. The excerpts chosen are more often literary than discursive. Smith was a good writer, able to keep the reader's attention and convey the sentiments intended, but these excerpts do not develop his ideas in any real length. They portray mathematics in radiant—sometimes fanciful—terms that a person disposed toward the humanities might find attractive but nevertheless judge a bit over-the-top: mathematicians are priests lighting candles in the chapel of Pythagoras; mathematics is "the poetry of the mind"; learning geometry is like climbing a tall mountain to admire the grandeur of the panoramic view; progress in mathematics hangs lanterns of light on major thoroughfares of civilization; and retirement is journeying through the desert to a restful oasis "in the shadow of the palms." Some passages are parables presented to help the reader appreciate what mathematicians accomplished as they overcame great obstacles.

While the excerpts occasionally recognize that mathematics touches everyday needs and is a necessary universal language for commerce and science, without which our world would be unrecognizable, their main emphasis—in line with Smith's fundamental outlook—is on mathematics' ability on its own to deliver joy and inspire admiration of its immortal truths. These are emotions many practicing mathematicians and mathematics educators share; Smith's references to music, art, sculpture, poetry, and religion are calculated to convey to those who are not so engaged, some sense of how thoughtful mathematicians value their field—as a grand enterprise of magnificent intrinsic worth.

In the Shadow of the Palms offers snapshots of the many ideas found in Smith's prolific writings about mathematics, mathematics education, and history of mathematics. It may not attract readers, though, who do not already understand and appreciate Smith's significance for these fields. Abbey himself acknowledges that his booklet "only scratches the surface of [Smith's] contributions" (p. 4). A recent conference devoted to David Eugene Smith and the Historiography of Mathematics (Paris, 2019) is a step toward recognizing Smith's importance, but a comprehensive scholarly treatment of Smith's work within his historical time period remains to be written.

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Origins

DOI: https://doi.org/10.56315/PSCF9-23Loke

THE ORIGIN OF HUMANITY AND EVOLUTION: Science and Scripture in Conversation by Andrew Loke. New York: Bloomsbury, 2022. viii + 200 pages. Paperback; $39.95. ISBN: 9780567706409.

On the cover of its June 2011 issue, readers of *Christianity Today* were greeted by the portrait of a distinctly ancient yet still remarkably human figure. Hovering nearby stands the intriguing title, "The Search for the Historical Adam." What had been a mostly academic debate had burst onto the popular scene. This article, arguably more than anything else, revealed the state of the scholarly debate, which, in a word, was not looking promising for traditionalists. A litany of high-profile figures, such as Peter Enns, Dennis Venema, and Scot McKnight, had struck successive blows to the long-cherished view of an original couple.

Just over a decade later, it seems a crisis may have been averted. Biologists and theologians have since offered not just one but multiple competing models that preserve both the genetic data and a doctrine of inerrancy. The debate has now shifted from "*if* Adam and Eve can be squared with contemporary science" to "*how* we ought to pair the two." The two most prominent attempts have been the recent pair of books by Joshua Swamidass and William Lane Craig, yet with the publication of *The Origin of Humanity and Evolution* by the accomplished philosopher Andrew Loke, a third major model has entered the discussion.

However, it would be a mistake to assume that Loke's work focuses solely or even chiefly on the question of the historical Adam. Rather, his more ambitious project is to provide a comprehensive interpretation of Genesis 1–9 in conversation with contemporary science. In chapter 1, Loke distinguishes between three different projects that are often conflated: (A) interpreting the

Bible, (B) showing the Bible to be true, and (C) showing there is no incompatibility between science and the Bible. Loke's project primarily undertakes Task C; as such, he is not suggesting the model he proposes is conveyed by scripture or would have even been known by the authors of the Genesis text. Rather, his more modest proposal is that the truths communicated by the early chapters of the Bible can be shown to accord with current biological data. Consequently, the much-exaggerated claims of conflict between science and scripture have yet to be justified.

Yet before Loke ventures to substantiate this claim, chapter 2 outlines his hermeneutical strategy. Loke affirms the reality of divine accommodation: God's revelations in the scriptural texts were communicated in a fashion his listeners would understand. However, Loke resists a strong view of accommodation that would deny a doctrine of inerrancy concerning scripture's statements regarding the physical world, defending the place of the latter doctrine in church history. What scripture says about both God and the natural world, he claims, is wholly accurate if interpreted correctly. How, then, does one square the creation account with the reality of an ancient cosmos? The task of the third chapter is to accomplish this reconciliation. Loke posits the interesting proposal that God ensured that the Genesis account was left intentionally vague to interpretation so that it might accommodate the cosmological understandings of people from different eras. Nevertheless, the core historical facts are still discernable, and Loke provides two possible interpretations for the creation account. While John Walton's functional view consumes the bulk of the discussion (though not without some minor disagreements by Loke), Loke offers C. John Collins's analogical interpretation as a possible alternative.

Chapter 4 then defends the compatibility of Loke's view with an evolutionary account, and the Garden as a localized area safeguarded from an imperfect outer world. Adam and his descendants were tasked with subduing the whole of creation by extending the boundaries of the Edenic paradise; they failed due to their sinful acts. This leads to the climactic fifth chapter that outlines Loke's model for the historical Adam. Loke notes the similarity between his model and the *Homo divinus* model offered by John Stott. According to this model, other anatomically modern *Homo sapiens* were present during Adam's time; however, only Adam and Eve were truly human since they alone possessed the image of God with all its substantial, relational, functional, and eschatological properties. In other words, only Adam and his descendants bore all the necessary traits, including a special election by God, that would qualify one as fully human. However, Loke grants that it is virtually certain other hominids contributed to the genetic diversity through intermarriage with Image-Bearers. Nevertheless, it is wholly possible for Adam to be a genealogical ancestor to all modern humans as Joshua Swamidass's research has shown. Thus, Loke's model preserves the much-valued claim that all humans today are, in fact, truly human.

When, exactly, did this original couple live? Loke takes no strong stance on the timing, and in his final chapter, he addresses these possibilities in conversation with the Flood narrative. Like Swamidass's model, it is entirely possible to place Adam and Eve in the near past (around 6,000 years ago). However, the presence of cave art—a remarkably human talent—predating this period moves Loke to opt for an earlier, far more ancient date. The Flood account poses no problem for either option if one accepts that a literal interpretation of the account does not demand a global interpretation.

Thus, Loke provides a model that, in his own words, escapes the Charybdis of young earth creationism without sailing headlong into the Scylla of biblical minimalism. Similar efforts have always risked a Procrustean amputation of either the theology or the science, cleaving off whatever is necessary to arrive at some violent and unnatural fit, yet Loke cautiously guards the most precious doctrines central to the theology of humanity's primordial progenitor without sacrificing solid scientific evidence. It is an impressive task, to say the least, and it is one that can confidently stand next to celebrated competing models. However, many might be offended by the assertion that pre-Adamite hominids were not truly human, and even Loke's suggestion of universal salvation for such beings may not soften the blow. The idea that God would deny full humanity to such beings will still seem like an unjust (or, at the very least, unfair) divine act. While Loke does an admirable job defending his stance from this difficult theological objection, one minor critique is that, while Loke's view seems motivated by a commitment to scriptural truth, his position lacks a sufficient defense of its biblical foundation. Why assume Adam must be the first human? Other models have argued differently, and the scriptural reasoning for Loke's position is relatively short and somewhat undeveloped. In fact, Loke spends significant time only on Acts 17:26, and, even here, he does not address many other proposed interpretations. Thus, the most controversial claim of the book lacks what Loke undoubtedly would regard as its most robust support: the biblical justification for Adam as the first human. Unquestionably, Loke has proven himself more than worthy of this hermeneutical task with his

other publications, yet the interested reader will have to search elsewhere for an answer on this topic.

But perhaps the most generous critique is one that asks for more. Brimming with Loke's customary brilliance and eloquence, it is difficult to deny this title's place among the best to emerge from the debate about Eden's infamous couple. By no means has the dispute ended, but contributions by Loke and others have helped to stabilize the ground so fiercely shaken just a few years ago.

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Philosophy of Science

DOI: https://doi.org/10.56315/PSCF9-23McGrath

NATURAL PHILOSOPHY: On Retrieving a Lost Disciplinary Imaginary by Alister McGrath. Oxford, UK: Oxford University Press, 2023. 256 pages. Hardcover; $39.95. ISBN: 9780192865731.

In this book, Alister McGrath provides an intellectual history and critique of what is now referred to as natural science, as well as a proposed re-conception of science going forward. The modern conception of science has its roots in something much older, referred to in the premodern world as "natural philosophy," and this older conception—McGrath argues—is one which was both richer and much more integrated with the rest of knowledge than is natural philosophy's contemporary stepchild, "science." The book has two parts. In Part 1, McGrath successfully labors to give an accessible introduction to the historical conception and development of natural philosophy and its trajectory/transformation towards contemporary "science," followed in Part 2 by a proposed direction *out* of the predicament which he and others see modern/postmodern science to be in.

In Part 1, over the course of five chapters, McGrath first lays out this history. In chapter one, he starts with natural philosophy as an intellectual enterprise finding its origins in the pre-Christian Greeks via Aristotle. In chapter 2, McGrath outlines how natural philosophy then underwent significant development and enrichment through what McGrath calls the "consolidation" of natural philosophy up through the high Middle Ages. On this scheme, a study of the natural world was guided first and foremost by a reverence for God, and an impulse to find the operations of the natural world as understood and explained by principles which were consistent with what God has revealed through both scripture and the church. Natural philosophy was therefore seen as but one chapter of a much larger story, in which understanding this story could be had only if one's heart were grounded in religious piety and one's intellect governed by proper theology (as handed down by church hierarchs).

Chapters 3 through 5 outline the ways through which natural philosophy underwent fundamental metamorphosis for the worse. In stages brought about by the sociological effects of the Copernican revolution, the Protestant Reformation, the scientific revolution, the Enlightenment, and finally the Darwinian revolution, natural philosophy became disenchanted and dis-integrated from the cohesive place it once held as part of a totalizing theological-cosmological worldview of the premoderns; it devolved into a dis-integrated, compartmentalized, and fragmented version of itself, as evidenced by the ever increasing creation of new "subdisciplines" of modern science, which are all largely closed off from one another and which do not enjoy any kind of real synthesis as the premodern intellectual enterprises once did. This modern endeavor, furthermore, seems to be more concerned about extending human's domination over nature (*technē*) than it is about truly understanding (*episteme*) the world that God created. Thus, devoid of a "disciplinary imaginary" which serves as an organizing principle, the study of natural philosophy has become a shell of what it once was. This shell is the "science" that we speak of and study today.

In Part 2, McGrath spends the last five chapters of the book offering scientists and philosophers of science a proposed way forward, a way which might recover at least some of the integration and richness that natural philosophy once enjoyed. He does this by employing a heuristic that comes from Karl Popper's conception of what Popper called the "three worlds," which Popper saw as distinct but related "realms" that encompass the scope of what can be known. On this scheme, the first world is that of objectivity or mind-independent objects, the world of "physical objects or physical states." The second world is that of person or mind-dependent entities—the world of subjectivity, such as emotion, affect, and aesthetic value. The third world is one that acts as a sort of bridge between the first two, one which contains "human intellectual constructions and artefacts" such as scientific theories, moral values, and social constructions. McGrath points out that Popper's own development of this idea is not "entirely satisfactory" (p. 129), and McGrath proceeds to build his own conception using this framework of the "three worlds" as a heuristic tool, borrowing from Popper little else other than the basic idea itself.

McGrath begins his proposed "disciplinary imaginary" with an outline that builds from this third world, the world of *theoria*. This is the world of mental models and

theories which serve to represent and organize bodies of data and evidence. For example, McGrath cites Dmitri Mendeleev's Periodic Table of the Elements. With this kind of organization in view, a certain "beauty" and "coherency" emerges, a kind of simple elegance that can inspire both (subjective) awe and enable further scientific (objective) investigation. It is in fact through these mentally constructed theories that we "see" and make sense of the external world, and these "imaginaries" should aim to engage *both* the intellect and the affect.

In chapter 8, McGrath visits the "first world" of objectivity, with the primary concern to show that, since humans are part of the very cosmos that objective science seeks to explain, there are inherent limits to the reach of a detached, person-neutral, objectivity. McGrath seeks to safeguard against a totalizing scientific reductionism by pointing out that a new natural philosophy will recognize that there are *several* aspects or layers of meaning to any given object of inquiry, and one needs to consider them all to get behind what's really there. He posits neo-Confucianism as one potential example of this kind of engagement with the external world.

Chapter 9 is about the importance of subjective experience, where McGrath seeks to show how aesthetic value and affective engagement are more than arbitrary states of mind. Instead, they often reflect true and proper responses to a world that *really* is pregnant with "beauty and wonder." McGrath then wraps up the book by surveying what he has done and emphasizing the need for a retrieval of natural philosophy, a retrieval that can be enabled through a newfound imaginary or imaginaries.

I will offer two points of praise and two points of criticism. First, McGrath's keen ability to clearly explicate a very complex subject is on full display in this book. McGrath covers an impressive amount of historical ground in the first half of the book in a surprisingly small space (about a hundred pages), complete with explanatory and exploratory footnotes which enable the reader to delve deeper into subtopics. In this way, and like McGrath's many other monographs, the volume is worthwhile if for no other reason than that it acts as a sort of brief yet rich handbook to the subject at hand. Secondly, McGrath's effort is worth considerable praise because he not only seeks to give an intellectual history and critique of the modern epistemic predicament concerning science, but he also delivers up a thought-provoking proposal on what can be done to begin to *address* the problem. His re-conception of Popper's "three worlds" model is, I think, worthy of serious consideration. The broader point, however, is that McGrath is unafraid to wield both a critical acumen and a hopeful positivity regarding this issue, and such constructive attitude from a mind like his is welcome.

On the other hand, in Part 1, McGrath ends his historical survey and critique of natural science with the nineteenth-century secular Darwinists. It is, in fact quite arguably, the horrors and figures of the twentieth century which serve to hammer home the point concerning the consequences of abandoning the disciplinary imaginary for an elevation of (fragmented) scientific knowledge and scientific goals above most everything else. Thus, the first five chapters could have served as a setup for a polemical slam-dunk, but without this survey of the twentieth-century consequences, Part 1 left me with the feeling that McGrath proceeded a bit too prematurely.

Secondly, in Part 2, the way in which McGrath approaches the problem of modern science and his laying out a potential solution gives the impression that he views the issue, fundamentally, as an intellectual one. Is it perhaps more likely, as C.S. Lewis believed, that the problems which plague the modern scientific establishment (including the epistemological problems that stem from fragmentation) are fundamentally *moral*, not intellectual (see *The Abolition of Man*)? On this idea, civilization requires first and foremost a turn back toward God, in repentance. Only then can our institutions—knowledge producing and otherwise—begin to function properly. Moreover, given that our current state of scientific and technological advancement has far outstripped our moral scruples, one is left wondering what a scientific establishment could be capable of with the *wrong* (morally speaking), yet effective, disciplinary imaginary in place. The lesson from the biblical story of the Tower of Babel comes to mind, where an unprecedented attempt at evil was made possible only *because* corrupt humanity enjoyed a cohesive and integrated knowledge base, and the subsequent fragmentation of knowledge through the dispersion of languages acted not only as a divine judgment, but also as a paternal guardrail.

In all, nevertheless, McGrath's contribution to the topic is a timely and welcome addition, one which is sophisticated while remaining accessible, critical while remaining constructive. It is well worth picking up.

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DOI: https://doi.org/10.56315/PSCF9-23McLeish

THE POETRY AND MUSIC OF SCIENCE: Comparing Creativity in Science and Art by Tom McLeish. New York: Oxford University Press, 2022. 414 pages. Paperback; $16.95. ISBN: 9780192845375.

In this tour-de-force book, British physicist Tom McLeish finally comprehensively argues, in one dense volume, what so many scientists have been claiming

piecemeal for centuries: that doing science often looks and feels like doing art. That is a broad, amorphous statement, of course, and scientists have not done a very good job of fully understanding this idea or selling it to the rest of the world. This carefully crafted volume must be the most exhaustive work in this area, treating the notion that the creative work of scientists and artists is extraordinarily similar, in that they both fundamentally involve an intimate passion for describing and representing the world around us.

This is not a book about beauty or wonder in science, but rather it examines how scientific ideas and theories come to a scientist's mind and find fruition as publishable science. The entire book juxtaposes literature and art with science and mathematics to help understand the creative process. One important impetus for writing the book, according to McLeish, was recent evidence that smart, capable high schoolers in England were choosing not to go into science because they believed it would not be nearly as fulfilling, creatively, when compared to work in the arts or humanities. McLeish, a Christian, succeeds in this book in showing that not only is creative thinking and experimenting necessary and "part of the chase" in science, but that it is also a natural fulfillment of our creative mandate as human beings made in the image of God. McLeish is also careful to give examples of "more-regular" science, rather than relying solely on the popular accounts of the creativity of exceptional geniuses; he tries to show that all scientists participate in this artistic-like creativity no matter what they are studying.

The first two chapters introduce the concepts of creativity and inspiration in science. McLeish begins an interaction with several important works that he draws on throughout the book: William Beveridge's *The Art of Scientific Investigation* from 1950, Henry James's *The Art of the Novel*, and Howard Gardner's 1993 work *Creating Minds* (one of many surveys of particularly creative individuals). Chapter 3, "Seeing the Unseen," is about visual imagination and its role in theory creation, artistic design, and general problem solving. Visual imagination is seeing things in the mind's eye, but it is obviously linked to actual sight and seeing the world, too. Surveying the history of thought in this area, McLeish ranges from Plato to Gregory of Nyssa, to the thirteenth-century polymath Robert Grosseteste, to the Italian painter Giotto, to Einstein, who said his theory creation and problem solving started with visual images in his mind, which often led to his famous *gedanken* experiments. Grosseteste is one of the main interlocutors for McLeish throughout the book, being an exemplar of someone having a broad view of thought and creative exploration, not just compartmentalizing a premodern understanding of the physical world from his theological and philosophical commitments.

Chapters 4 through 6 sequentially juxtapose each of the three main areas of scientific work (experiment, theory, and mathematics) with their natural counterpart in literature and music. Experimental science is akin to writing a novel (!?) in that both set up artificial worlds that are tested against the real world and help illuminate the real world. Theoretical science is akin to writing poetry, in that both re-imagine the universe within fixed constraints: poetry within a certain shaping but constraining form, and theoretical visions of what goes on "under" the natural world constrained by a necessary conformity to that world. Chapter 6 compares mathematical creativity with composing and listening to music—the two "wordless" human endeavors in the world of the abstract.

The book is ultimately a treatise on creativity, and as such applies not just to science and art, but to all human endeavors that require creativity. In the final two chapters (7 and 8), McLeish develops what he describes as an "Ur-narrative of creative experience." Starting with a four-step creative process taken from Graham Wallas's 1926 work *The Art of Thought*, he adds in three more important stages that emerge from his analyses. The seven steps are: vision, desire, industry, constraint, incubation, illumination, and verification. (McLeish has added in desire, industry, and constraint, along with switching Wallas's *ideation* to *vision*.) Chapter 7 deals with emotion and drive in scientific creation, and chapter 8 ponders the purpose of human creativity, the telos that ultimately drives scientists and artists to such great lengths in pursuing their creative work. McLeish brings the *imago Dei* front and center, drawing on the two great hymns in the Book of Job, "Voice from the Whirlwind" (Job 38–42) and "Hymn to Wisdom" (Job 28), as guides to understanding the creative impulse to understand creation. In this he draws on his previous volume with Oxford, *Faith and Wisdom in Science*.

I believe that listing all the scientific works that McLeish describes in detail with regard to the creative elements behind the works is a good way to convey the magisterial scope of this intellectually rich book. Topics that get 2–10 pages each of description include Feynman's theory of beta decay, McLeish's own considerable contribution to viscous flow in branched polymer melts and his idea of entropically based allostery in biology, Belgian scientist Jan Vermant's work in mesoscale properties of "living matter" (which involves cellular-based material science), "collective phenomenon" and its original invocation by Pierre Weiss in 1907 to explain ferromagnetism, the centuries-long premodern

controversy over the nature of sight (*intromissive* vs. *extramissive*, etc.), the recent evidence of a star being destroyed by a black hole, Boyle's contributions to the founding of modern experimental science, Alexander von Humboldt's important contributions to the value of a wholistic, multilevel vision of nature and science, Emmy Noether's astonishing discovery of the theoretical origin of conservation laws in physics, the discovery of the all-important fluctuation-dissipation theorem over 30 years (inaugurated by Einstein in 1905, applied to electrical noise by Nyquist in 1928, and fully generalized by Callen and Welton in 1951), the recent development at Caltech of a jet fuel polymer additive that greatly inhibits explosions of jet fuel (motivated in part by the horror of the fuel explosions on 9/11), and finally the full discovery of what causes rainbows by Theodoric in ca. 1310. The descriptions of these historic achievements are each fascinating in their own right and very readable—they alone, for me, would justify an investment in this book. When they are paired with a similar creative work from art, poetry, or fiction, the juxtaposition is extremely fruitful, though the philosophical/psychological analyses get much denser.

Many other discoveries are given much shorter treatment (less than one page), including Andrew Wile's solution to Fermat's Last Theorem, Dirac's mathematical discovery of spin and anti-matter, Poincaré's discovery of a new class of Fuchsian functions, Royer's recent proof of the Gaussian Correlation Inequality in statistics, and Heisenberg on discovering quantum matrix mechanics. The explorations into artistic and literary creativity are typically much shorter, but are nearly as numerous; they include a painting conceptually representing a string-quartet performance by English artist Graeme Willson, Virginia Woolf's *To the Lighthouse*, Robert Schumann's orchestral work *Konzertstück*, and Picasso's masterpiece *Guernica*.

At nearly four hundred pages, this is not light reading and takes some patience and time to get through. It is written at a very high level of sophistication, and therefore one is often "bogged down" trying to make complete sense of what one is reading. (However, if one is not writing a review of the book, one need not spend quite so much time disentangling every dense sentence to get the main gist of the passages.) Also difficult are the many references to previous parts of the book. While these references are entirely appropriate, they are quite demanding of the reader given the sheer number of names and amount of material covered. I had to do quite a bit of flipping back and forth, checking the index to remember exactly what so-and-so said that is now being referenced 100 pages later. In other words, this is a thoroughly academic text.

This is a revised edition of the book, which was first published in 2019. The overwhelming positive response, according to the new preface, prompted the author to immediately answer some of the initial reviews and friendly critiques, which I believe made the book quite a bit better (initially there was not nearly as much about poetry; the comparison of poetry with theoretical science now became a separate chapter, enabling McLeish to more logically and thoroughly cover the territory he had staked out). McLeish sadly died very recently (February 2023) at age 60, while holding the newly created chair in Natural Philosophy at University of York. He was a lay preacher in the Anglican Church and a Fellow of the Royal Society.

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DOI: https://doi.org/10.56315/PSCF9-23Bishop2

EMERGENCE IN CONTEXT: A Treatise in Twenty-First Century Natural Philosophy by Robert C. Bishop, Michael Silberstein, and Mark Pexton. Oxford, UK: Oxford University Press, 2022. 363 pages. Hardcover; $103.65. ISBN: 9780192849786.

Reductionists dream of a day when all scientific truths can be derived from fundamental physics. Bishop, Silberstein, and Paxton show that dream is now dead, or at least it's quite ill. But what will replace it? One answer is "emergence," although that term is ambiguous. In its weak sense, it merely expresses pessimism about our ability to fully understand how microphysics produces all other phenomena. In its strong sense, it means that some entities have a kind of autonomy from physics, with their own "causal powers," including downward causation. Bishop et al. seek to replace strong and weak emergence with "contextual emergence."

Let's start with an example (sec 2.4). Rayleigh-Bénard convection occurs when a fluid is trapped between a heating plate below and a cooler one above. Convection cells emerge as warmer fluid rises toward the top and cooled fluid sinks. While molecular interactions play a part in this, sustained convection is impossible without the macroscopic plates. This behavior is not wholly determined by the fluid's constituent parts but rather by the context in which the fluid exists.

What this and scores of other examples show is that phenomena at a given scale often depend on a host of "stability conditions" at other scales—sometimes higher, sometimes lower. *Contra* the reductionist, the authors argue that the behavior of entities, properties, and processes at a given level is never wholly determined by events at a lower level. Macroscopic conditions (among other things) play an essential and ineliminable

role. If we knew all the truths of nature, we would see that not all dependence is bottom-up.

"But the plates in your example are made of matter," says the critic, "We can reduce those to the behavior of atoms as well." A complete mathematical description without idealizations? "Well, it can be done in principle." Let's consider another example while we wait. Physicists in the Newtonian era devoted much time to the study of planetary orbits. One surprising stability condition is three-dimensional space. In four dimensions, regular orbits that resist small perturbations would be impossible (p. 29). Note that spatial dimensions are not part of the system. They are the context in which the system exists. Three dimensions are a necessary condition for stable orbits but cannot be reduced to the system's constituents even in principle. The properties of the parts do not determine the properties of the whole. This example illustrates why emergent properties are often inexplicable or unpredictable given complete knowledge of lower-level constituents: stability conditions are typically not at some lower level. While some stability conditions are causal and mechanical, like the plates in the convection examples, others are acausal, like conservation laws and least action principles. Still more are abstract properties of dimension and the geometry of mathematical spaces. Whichever the case, the authors consider those conditions to be as real or "fundamental" as anything at the level of elementary physics—something that sets this book apart from both reductionism and many other versions of emergentism.

Emergence is often associated with novelty, such as when a new and unexpected higher-level property emerges from its base. The authors believe this attention is misplaced. They focus instead on how stability conditions either open or close off areas of "possibility space." A possibility space is an abstraction in which each point represents a possible state or behavior of the system. For example, one point in the possibility space of a baseball represents its being in orbit—a possibility that will likely never be actualized. In Newtonian mechanics, the ball might also travel at the speed of light. Under special relativity, on the other hand, that part of possibility space is closed to the ball. As a result, no material object can reach that speed. The more interesting and neglected case occurs when stability conditions *create* access to parts of possibility space. For example, lasers do not exist in nature. Their stability conditions include the existence of a resonance cavity in which atoms can be electrically stimulated and isolated from their environment and putting those atoms in the proper state to begin the process (sec 4.9.1). When these conditions are in place, the area of possibility space representing coherent light becomes accessible. Such light has always been physically possible, but without the requisite context, it cannot become actual.

The authors make several applications to perennial questions in the philosophy of science that I do not have space to elaborate on. These include modality, dispositions/causal powers, properties, the laws of nature, causation, and determinism. Each of these has a relation to stability conditions that is often overlooked. The authors show how progress can be made on each question with less metaphysical baggage than many analytic metaphysicians assume.

Chapter 7 includes several possible objections, but one stands out. While we might need to use multiscale modeling in order to make predictions, that's because of our own epistemic limitations. Stability conditions are important, a critic might grant, but they are ultimately grounded in fundamental physics just like everything else. If we only knew enough about the system and its contexts, we would see how it's all due to the behavior of fields, particles, or whatever resides at the lowest level.

Bishop et al. reply that emergence has the evidence on its side, including an entire book with dozens of examples that cannot be reduced in the manner the critic envisions (p. 313). Nonetheless, the ontological reductionist continues to claim that while these examples have not yet been reduced to lower-level phenomena, it's just a matter of time. One wonders how long such promissory notes will be accepted.

My only concern is that contextual emergence might be *too* commonplace. Emergentists, especially of the strong variety, sometimes have difficulty providing convincing examples. Consciousness and quantum entanglement always make the list, but neither is fully understood. Contextual emergence, in contrast, is ubiquitous. Many examples are from biology and neuroscience, as one might expect, but most come from physics itself. Consider one more. Whether a dying star forms a white dwarf, neutron star, or black hole depends on its context, specifically how much mass the star had prior to collapse (sec 4.4). All three are therefore contextually emergent. But our hypothetical critic will surely complain that there's nothing *emergent* about this. The context is just mass, and mass is fundamental. Even some fellow emergentists might wonder whether calling every example that relies on necessary conditions "emergence" diminishes the significance of the term. Whatever the terminology, the book highlights a neglected aspect of what science tells us about the world. The objects and properties science studies depend on stability conditions, and those conditions are not typically found at smaller scales. Contextual

emergence, therefore, stands in stark contrast to what reductionists had led us to expect.

Insofar as reductionism is incompatible with theism, this is the main takeaway for Christian academics. Science still tends to operate under a reductionist narrative that can deal with religious belief only in terms of psychological predispositions and sociological pressures. But if this narrative is false even in the physical sciences, then religious beliefs need not be restricted to such cramped corners. One might even wonder whether some of those beliefs are true.

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Physics

DOI: https://doi.org/10.56315/PSCF9-23Palmer

THE PRIMACY OF DOUBT: From Quantum Physics to Climate Change, How the Science of Uncertainty Can Help Us Understand Our Chaotic World by Tim Palmer. New York: Basic Books, 2022. 297 pages. Hardcover; $30.00. ISBN: 9781541619715.

Tim Palmer, a distinguished physics professor at the University of Oxford, has authored a captivating popular science book exploring chaos in complex systems. Early in his career, he switched fields from mathematical physics to weather forecasting and made significant developments in ensemble weather prediction, revolutionizing our understanding of weather patterns. The author discusses how delving into this realm reveals a chaos geometry, describing difficult-to-understand real-world phenomena. He takes the reader through various complex systems that exhibit a marked sensitivity to initial conditions, like the renowned "butterfly effect." Chaos geometry describes a system that is predictable and stable for a long time, but occasionally veers into new directions. The study of chaotic complex systems challenges traditional notions of predictability.

The book is divided into three parts. Part 1: The Science of Uncertainty explores the concept of chaos geometry. Palmer captivates readers from the start by sharing a true story about a renowned BBC weather forecaster. In 1987 this forecaster infamously failed to predict the most severe storm in 300 years, striking England. This incident highlighted the unsettling truth that complex systems can deviate significantly from historically stable patterns. As a polymath, Palmer generously shares captivating examples and illustrations from fields such as history, philosophy, and art. Part I is solid science and mathematics, but without equations.

Part II: Predicting Our Chaotic World explores Palmer's influential technique to forecast inherently uncertain systems, running models multiple times with slightly different initial conditions. Chaos geometry offers a powerful description of the behavior of these systems. The author focuses on Lorenz's idea that even with infinitesimally small uncertainty, we cannot predict beyond a finite horizon in time. The author extends the concepts from Part I from well-established domains such as climate, to emerging areas such as disease, economics, and conflict.

Part III: Exploring the Chaotic Universe and Our Place in It delves into speculative realms and may appeal to readers of *PSCF* as it engages with metaphysical inquiries regarding Christian theism. Palmer grapples with perplexing intellectual dilemmas, including free will, consciousness, and the nature of God. In his pursuit to unravel nature's workings, he confronts philosophical and theological quandaries. At its essence, he posits that the universe operates under determinism and challenges the notion that uncertainty in nature is primarily ontological as Bohr espoused, rather than epistemic as advocated by Einstein. Raising a thought-provoking query, the author asks, "Could there be something fundamentally flawed with quantum mechanics itself?" He asserts we must face the fact that the violation of Bell's inequality can be explained only by either abandoning the concept of definite reality or considering the equally dreadful notion of quantum action-at-a-distance. Subsequently, Palmer presents a naturalistic explanation involving counterfactual worlds and puts forth two conjectures.

Conjecture A suggests that the universe operates as a nonlinear dynamical system, unfolding within a cosmological state space defined by a fractal attractor. In simpler terms, a fractal invariant set is a mathematical idea in which a set demonstrates self-resemblance at various magnitudes, containing miniature replicas of itself through a repetitive pattern. Meanwhile, Conjecture B suggests that the deepest laws of physics describe the geometric properties of a fractal invariant set within the cosmological state space.

Palmer's abstract and subtle perspective challenges the prevailing view in physics, which embraces Bohr's interpretation of inherent uncertainty in quantum mechanics. Instead, Palmer aligns himself with Einstein and Schrödinger, rejecting the idea of God playing dice and the concept of a cat being both alive and dead. According to Palmer, the laws of physics are deterministic, devoid of randomness. He suggests conceptualizing our world as a specific solution set within a space of permissible solutions, influenced by a

fractal attractor. This space includes neighboring solutions that represent counterfactual worlds similar to our own, some permissible and some not. This perspective resembles the multiverse hypothesis, suggesting the existence of separate realities that impact our own. Analogously, imagine a Mandelbrot fractal set with the gaps indicating prohibited solution sets. Palmer openly acknowledges that he has not fully developed the specifics of his hypothesis.

Palmer argues that reductionism, as an approach, falls short in addressing the profound questions of quantum mechanics. He advocates for unconventional thinking and the exploration of radically different solutions, as our understanding of quantum mechanics and its implications for the universe remains incomplete. In Palmer's view, the deterministic nature of the fractal universe offers an explanation for phenomena such as spooky action at a distance. He proposes a worldview in which elementary entities and the notion of reality possess certainty and definiteness, providing insights into quantum mechanics, gravity, dark matter and energy, and the expanding universe. Palmer expands his hypothesis to free will, consciousness, and the role of God. Ultimately, he applies the Lorenz model of chaos to understand the profound questions surrounding life and reality.

Palmer's speculative arguments from Part III follow from his philosophical naturalism, and seek to explain the grand inquiries within a worldview rooted in staunch physicalism. Consequently, his cosmogony is materialist, drawing from options in a cosmological state space, and he asserts that free will and consciousness are somewhat illusory. According to Palmer, our behavior, emotions, and thoughts can be traced back, through various scales, to the movements of subatomic particles.

Palmer's arguments ultimately rely on a false analogy. By conflating an observation from weather prediction to consciousness, free will, and God, he overlooks the crucial dissimilarities between these scenarios. He incorrectly assumes that what applies to one domain will inevitably apply to the others. A valid analogy requires relevant similarities between the elements being compared, justifying the comparison. Yet it is difficult to see how inanimate subatomic particles involved in weather patterns can be equated with traditional descriptions of God. Without these pertinent similarities, the analogy is flawed and may lead to erroneous conclusions.

Palmer's speculative and logically flawed exploration of options within state space is fundamentally a metaphysical response, substituting a "cosmological invariant set" for god. Nevertheless, I must acknowledge the enjoyment and intellectual stimulation derived from reading his book, and commend Palmer for his innovative naturalistic endeavor to explain reality, even though it ultimately falls short of being the best and most plausible account of reality.

Reviewed by Randy L. Smith, former NASA engineer, McKinney, TX 75072.

Psychology

DOI: https://doi.org/10.56315/PSCF9-23Barrett

THEOPSYCH: A Psychological Science Primer for Theologians by Justin L. Barrett. Blueprint 1543, 2022. 176 pages. Paperback; $19.15. ISBN: 9798985852004. Also, free download at https://blueprint1543.org/wp-content/uploads/2022/03/TheoPsych-PDF.pdf.

It is not often that one finds a book about construction written by a psychologist. However, Justin Barrett's *TheoPsych* is just that. The author imagines the theologian as a master palace builder in need of a collection of specialized materials and knowledgeable artisans to do specific modular work for the larger project. *TheoPsych* serves as a "specs sheet" for the potential contributions psychological science can bring to the project. The manuscript is designed not only to serve the interested contemporary theologian who already desires this input, but even more so, it seeks to convince the suspicious or disinterested theologian of the usefulness of the discipline. As such, "bridge builder" seems an equally fitting metaphor. In any event, intellectual efforts which suggest a unity of truth come freighted with hope for this reader because of the potential they hold to generate cross-disciplinary clarity.

Descriptively, the book features five chapters, the first of which argues for the theologian's need of psychological science, distinguishes it from the more general and potentially misleading term "psychology," and seeks to help the inquisitive theologian identify the types of questions in which the psychological sciences will be useful. Here, as in other parts of the text, Barrett gives form to the points being made by posing insightful example questions. For instance, "Why does it often seem so hard for people to grasp and hold onto the idea of Grace?" (p. 13).[1]

Chapter 2 further defines the psychological sciences by way of a quick trip through the history of experimental psychology, notes the mindset of the scientific psychologist (i.e., curious and skeptical), describes the demographically relevant features of this community of scholars, and briefly catalogs the various types of materials produced by its professionals. Additional care is taken to delineate the organizational structure

of empirical papers and to clarify important discipline-specific terms such as evidence, hypotheses, effects, and effect sizes.

The third and largest chapter of the book maps out the many areas and subdisciplines the field has to offer. These include the biological basis for behavior, social psychology, personality psychology, cognitive psychology and cognitive science (it's more interdisciplinary cousin), developmental psychology, and a few others. The relative bulk of this chapter reflects space allotted within each area to draw out particular lines of research relevant for use in interdisciplinary collaboration. As in other sections, Barrett never strays too far from the book's stated aim, to serve the integrative needs of the interested theologian.

Interestingly, it is not until the penultimate chapter that implications related to emerging new paradigms and overarching themes are brought to the foreground. It opens with a description of the recent emergence of positive psychology and the current emphasis placed on cognitive anthropology and cultural evolution. These areas are followed by a section on evolutionary and comparative psychology. The chapter concludes with religion itself as a topic of study as viewed from four different vantage points: psychology, cognitive science, evolutionary studies, and neuroscience.

The last and briefest chapter addresses the thorny issue of methodological naturalism, noting its necessity to avoid supernatural explanations but also lamenting its inability to settle contentions regarding the relationship between human behavior and overarching metaphysical questions. This chapter also speaks to the problem of reductionism, arguing that psychological scientists oftentimes attack their topics of interest reductively. While acknowledging that many then blithely imply ontological reductionism in their interpretations, nonetheless Barrett suggests that "… most good psychologists do not forget the whole" (p. 140). The book concludes with one more call for theologians to incorporate the findings of psychological science into their work.

Evaluatively, the book has much to offer, including a very expeditious yet effective pathway forged through this broad and corrugated discipline. Additionally, the chosen areas of elaboration seem appropriate and properly suggestive of potential cross-disciplinary alignment. Complementing the helpful exemplar questions peppered throughout the summary sections are several text boxes highlighting examples of existing cross-disciplinary activity. For instance, one side-bar discussion features the work of theologian Christopher Woznicki, who argues that concepts in cognitive psychology can be used to better give an account of the theological notion of *perichoresis* (pp. 81–82). Most importantly, the author's genuine desire to stimulate interdisciplinary collaboration readily seeps through the pages. Barrett has built a strong and winsome case suggesting theologians willing to interact with the psychological sciences will be well served in doing so.

The most substantial drawback has to do with what has been left out, namely, the soft underbelly of the discipline. For instance, there was no mention of the replication crisis now plaguing the psychological sciences.[2] Readers should be aware that there are challenging measurement difficulties that sit at the foundation of all scientific pursuits, especially those that aspire to contend with concepts such as anxiety, emotion, personality, and attachment.

Furthermore, although the book offers many helpful definitions, two critical ones were found missing. One is the construct of *religion*. The default post-enlightenment understanding is far from clear and directive when made the focus of study.[3] The other is *science* itself. In addition to enduring definitional challenges regarding both the term as a method and as a body of knowledge, there are also important sociological aspects of the concept that merit mentioning. That is, science as a community; a community that can succumb to the same "groupish" tendencies found in all social networks.

A more complete historical account would serve to support the "science as community" omission noted above. Perhaps outsiders should be made aware that the history of psychology is more than a clean handoff from Wundt to Watson to the modern psychological scientist. Freud, for instance, was dogmatic in claiming his system of psychoanalysis was anchored in the natural sciences.[4] But there were also the Functionalists and the Gestaltists—the "physics-minded" Gestaltists offering a nonreductionistic paradigm, by the way. Readers should know that psychological science has been governed by many paradigms over the past 150 years, each of them being considered properly scientific by their advocates.

There is also no mention of some rather dubious attempts by psychological scientists in the past to directly address (i.e., correct) theological concepts,[5] including offerings of updated understanding of Jesus in light of modern psychology.[6] In one sense there may be good reason for their omission. These bygone works reside firmly in history's dustbin, and unlike these previous efforts, *TheoPsych* is not trying to "do" theology, rather it is merely offering its services passively. Nonetheless, an acknowledgment of and distinction between this history and the current project might serve

to allay any misgivings a historically informed reader might have, especially when sections of *TheoPsych* could be interpreted as being somewhat assertive (e.g., Various Sciences of "Religion," pp. 126–35). Greater lengths should be taken to avoid any impression that this is the work of a missionary from the land of facts sent to enlighten the backward residents of faith.

Finally, there is the influence of the current paradigm. The most popular option is evolutionary psychology. This approach is noted in the book; the promise of interesting connections being forged with biology, cultural studies, and anthropology is properly identified as clearly worthy of continued exploration. However, this is the third attempt to tie the science of human behavior to biological evolution, the first two (eugenics and sociobiology) having left a rather embarrassing legacy.[7] Evolutionary psychology has several major problems, and they are not particularly helped when partnered with the evolution of culture.[8]

In summary, this book would better serve collaborative efforts if the picture presented within were not so nice and tidy. In the long run, brutally transparent portrayals will be needed from all collaborators if there is to be hope for building cross-disciplinary theoretical structures that bring us closer to truth. Despite these criticisms, *TheoPsych* is unquestionably an impressive and important offering, one that is well positioned to advance the essential work of cultivating interdisciplinary syntheses. Now, if only more folk in the social sciences would care to understand what theology has to offer them.

Notes

[1]For example, Adam S. Hodge et al., "Experiencing Grace: A Review of the Empirical Literature," *The Journal of Positive Psychology* 17, no. 3 (2022): 375–88, https:/doi.org/10.1080/17439760.2020.1858943. Also, see K. I. Pargament and J. J. Exline, *Working with Spiritual Struggles in Psychotherapy: From Research to Practice* (New York: Guilford Press, 2021), https://www.guilford.com/books/Working-with-Spiritual-Struggles-in-Psychotherapy/Pargament-Exline/9781462524310/contents.

[2]J. P. Ioannidis, "Why most published research findings are false," *PLoS Medicine* 2, no. 8 (2005): e124, https://doi.org/10.1371/journal.pmed.0020124. Erratum in *PLoS Medicine* 19, no. 8 (2022): e1004085.

[3]Peter Harrison, *The Territories of Science and Religion* (Chicago, IL: University of Chicago Press, 2015).

[4]Sigmund Freud, "Some Elementary Lessons in Psychoanalysis," in *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, ed. James Strachey (London: Hogarth Press, 1940).

[5]Raymond B. Cattell, *Beyondism: Religion from Science* (New York: Praeger Publishers, 1987).

[6]Granville Stanley Hall, *Jesus, the Christ in the Light of Psychology* (New York: Doubleday, 1917).

[7]Paul A. Lombardo, *Three Generations, No Imbeciles: Eugenics, the Supreme Court, and* Buck v. Bell (Baltimore, MD: Johns Hopkins University Press, 2022).

[8]Edwin E. Gantt and Richard N. Williams, "The Triumph of the Will: Evolutionary Psychology and the Conceptual Incoherence of Enhancement," *Journal of Humanistic Psychology* 62, no. 5 (2020), https://doi.org/10.1177/0022167819899009.

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DOI: https://doi.org/10.56315/PSCF9-23Hackney

POSITIVE PSYCHOLOGY IN CHRISTIAN PERSPECTIVE: Foundations, Concepts, and Applications by Charles Hackney. Downers Grove, IL: IVP Academic, 2021. 344 pages, index. Paperback; $45.00. ISBN: 9780830828708.

There have been quite a few volumes over the last several years that have attempted to make sense of the relationship between the burgeoning field of positive psychology and the theology and practice of Christianity. Charles Hackney begins this volume by drawing upon the popular definition of positive psychology provided by Shelly Gable and Jonathan Haidt, "The study of the conditions and processes that contribute to the flourishing and optimal functioning of people, groups and institutions." In so doing, Hackney sets the scene for a comprehensive and lively examination of how this booming field of psychology interacts with Christian faith.

Christians have been quite rightly interested in the field of positive psychology for numerous reasons. There is arguably a sense of common purpose between Christian aspirations and those of positive psychology. Both to some extent claim, or at least aim, to produce a flourishing and abundant experience of living, and thereby share an interest in outlining the kind of life that is likely to produce this sort of fruit. Over the last two decades, positive psychology has made its presence felt in almost every sphere of practice: education, business, health, politics, and spirituality, to name a few. Any field of scholarship that claims such a wide and all-encompassing remit will no doubt be of interest to people of faith, partly as a significant cultural phenomenon worthy of attention, but also perhaps as a potentially controversial competitor and usurper of faith.

Hence, while most treatments in the recent upsurge in Christian writing about positive psychology are largely (dare I say) positive, there is also a critical engagement with the field. There is both enthusiasm and disquiet in the secondary literature. It is a cause for celebration that many of the leading scientific contributors in areas such as humility, forgiveness, gratitude, hope, wisdom, and so on, identify themselves as Christians. Nonetheless,

there is some nervousness that this naturalistic and pragmatic approach to well-being and virtue could steer some away from genuine faith in the divine. Christian scholars are interested, but hesitant—as if they give two cheers for positive psychology.

Needless to say, Hackney covers all of the above clearly and accurately in the first section of this book. While there may have been several excellent books covering this area previously, in my view, this volume has some unique selling points. Firstly, it is a comprehensive introduction to the critical dialogue between positive psychology and Christian thought; Hackney does a very good job of covering many of the major concepts in contemporary positive psychology. Secondly, the reference list alone is worth the ticket price. It takes up over sixty pages and nearly a fifth of the entire volume. For those who want to explore the rich interaction between positive psychology and Christianity further and in more depth, the reference list will be a treasure trove.

Furthermore, the book is well organized, starting with the big picture in theology, philosophy, and psychology, then turning toward more-precise treatments of positive experience, cognition, personality, and relationships. It concludes with two vital areas of interest for positive psychology: its applications in sports education, the workplace, and religion; and an absolutely vital final set of chapters on the second wave of positive psychology (which has given more attention to the important dialectic between the positive and negative in life, a dialectic which prevents positive psychology simply being viewed as the study of positive thinking or a fatuous happy-ology). I particularly liked the title that Hackney offers to this final section: "the positive in the negative and the negative in the positive." It captures the spirit of the maturing field of positive psychology and makes for some more-nuanced treatments of the questions of sin and eschatology, the absence of which often bother Christians who consider the contribution that positive psychology can make to the life of faith.

It is also worth mentioning the style in which the book is written. It is easy to read, written in simple language, without dumbing down the technical theological and psychological nomenclature necessary for a scholarly treatment of the area. Hackney is not afraid to insert anecdotes and vignettes to enliven and illustrate the treatment of certain areas, and at various points demonstrates a reflexive stance by addressing the reader in the first person. Nor is he averse to a dose of witty humor; his subheading "Repent for the End (of this chapter) is Near" made me laugh out loud.

Overall this makes *Positive Psychology in Christian Perspective* an ideal entry-level text for the first-time reader. Previous volumes that have aimed to offer a relatively comprehensive analysis of the positive psychology-Christianity dialogue have been mainly multi-author editions or technical volumes written by and for theologians, philosophers, or psychologists. Hackney, however, seems to have pulled off a text that is both comprehensive and accessible. It is unlikely that advanced scholars interested in the field of positive psychology will read the book from cover to cover, but they will still no doubt benefit from dipping into the many pertinent insights that Hackney offers.

I assume that Hackney's principal audience comprises Christian students, undergraduates and postgraduates, all studying positive psychology for the first time, or wanting a Christian perspective on positive psychology. The increasing number of MAPP (Masters in Applied Positive Psychology) programs internationally often attract Christian practitioners, and Hackney has composed a very good accompanying text for helping them make sense of the alignment of their faith with their studies. For me personally, as a psychology professor working in a secular institution, it is unlikely to be the kind of volume that would appear on a reading list, but I already have in mind several students to whom I will be recommending it when I teach positive psychology in the spring semester. The book would be a perfect recommendation for pastors who are interested or concerned about positive psychology and would like to know more. Perhaps there is no better endorsement than that.

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TECHNOLOGY

DOI: https://doi.org/10.56315/PSCF9-23Hiestand

TECHNĒ: Christian Visions of Technology by Gerald Hiestand and Todd A. Wilson, eds. Eugene, OR: Cascade Books, 2022. 236 pages. Hardcover; $49.00. ISBN: 9781666704228.

The product of their 2019 conference of the Center for Pastor Theologians, *Technē* consists of fourteen contributed essays that seek to articulate important elements of the relationship between Christianity and contemporary technology.

The book is organized into two sections: Theological Reflections on Technology, and Technological Reflections on Theology. However, while one might expect a section of articles by theologians reflecting on technology, and then a section of articles by engineers and scientists reflecting on the implications of theology

for their work, this is not what the reader will find. Instead, the sections are best understood as "theoretical," focusing primarily on questions about the nature of technology and its relationship to the church, and "applied," focusing on specific technologies, fields of study, or theological methodologies.

The "theoretical" section of the book illustrates the divide between thinkers who are optimistic about the potential for technology to advance the faith (chap. 4) and those who are concerned about the impact that technology might have on the church or the Christian life (chaps. 1, 2, 3, 5, and 6). The book is relatively one-sided. Douglas Estes (chap. 4) and Jennifer Powell McNutt (chap. 14) both defend the adoption of digital technologies by the church, and while she does not make the argument in these terms, McNutt's article suggests that pastors should begin developing relationships with engineers working in information technology. However, Joel D. Lawrence (chap. 1), Nathan A. Brendsel (chap. 2), Andy Crouch (chap. 3), Christopher J. Ganski (chap. 5), Jonathan Huggins (chap. 6), Karen Swallow Prior (chap. 12), and Felicia Wu Song (chap. 13) are all much more cautious about the adoption of technology.

Estes claims that "the rot at the root [of Christian scholarship on technology] is the uncritical acceptance and appropriation of Martin Heidegger's ideas about technology" (p. 66). Certainly, Estes is correct that the discussion is heavily influenced by Heidegger's thought. However, this still allows for an array of views ranging from Lawrence's claim that we need to learn from the Amish (p. 13) to Crouch's distinction between *technē* as "the artful, cultural engagement in God's world" (p. 58) and *technology* (though perhaps "technologism" would be better) as a dream for a life of total ease and complete control brought about by near-magical technological artifacts. Certainly, we do need to *critically* interact with the Heideggerian roots of much contemporary writing on technology, and Estes's critique of Heidegger's thought is helpful, but perhaps we do not need to simply "exorcise Heidegger from our thoughts" (p. 74).

There is also a significant divide between two approaches that authors take to thinking and writing about technology. First, some want to speak of technologies or artifacts such as CRISPR, Digital Readers, or Virtual Reality Technologies. Second, others want to speak in terms of a technological worldview, social imaginary, culture, or society that shapes our motivations in interacting *with* technology. The concern of authors like Lawrence or Crouch is not primarily that eReaders are bad for our brains or that dishwashers are making us lazy. It is primarily that we have developed a milieu that prioritizes comfort, convenience, and ease as the highest good. The development of modern technologies has enabled a socio-culture perspective that enables and reinforces our idolatry of comfort, convenience, and ease.

The "applied" section addresses three specific contemporary technologies: AI (chap. 8 and 9), biotechnology (chap. 10 and 11), and social media (chap. 13). Neal D. Presa (chap. 8) defines AI as "a robot that functions autonomously" (p. 131) and focuses on the applications of AI in robotics. Missy Byrd DeRegibus (chap. 9) distinguishes between weak, strong, and super AI and focuses on the theological implications of strong and super AI. Nathan A. Barczi (chap. 10) and Jeff Hardin (chap. 11) both focus on applying theological insights to biotechnology. However, Barczi, a theologian, focuses on explaining the functional view of the image of God while Hardin, a scientist, focuses on explaining the process of embryonic development. However, their articles could both go much further in relating those subjects to the development of biotechnology. Song (chap. 13) provides a clear explanation of the ways in which social media is personally and morally deformative.

The three remaining articles are somewhat harder to categorize. Bruce Baker (chap. 7) provides a set of catechetical questions raised by new technologies and then attempts to answer them. Prior (chap. 12) argues for the importance of print reading over and against electronic mediums for reading. Finally, McNutt provides a detailed description of the important role that printers and the printing press played in the Reformation and claims that the same kind of relationship could be developed with the wide variety of digital technologies.

Some of the articles are excellent. For instance, Crouch and Wong both provide very persuasive and detailed arguments for their positions, and Estes gives an impassioned argument in defense of the adoption and use of technologies of many kinds by the church. However, some of the articles in the book miss the mark. As one example, Baker's catechism could be much more clearly organized. At the end of each question, he includes several scripture verses, but it is not always clear how they relate to his topic. This is perhaps most evident in question 8, which asks whether AI can be spiritual, but it is unclear how the passages he cites (Isa. 40:13, Job 5:9, and John 1:18, which appeal to the greatness of God) are related to the question. Further, the questions that he poses are good, but the answers he provides could be more clearly explained and supported. For instance, Baker argues against hard and soft materialism and dualism about the human person. He then endorses an "irreducible, intrinsic interdependence" of the human person, but if this is neither a version of soft materialism nor dualism, it is unclear what his position entails.

I was also surprised by what was not included in this book. The articles interact with two major streams of thought: (1) the Heideggerian analysis of a technological society read through a theological lens, and (2) what Evgeny Morozov labeled "technological solutionism," coming primarily through futurist writers and science fiction.[1] It is important to note that neither Estes nor McNutt are technological solutionists insofar as they do not claim that all human problems can be solved through advanced technologies. However, significant movements in the philosophy of information and technology are entirely ignored.

Two directly relevant examples are worth mentioning here. First, in the study of information and computer ethics, there is an important push to consider this field within the model of environmental ethics. The Italian philosopher Luciano Floridi has been a primary proponent of this view and has, at times, explicitly connected it with the idea of stewardship prominent in Christian environmental ethics.[2] Second, there is a turn toward the methodology of virtue ethics that is expressed both in scholarly and in professional work. Shannon Vallor has connected the ethics of technology with the Aristotelian virtue tradition, which has had many classical and contemporary Christian contributors.[3]

Further, the code of ethics of the Association for Computer Machinery places an emphasis on the moral character of computer engineers and opposes this to the common emphasis on strict rules to be followed.[4] There is, in turn, a strong Christian tradition of virtue thought, both Aristotelian and non-Aristotelian, that could be put into meaningful conversation with this turn to an ethic of virtue and character.

Finally, it is also worth noting that the book is preoccupied with digital and biotechnical technologies. While understandable, this preoccupation risks ignoring the significance of other areas of technological development such as transportation, energy, or construction technologies. This suggests to me that Christian theologians are, to some degree at least, overly focused on what we already know. We interact with important, but familiar, sources such as Jacques Ellul, Marshall McLuhan, and Neil Postman, but many of us are ignorant of the significant developments in both the philosophy and ethics of technology, and the actual potential of developing technologies. This book provides a helpful cross-section of current trends in Christian theological thought on technology, but it also suggests the need for Christian theologians to branch out.

Notes

[1]Evgeny Morozov, *To Save Everything, Click Here: The Folly of Technological Solutionism* (New York: PublicAffairs, 2013).

[2]Luciano Floridi, "Information Ethics," in *The Cambridge Handbook of Information and Computer Ethics*, ed. Luciano Floridi (Cambridge, UK: Cambridge University Press, 2010), 95.

[3]Shannon Vallor, *Technology and the Virtues: A Philosophical Guide to a Future Worth Wanting* (Oxford, UK: Oxford University Press, 2016).

[4]Don Gotterbarn, Michael S. Kirkpatrick, and Marty J. Wolf, *ACM Code of Ethics and Professional Conduct: Affirming Our Obligation to Use Our Skills to Benefit Society* (New York: Association for Computing Machinery, ACM Committee on Professional Ethics, 2018).

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Letters

A Response to Gary Emberger's Article

I appreciate Gary Emberger taking the spirit world seriously in his helpful article on God, evolution, and Satan ("The Nonviolent Character of God, Evolution, and the Fall of Satan," *Perspectives on Science and Christian Faith* 74, 4 [2022]: 224–39). I am among those few who do consider the concept of the angelic fall to be helpful in our understanding of "natural" evil. However, I have a few comments/questions that may further our understanding.[1]

First, as with much biblical language, references to evil spirits are fluid and often ambiguous, with multiple metaphors being used to describe them (interestingly, some refer to animals: wild beasts, locusts, serpents, scorpions). Hints of an angelic fall are scattered (the serpent of Genesis 3, the sons of God in Genesis 6, the fall of an exalted one in Isaiah and Ezekiel, and the apocalyptic expulsion of the dragon/devil from heaven) throughout scripture, and describe differing reasons, chronology, and locations of this fall. A primordial fall also requires acceptance of the gap or restoration theory of creation, which has limited biblical support. It remains a logical concept but can only tentatively be accepted.

Second, although I agree that God does not desire suffering and evil works in opposition to his will, I wonder if you (following Boyd) ascribe too much power to evil spirits. The Bible depicts them as disorganized, having limited freedom and abilities, and following Jesus's commands (not Satan's). There is only one reference to animals being demonized (pigs in the Gerasene demoniac) and it is Jesus who inflicts the evil spirits on the pigs. Boyd compares demons with "viruses that cannot

survive long on their own; they need to infect someone or something."[2] Viruses have some ontological status, but not autonomous personhood (although more could be said).

Third, in the Gospel stories, and in much anecdotal and theological literature, evil spirits are noted to be associated with, perhaps parasitic on, sin (e.g., Eph. 4:26, 27; 1 Tim. 3:6). Indeed, their ontology may increase when fueled by human sin. However, it is difficult to understand how creatures not made in God's image, without moral responsibility, can sin and thus allow an entry point for demons. Furthermore, should Christians, who are authorized to expel demons, be expelling demons from animals?

Fourth, all the deliverance stories in the Gospels and Acts have theological purposes—primarily to reveal Jesus's identity and purpose. As his kingdom advances (Jesus moves to unclean places), we see more demonic activity, since evil spirits work to thwart God's purposes, and hinder salvation. It is difficult to see how violent behavior in animals may interfere with the kingdom of God, other than in a very general sort of manner, such as suffering and human disillusionment.

Despite these points, I cautiously support the concept of evil spirits possibly being a causative factor in "natural" evil. We cannot dismiss everything that lacks scientific or clear biblical support. I suggest that a both/and or multifactorial approach is more fruitful.[3] Some events that are incompatible with God's character and will may be random (by-products of normal processes, similar to Polkinghorne's free process defense) whereas others may result from the interference of demons. Or, perhaps more likely, evil occurs due to some interaction between them, as well as human sin or abdication of responsibility. Perhaps demons are parasitic on negative natural occurrences making them worse. It may be interesting to note any association between human sin and "natural" evil—this may strengthen arguments for the role of evil spirits. (David Bentley Hart suggests this with respect to the 2004 tsunami.[4])

The issue is interesting but complex!

Notes

[1]See E. Janet Warren, "Chaos and Chaos-Complexity: Understanding Evil Forces with Insight from Contemporary Science and Linguistics," *Perspectives on Science and Christian Faith* 63, no. 4 (2011): 255–66; E. Janet Warren, *Cleansing the Cosmos: A Biblical Model for Conceptualizing and Counteracting Evil* (Eugene, OR: Pickwick Publications, 2012). In support of Emberger's nonviolent approach, I argue against the use of "spiritual warfare" language.

[2]Gregory A. Boyd, *God at War: The Bible and Spiritual Conflict* (Downers Grove, IL: InterVarsity Press, 1997), 195.

[3]See Warren, *All Things Wise and Wonderful: A Christian Understanding of How and Why Things Happen, in Light of COVID-19* (Eugene, OR: Wipf and Stock, 2021).

[4]David Bentley Hart, *The Doors of the Sea* (Grand Rapids, MI: Eerdmans, 2005).

E. Janet Warren
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Author's Reply

I welcome Janet Warren's identification with the "few" of us who consider an angelic fall helpful in understanding "natural" evil. Warren points out that the concept of evil spirits as causative factors in "natural" evils does not enjoy abundant, clear biblical support, but she is also wary of too quickly dismissing the concept on that basis alone. Indeed, as I attempted to demonstrate in my article, the plausibility of the concept resides in its resonance with the Bible's revelation of an unseen supernatural reality behind observed events, a reality where good and evil spiritual beings are in conflict. A reasonable and defensible corollary is that this spiritual conflict extends to deep time processes such as evolution.

Warren's comments about the complex causality underlying "natural" evil are well founded. Her suggestions about the parasitic nature of evil spirits and the usefulness of a multifactorial approach to "natural" evil are welcome and helpful. To be clear, the intent of my article was not to simplistically claim that all undesirable natural occurrences are the result of demonic activity; rather, my goal was to question the attribution of evolutionary evil to God's willful plan. Doing so, as explained in my article, is contrary to the character of God as revealed in the life and teaching of Jesus.

In an effort to better understand the complexity of this issue, Warren offers four comments/questions. I will comment on those aspects of her comments/questions most pertinent to my article.

First, I do not believe a postulated primordial fall of Satan requires acceptance of the gap/restoration theory of creation as popularized in the Scofield Reference Bible of the early twentieth century. This theory postulates a long gap of time between verses 1 and 2 of Genesis 1 in which an original creation (v. 1) was destroyed as a result of the fall of Satan, followed by recreation (v. 2). My article makes no mention of *when* Satan fell other than to indicate that a fallen Satan likely influenced or distorted the evolutionary process from early on.

Second, Warren suggests I "ascribe too much power to evil spirits." But why downplay their power? After all,

Jesus came to destroy the works of the devil, a being described as the *ruler* of this world and as holding the power of *death*. Certainly, the incarnation, life, death, resurrection, and ascension of Jesus to heaven has limited Satan's power in the present. But prior to Jesus's ascension, Satan and the other fallen angels apparently enjoyed considerable power and are portrayed as formidable foes (Dan. 10:13, Rev. 12:9). Pertaining to my article, the question to be considered has to do with their capabilities throughout evolutionary time—a matter of speculation, certainly, but the Bible offers little reason to underestimate Satan's power in primordial time.

Third, I agree with Warren's reluctance to think of animals sinning, thereby allowing entry points for demons. Nor do I think that Christians should be in the business of expelling demons from animals. The premise of my article is that evil spirit beings, working in opposition to God's will, distorted the evolutionary process resulting in the violence and suffering associated with evolution. The mechanisms underlying such distortions lie in the realm of speculation. My article does not suggest that, for this distortion to occur, it is necessary for demons to possess animals in the same manner as recorded for humans.

Lastly, Warren wonders how the "violent behavior in animals may interfere with the kingdom of God." Extending her tentative answers, I suggest that the attribution of the violence and suffering associated with the evolutionary process to God's willful intent presents not simply "human disillusionment" but, rather, a thoroughly contradictory portrait of God's character as revealed by Jesus. To suggest that predation, harmful mutations, cancer, deadly pathogens, etc. are all *God's ideas* and/or the only way God could have created, is to erect a substantial barrier, at least for some, to coming to faith and inclusion in the kingdom of God.

Warren rightly concludes that the causation of "natural" evils is complex. Mystery is interwoven with complexity. With no desire to downplay the complexity of the issue, a major goal of my article was to support the claim that the nature of the character of God is not part of that mystery or complexity. By ascribing the violence and suffering of the evolutionary process to evil spiritual beings working in opposition to God's will, God's good, loving, and nonviolent character is consistent throughout all time.

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