History of Science

REACHING FOR THE MOON: A Short History of the Space Race by Roger D. Launius. New Haven, CT: Yale University Press, 2019. 256 pages. Hardcover; $30.00. ISBN: 9780300230468.

Reaching for the Moon: A Short History of the Space Race joins a small swarm of recent books riding the surge of interest in the early space program, thanks to the fiftieth anniversary of Apollo 11. Given this spate of recent works, and the vast trove of related works already in existence, it is hard to imagine what new insights might be provided. On this count, the book is a pleasant surprise. Roger Launius concentrates on geopolitics, domestic politics, and bureaucratic structures, in the US and USSR, in the years leading up to the first moon landing in 1969. The juxtaposition of the American and Soviet programs throughout the first half of the book is a novel approach that makes for fresh insights. As for the technical information, there is just enough to provide important context for the primary political-history story (with a few regrettable misstatements along the way).

The book starts with the Soviet space program of the 1960s in parallel with the US program. Especially interesting is the oft-neglected Soviet program to land men on the moon. Although the Soviets denied the existence of this effort at the time in order to save face, the Russians have since owned up to its existence. Placing it in parallel with the American program provides instructive lessons. This is especially appropriate here since it is the geopolitical cold-war rivalry of the 1960s that drove both space programs. A major lesson to be drawn from the comparison relates to the devastating internal fighting in the Soviet program. This jockeying for political influence and resources is very relevant to the Soviet failure to land men on the moon before NASA.

The text also discusses the 1957–1958 International Geophysical Year (IGY) of planned international research projects, and the fact that each nation knew that the other was working on an Earth satellite well before Sputnik "took us by surprise" in 1957. This is frequently overlooked. The political and public reaction in the US—which led to the space race—is explained in some detail.

The material on Wernher von Braun, the most famous of the German rocket scientists brought to the US after WWII to help with rocket development, is not new but is frequently overlooked. His work for Hitler always haunted his reputation, but was largely washed away in his charisma and excellent work for the American program. However, it never completely disappeared and is discussed fairly here.

James Webb, NASA's administrator during the initial phases of Apollo, comes across as one of the heroes of the story, and rightly so. Although President John F. Kennedy (JFK) was not that much into space, and expressed the desire to only spend the minimum necessary to get to the moon, Webb held out and was able to get the resources to build a multifaceted infrastructure for space exploration, for which we continue to reap the rewards (Launch Complex 39 at Kennedy Space Center was used for the Apollo lunar launches, repurposed for Space Shuttle launches, and is now used by SpaceX). It is for good reason that the next great space telescope is named after him, even though his most obvious success was in shepherding the flights of Apollo.

The background of the actual decision by JFK to put the nation on the path to landing a man on the moon "in this decade" is perhaps the most compelling, along with the penultimate chapter on reflections about the meaning of the accomplishment. The comparison of the responses of Eisenhower (president at the time of Sputnik) and Kennedy (president when Gagarin made the first human spaceflight) is instructive. Along the same lines as his warning about the rise of the military-industrial complex, Eisenhower put the "surprise" Sputnik launch into perspective and warned against the rush to an overreaction. This was turned into a political liability by the ambitious Lyndon Johnson, who used it as a way to convey the Eisenhower administration as underestimating the existential threat to the US presented by the new domain of spaceflight. Kennedy capitalized on this and, along with unfounded claims of a "missile gap" between the two countries, made America's relative lack of prominence in space a major political issue. This led to inspirational rhetoric and resonated with the image of the young and vibrant new president. The embrace of a moon-landing program as a way to recapture America's preeminence was a natural decision. A lunar-landing mission had already been under study by the Space Task Group (the predecessor of the Johnson Space Center, led by Robert Gilruth), but it was always seen as part of a larger and more methodical program that included orbital flights and space stations. Apollo was a detour from this larger and more coherent vision. NASA and the US have lived with this dichotomy ever since: the impressive space spectacular contrasted with the methodical long-term development of spaceflight capabilities.

One theme throughout the book is that a major goal—if not *the* major goal—of Apollo was to demonstrate

Book Reviews

the superiority of the American system in marshaling resources for great accomplishments. This was not just for pride and prestige, but to sway nonaligned nations which were choosing which nation-system to follow. As Kennedy said in his speech to Congress announcing the lunar-landing goal:

> Finally, if we are to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did the Sputnik in 1957, the impact of this adventure on the minds of men everywhere, who are attempting to make a determination of which road they should take.

The goal is geopolitical persuasion, not science or exploration or heroism. That much is clear and undisputed. However, what is lacking is an objective assessment of the international impact on the "minds of men everywhere." Some anecdotes are provided as to the outpouring of international goodwill for the US after Apollo 11, but nowhere—in this book or otherwise—have I seen a popular account of the impact on unaligned nations.

By using human spaceflight as a tool for political ends, enormous resources were made available, but the public came to see space exploration as a series of spectacles. Anything less spectacular than Apollo was perceived to be an unfortunate loss of direction and lack of leadership by NASA—a sentiment that prevails even today. But Apollo is a hard act to follow. As the author points out, Apollo was a product of the times, and NASA did not seem to understand that; this left a "divided legacy as to the true meaning of the accomplishment and what it meant for the future of space exploration." It was astoundingly successful in the context of the time, and then the context changed.

Enthusiasm for space peaked when it was novel and heroic and geopolitically crucial. It is a mistake to think that there ever was a time that the American public overwhelmingly supported huge strides in human spaceflight in and of themselves. That is a sobering conclusion. It says much about us as a nation and makes one question just how bold and adventurous we are, as opposed to willing to take risks for pragmatic ends.

Apollo was a clear demonstration of technological prowess, which fed America's self-image as a great nation and contributed to a long sense of technological progress as inherent to American greatness and uniqueness. The technical virtuosity of Apollo was truly impressive, which also gave the impression that large government technology programs could solve any problem no matter how challenging. NASA reaped the rewards of this, and continues to benefit from this image, but NASA is also trapped by it since its resources do not match these expectations. Apollo was successful because it was constrained and bounded, the basic technology was understood and defined from the start, and no great conceptual leaps were needed for its fulfillment. The problems of world hunger and poverty are not so easily formulated.

That the Apollo moon landings still hold a fascination for us tells us something about ourselves, but what? To some extent, there is something for everyone, since the program was so wide ranging. Begun with purely political motivations, it touches on something much more fundamental, as explored in the final chapter. It has often been noted that seeing Earth in its wholeness from deep space was the start of the environmental movement. As T. S. Eliot stated, "We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time."

On a more regrettable note, some of the fascination with Apollo, in some quarters, is nostalgia for a time when America seemed to have a clear manifest destiny that was largely promulgated by white males. Also mentioned is the desire of many people to frame Apollo as a form of religious experience—humans touching the cosmos, reaching beyond physical limitations, and the like. This journal has previously published two of my reviews of books that attempted to make this religious connection, with little success. Apollo remains a major technical accomplishment, one of the most significant of the twentieth century, which was conceived under geopolitical necessity but continues to inspire and beg for more noble interpretations.

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THE CREATIVITY CODE: Art and Innovation in the Age of AI by Marcus du Sautoy. Cambridge, MA: Harvard University Press, 2019. 295 pages plus preface and acknowledgments. Hardcover; $30.00. ISBN: 9780674988132.

Following his international bestseller *The Music of the Primes*, mathematician and science popularizer Marcus du Sautoy, Simonyi Professor for the Public Understanding of Science at Oxford University, takes lay readers on a vibrant tour of the world of creativity and the history of attempts at automating the creative process. In so doing, he touches on deep questions of what it means to be human.

In his first chapter, du Sautoy poses what he terms "The Lovelace Test" of computer creativity, an analogy to the well-known "Turing Test" for determining machine intelligence, and in homage to computing pioneer Ada Lovelace. Lovelace's musings on the future applications of computers to creative pursuits form a recurring theme throughout the book.

> To pass the Lovelace Test, an algorithm has to produce something that is truly creative. The process has to be repeatable … and the programmer has to be unable to explain how the algorithm produced its output. (p. 6)

As for what counts as "creative," du Sautoy specifies that it must be *new, surprising*, and *of value*. Furthermore, "[f]or a machine to be deemed truly creative, its contribution has to be more than an expression of the creativity of its coder or the person who built its dataset" (p. 6).

So begins a discussion of *human* creativity, drawing on the work of cognitive scientist Margaret Boden, who identified three main types of creativity: exploratory (pushing the boundaries while keeping to the rules), combinational (achieving a synthesis by combining different constructs), and transformational (complete game-changers). Du Sautoy describes examples of these from the worlds of art, music, and mathematics, and notes that while computers may do well at exploratory and combinational creativity, transformational creativity is not yet well enough understood to be taught to humans, let alone machines. However, Boden believes that 97 percent of human creativity is of the exploration type, and thus machines present a potential "threat" that might overturn the human dominance in creative accomplishment.

Some might wonder what a mathematician knows of creativity, as du Sautoy concedes that "mathematicians are a bit of a misunderstood breed" (p. 145). In chapter 9, "The Art of Mathematics," he relates his quandary as a young man upon encountering the work of the great G. H. Hardy, who wrote in *A Mathematician's Apology* (Cambridge University Press, 2004),

> A mathematician, like a painter or a poet, is a maker of patterns … The mathematician's patterns, like the painter's or the poet's, must be beautiful; the ideas like the colors or the words must fit together in a harmonious way. (p. 141)

Du Sautoy confesses that, up to that point, "I'd never imagined mathematics to be a creative subject, but as I read Hardy's little book it seemed that aesthetic sensibilities were as important as the logical correctness of the ideas" (p. 141). Echoes of this appear in Douglas Hofstadter's famous *Gödel, Escher, Bach*

(Basic Books, 1979) and William Dunham's lovely *Journey through Genius* (Penguin Books, 1991), in which the great theorems of mathematics are presented as enduring masterpieces of art. To these discussions, du Sautoy adds the metaphor of mathematics as story: "I believe a good proof has many things in common with a great story or a great composition in that it takes its listeners on a journey of transformation and change" (p. 229). He ties this in with AI efforts toward story generation and essay writing. He even concedes at the end that a portion of the book's text was generated by an AI authorship tool.

It is an apt analogy, for narrative is a skill that du Sautoy shares with other successful science communicators, telling stories from history as well as from personal encounters with a host of leading computer scientists, artists, and musicians—names like art curator Hans-Ulrich Obrist and musician Brian Eno. Du Sautoy's lofty academic position provides him with the privilege of access to such luminaries, allowing for off-hand remarks such as the beginning to chapter 3 about the development of the *AlphaGo* program which soundly defeated the world's top-ranked player in the game of Go: "I was sitting next to [DeepMind co-founder] Demis Hassabis at one of the Royal Society's meetings …" (p. 218). Du Sautoy's personal story is woven throughout the book, from his own experiences in contributing to the mathematical study of symmetry to his appreciation for art and music. *The Creativity Code* contains narratives about the development of, if not *every* attempt at machine-based creativity, a vast panoply of major and minor systems throughout history: for example, from the dice-based compositional games of Mozart to the neural nets of *DeepBach*, from Gerhard Richter's *4900 Farben* to *The Next Rambrandt* of Microsoft and TU Delft, and from early choose-your-own-adventure stories to the interactive narratives of Mark Riedl's *Scheherazade-IF*.

Toward the end, the intensity and depth of feeling in the book escalate. After surveying developments in the fields of music, art, poetry, and more, he shares his own musings on mathematics via AI, in which one can feel his personal stake; for example, in concerns of computers taking over his livelihood. Remarks made earlier by artists and musicians about whether a computer-generated piece is not merely new, but also surprising and valuable, take on a new poignancy, as in his lament about the mathematical proof-generating program Mizar: "I left the DeepMind offices rather downcast … what I had seen was like a mindless machine cranking out mathematical Muzak" (p. 223). He then shares a quote from mathematician Henri Poincaré who might as

Book Reviews

well have been speaking of songwriting: "To create consists precisely in not making useless combinations. Creation is discernment, choice …" (p. 228).

Unlike his Simonyi Professor predecessor Richard Dawkins, du Sautoy demonstrates no antipathy toward religion, yet his musings on human identity and religious motivations for art ring, at times, strangely superficial in comparison to the other topics he covers so deftly. At one point, without any hint of irony, he tells a story about how religion arose from humans' need to tell stories to explain the world around them. Almost the entirety of the book is concerned with the *how* of creativity (i.e., in the processes), as well as concerns about the implications for the future employment of artists, writers, musicians, and, indeed, mathematicians in the face of AI advances. These lead naturally to the capstone final chapter, "Why We Create," in which he quotes from psychologist Carl Rogers and author Paul Coelho on the roots of creativity as a human need to communicate and to bind communities together. While du Sautoy doesn't go on to provide it, these reasons form a subset of a Christian response to the *why* of human creativity, for example, as seen in *Creator Spirit: The Holy Spirit and the Art of Becoming Human* (Baker Academic, 2011) by theologian/musician Steven Guthrie, who likens creativity to gift-giving: "God invites us into the ecology of gift that is at the center of God's own life … God's intention is that we would, like God, be agents capable of giving to others" (p. 158).

The Creativity Code is current with respect to AI developments up until the time it went to press. However, this was prior to the debut of the "transformer" language models in early 2019, which far surpassed many people's conceptions of the capabilities of generative language models, even inspiring widespread concerns regarding their potential misuse (for example, see J. Vincent, "OpenAI's New Multitalented AI Writes, Translates, and Slanders," *The Verge*, Feb. 14, 2019). Thus, in reading the later chapters on AI, language, and text-creation, one wonders how differently an updated edition of this book would read in light of these developments. With AI changing so quickly, it may be impossible to produce a book that will stand the test of time in every respect, and it remains to be seen what other "updates" the coming years will bring as far as AI's capabilities. Yet, as both a comprehensive historical survey and as an authoritative statement of values about creativity, du Sautoy's book will remain a significant contribution and should be read by anyone interested in the intersection of AI and creativity.

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MEDICINE AND HEALTH

CARE AND CURE: An Introduction to Philosophy of Medicine by Jacob Stegenga. Chicago, IL: University of Chicago Press, 2018. 248 + xiii pages, including bibliography and index. Paperback; $25.00. ISBN: 9780226595030.

As I began writing this review, our Minneapolis newspaper reported on the controversy that Blue Cross Blue Shield Minnesota raised when it decided to work with a for-profit contractor in South Carolina to use evidence based medicine (EBM) for prior approval of procedures that it will cover. Many physicians, hospitals, and patients are complaining that the newly aggressive denials are tantamount to fraud. This is the intersection of medicine, economics, and public policy and, according to Jacob Stegenga, philosophy of medicine can help us clarify the issues. He sees it as a branch of philosophy of science (he is a philosopher teaching in the Department of History and Philosophy of Science at the University of Cambridge) and defines philosophy of medicine as "the study of epistemological, metaphysical, and logical aspects of medicine, with occasional forays into historical, sociological, and political aspects of medicine" (p. 1). As defined, it covers a lot of territory, so an introduction that provides a map of the main issues and the controversies involved in them is very useful, and that is what Stegenga provides. He does not provide a detailed discussion, much less a resolution of all or any of the debates, but he gives an informed overview and a clear outline of the dueling positions and even of the intramural debates within them.

Part I, "Concepts," begins with chapters on health and disease: is the former simply the absence of disease or, more positively, the sort of flourishing that includes mental and social well-being? The reader will find problems (or, as Stegenga is fond of saying "puzzles") with either of these answers. And defining disease raises similar issues: both "naturalism" (disease is simply dysfunctioning physiological systems) and "normativism" (disease is a disvalued state), as well as the hybrid effort to mediate them, elicit enough puzzles that "eliminativism" tries unfruitfully to get along without a theory of disease. The role of phenomenology is to describe what it is like to be diseased, something even naturalists try to recognize with the category of "illness." Chapter 3, "Death," asks whether it is a biological event (such as the whole brain death of an organism) or a metaphysical one (higher brain death of a person). Some might like more detail here, especially when he dis-

cusses in a few pages whether one's death is bad for oneself (dating the argument as "going back to" Lucretius, when it actually goes back 250 years earlier to Epicurus) as well as the ethics of euthanasia and abortion. I think that he could have reiterated his decision to let medical ethics be its own field and have spent more time on the definitional issues, but he might reply that he is trying to provide only a high-flying overview or map of the debates.

Part II, "Models and Kinds," begins with an important chapter on nosology—the classification of diseases—that shows the puzzles involved in the three main theories: the *etiological* (with its three sub-theories about what it means to cause a disease), the *pathophysiological* (what biological mechanism is malfunctioning?), and the *symptoms-based* such as we find in the *Diagnostic and Statistical Manual of Mental Disorders*. A chapter on reductionism (biomedically disease centered) and holism (patient centered) gives the book its title: the former is aimed at *cure* and the latter at *care*. Medicine needs both.

Part III, "Evidence and Inference," is the most philosophically ladened section and the one I found most revealing. Chapter seven lays out what counts as evidence for the effectiveness of pharmaceuticals. Randomized controlled trials (RTC) are thought to be the gold standard, and meta-analysis amalgamates the outcomes from multiple studies. So why do meta-analyses of the same primary evidence sometimes reach contradictory conclusions? Here Stegenga provides what for me is his eye-opening summary of the sources of bias in medicine (perhaps 56 of them), of threats to objectivity, of distressingly common fallacies of inference, of problematic elements in claims of effectiveness, and of difficulties in decisions about diagnosis and the wisdom of screening. It is enough to make one skeptical and, indeed, in 2018, the same year as this book, Stegenga also published a book sympathetic to *Medical Nihilism* (Oxford University Press). His informed medical skepticism (a better, albeit less snappy phrase than medical nihilism) about the effectiveness of medical interventions, such as anti-depressants, can elicit both praise and blame, as seen here: https://aeon.co/essays/the-evidence-in-favour-of-antidepressants-is-terribly-flawed. If you click on the comments you will see the contours of the debate, as well as his willingness to engage his critics.

The final section, "Values and Policy," has a chapter on "Psychiatry: Care or Control?" that shows the difficulties in reaching agreement on diagnoses and treatments when decisions are based mainly on symptoms. The resultant room for social and political abuse of psychiatry is underscored. The chapter

on public "Policy" highlights the "10/90 gap": 90% of the world's medical research resources are devoted to studying diseases that affect only 10% of the world's population and, of course, it is the poor who are left to suffer the diseases that could easily be fought except that there is little financial incentive to do so. So, should medical research be socialized the way medical delivery is? The final chapter on "Public Health" raises the question of whether "prevention" should be added to "cure and care" as part of the mission of medicine. One problem is that most of the developments that prevent diseases are non-medical ones such as improved sanitation and clean drinking water. And when we consider preventative medicine, we encounter the problem of deciding how much mass screening (with its inevitable negative side effects) is worth how many lives saved. Stegenga does not raise the currently hot issue of vaccination and whether we should allow nonmedical exemptions that undermine herd immunity. This omission and others (is gun violence a public health issue?) underscore the fact that even a comprehensive map of philosophy of medicine cannot cover all the relevant issues in 250 pages.

Stegenga calls his approach "analytic naturalism," which connotes careful analysis of scientific ideas appealing only to empirical facts about nature and history (p. 3). As expected in analytic philosophy, the emphasis is on clarity and relevant distinctions. Indeed, he loves distinctions and subcategories, often saying, "Let's call this …" Sometimes I wondered if his labels are commonly accepted; for example, he refers to "Pre-Conscious Hypersomniferosis" (PCH) without defining it (he invites the reader to say which normal condition is being medicalized here), but when I googled it, the only reference I found was to this very book. The writing prizes clarity over eloquence, and prizes argument over consensus. Often in one paragraph, we find a claim, an objection or two to it, a response or two to the objection(s), and sometimes a reply or two to the response(s). This method gives a good overview of the debates, although it conveys the impression that we have an endlessly contested field.

Most of the book can be understood by laypersons, though at least one explanation—that of frequentism versus Bayesianism (theories of statistical inference)—presupposes more background knowledge than many of us have. And this was part of the very important points about the difference between "risk reduction" and "risk difference" and about the "base-rate fallacy," points that not only show how big pharma can commercially exploit the confusion, but also seem important to understanding problems

Book Reviews

with the use of EBM that I mentioned at the beginning of this review.

The "Note to Teachers" at the beginning of the book indicates that the main intended audience is college and medical school students. I think that the book could be an excellent supplemental text in college and medical school classes. In fact, the author lists his websites with sample syllabi for such courses. The readings listed at the end of each chapter are included (with links) in the syllabi; they are also the ones referenced in the chapters. Each chapter begins with a useful summary of the coming discussions and ends with discussion questions that tend simply to ask what the reader thinks about the arguments summarized. Anyone interested in the debates of the methodologies and effectiveness of contemporary medicine will find this clear and concise survey of the issues very useful.

Stegenga's "analytic naturalism" does not entail "metaphysical naturalism," which is the denial of any reality beyond the natural phenomena that science studies (though it can affirm that nature may well contain realities that are beyond what current science studies or can even imagine). But his approach does entail "methodological naturalism," which denies appeal to any supernatural realities. Many Christians in science accept the latter as intrinsic to doing science, and they will feel at home with Stegenga's approach. But even those who believe, say, in the supernatural power of petitionary prayer and see it as a legitimate part of medicine, can learn a lot from this well-informed study of the difficulties and limits of current medical practice and research.

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ORIGINS

JESUS, BEGINNINGS, AND SCIENCE: A Guide for Group Conversation by David A. Vosburg and Kate Vosburg. Farmville, VA: Pier Press, 2017. 101 pages. Paperback; $12.95. ISBN: 9780996991513.

David A. Vosburg, a chemist, and Kate Vosburg, an InterVarsity Christian Fellowship campus minister, wrote this small book for groups that want to have healthy, respectful conversations about faith and science. Their book is organized into three sections with four chapters per section—perfect for a twelve-week adult Sunday school class or small group study. Each chapter is only 5–7 pages long, so the book will accommodate busy participants who would not take the time required to read lengthy assignments in preparation for a discussion. The three sections focus on science in the context of creation/origins. Part one is entitled "What does the Bible say about creation?" Part two shifts the creation focus to humans in "What does the Bible say about human origins?" The last part pulls the focus outward to science and faith broadly in "What does the Bible say about science?"

This book is a call to reflect on biblical texts that can inform our understanding of the relationship between science and the Christian faith. It is a gentle, faithful, easily accessible, thoughtful starting point for a respectful dialogue.

This book is not a resource in which you can find scientific evidence for or against evolutionary theory or an old earth. It is not a place to find deep, complex theological or hermeneutical arguments, although it includes an extensive list of excellent additional resources if a leader, small-group participant, or reader wanted to dig deeper. It does make the argument that science and faith are not in conflict, but it does not argue for a particular point of view on origins. It does not explore other points of integration between science and faith such as creation care, medical ethics, or genetic technologies.

People considering using this book to lead a small-group study do not necessarily need extensive scientific or theological knowledge, but some background in one or both would be helpful, depending on how deeply participants might want to delve into foundational information and/or evidence. If, however, participants are generally open to a discussion of what scripture says about science, anyone could use this book to lead a group.

Jesus, Beginnings, and Science has many strengths. The authors bring expertise in both science and faith to each chapter of this book. They both have experience working with young people who are struggling to put science and faith together faithfully. Vosburg and Vosburg use Genesis but do not limit themselves to Genesis. They include Old Testament texts from Psalms, Job, and Isaiah as well as passages from the Gospels, Paul's letters, and Revelation. I appreciated that their use of the whole of the Bible naturally broadens any discussion of origins/creation out from a singular focus on the creation narratives of the first chapters of Genesis. The open-ended and thought-provoking questions they include for reflection and discussion are excellent. Each chapter incorporates scripture, prayer, and worship, which I imagine help keep a group focused on the unifying tenets of their faith, even if they are discussing something about which they might strongly disagree.

I have taught a number of adult discipleship classes at my home church, some on issues that involve science. Bringing science into the church and helping people talk about science and faith is important to me. I consider helping Christians who are non-scientists to integrate science and faith faithfully, a responsibility of scientists who are people of faith. I am glad that I found and read this book, and I will be adding it to the list of potential topics for a future adult discipleship class at our church. It is a class I'd be eager to teach, in large part because this is such an excellent resource. I hope more scientists pick up this helpful book and use it to facilitate discussion on *Jesus, Beginnings, and Science* in many contexts.

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Φ PHILOSOPHY

ON HUMAN NATURE by Roger Scruton. Princeton, NJ: Princeton University Press, 2017. 151 pages. Hardcover; $22.95. ISBN: 9780691168753.

The distinguished writer and philosopher Roger Scruton has written an admirable and clear account of what we might call the human difference in his book *On Human Nature*. It is, in some respects, a scaled-down version of *The Soul of the World* (Princeton University Press, 2014). As in his earlier work, Scruton takes aim at reductionist accounts of human beings, whether from evolutionary psychology, biology, or neuroscience. This is, probably, the strongest part of the book and of most interest to readers of *PSCF*, so that is where I will be concentrating my energies in this review. Though he draws upon other philosophic traditions, Scruton's main influence is Immanuel Kant; throughout his book, Scruton demonstrates the continuing relevance and contribution of the Kantian tradition to an account of personhood.

While Scruton accepts that we are biological beings governed by biological impulses and demands, he rejects the notion that reductionist views of human beings could ever capture, without remainder, our humanity. We are middling beings with one foot in biology and the other in culture. We have emerged from our biological past into personhood, and that means not just consciousness, but also self-consciousness, freedom, and moral awareness. Scruton uses an analogy to talk about the nature of personhood as an emergent reality. A portrait painter may work with lines and blobs of paint, and, looking at the painting, we may see mere lines and blobs, but assuming that the painter is skilled, eventually we shall also see a human face emerge from the canvas.

At some point, never mind when exactly, the number of lines and blobs "conspire" to become a face. There is, Scruton says, quoting Hegel, "a transition from quantity to quality" (p. 38). On the one hand, the face can be viewed as a property of the canvas distinct from the blobs of paint "for you can observe the blobs and not see the face, and vice versa" (p. 31). On the other hand, it can be argued that the face is *not* "an additional property of the canvas, over and above the lines and blobs." This is true because, as soon as we see the lines and blobs, we see the face. Scruton suggests that this is the way we should view our personhood: rooted in the life and behavior of the body, but not reducible to it. Put another way, Scruton believes that reality is multilayered, that some new and unprecedented whole can spring from the parts.

As persons, we come to exist in a new order of things with new potentialities. One of these potentialities is that we are free beings. The emergence of freedom opens a new relation with ourselves as a conscious center of self and a new kind of relation to others, as we realize that they, too, are self-conscious beings. We come to recognize that we not only have desires but that we can also evaluate those desires, asking ourselves whether those particular desires are worthy of being desired. This process of recognition and evaluation is the emergence of the ethical in us. For Scruton, the emergence of these things makes human beings qualitatively different from our closest living ancestors, the chimpanzee and bonobo.

Related to these points, but with a little different emphasis, is Scruton's discussion of "the intentional stance." The intentional stance means that we experience ourselves from the first-person perspective and can know and welcome others as sharing in our life when we address them as "you." Scruton takes issue with the "eliminative materialism" of Paul and Patricia Churchland, since they seek to dissolve the human self and agency in a welter of neurological soup. The first-person comportment so essential to Scruton's worldview is lost to a third-person account of synapses and the neurochemistry of the brain. No place for personhood here, let alone such things as intentionality or moral responsibility. Scruton is wary of the Churchlands' project since what is eliminated in their materialist account of the person is *the person*. For Scruton, the first-person stance peculiar to human beings is the essential ground of our ability to experience and appreciate "the second-person standpoint" (p. 50). The second-person perspective (in conjunction with the first-person stance) serves as the basis of our sense of moral responsibility to the other.

Book Reviews

Scruton ventures into an analysis of the nature of the political, a critique of utilitarianism ("moral arithmetic"), and the sacred, but space prevents me from considering these. Instead, let me close by turning to his engaging, Kantian-inspired critique of pornography. I turn to this topic chiefly for the way in which Scruton's analysis touches upon some of the important themes of the book, namely the emergence of the self and how this is related to the ethical dimension. Scruton makes the interesting point that porn depicts such a depersonalized space in which arousal and desire occur that observers are encouraged to regard themselves as if they were disengaged automatons, that is, non-selves engaged in using the other as a kind of apparatus. With porn, human agency and intimacy is banished since there is, in a sense, no "I" or "You" in relation, only "It."

> The real evil of porn lies not in its portrayal of other people as sexual objects but in the radical decentering that it effects in the sexual feelings of the observer. It prizes sexual excitement free from the I-You relation and directs it to a nameless scene of mutual arousal, in which arousal too is depersonalized, as though it were a physical condition and not an expression of the self. This decentering of arousal and desire makes them into things that *happen* to me, occurring under the harsh light of a voyeuristic torch instead of being part of what I am to you and you to me, in the moment of intimacy. (p. 74)

I do not know if this is the best book on the topic, but, in his many books, Scruton has surely done us a service in helping us to see the vital role that philosophy and the humanities must play in a world increasingly given over to the conviction that only the quantifiable is real, only the measurable is important. I recommend this book for undergraduate libraries in the humanities.

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THE ASHTRAY (OR THE MAN WHO DENIED REALITY) by Errol Morris. Chicago, IL: University of Chicago Press, 2018. xii–207 pages plus cast of characters, bibliography, and index. Hardcover; $30.00. ISBN: 9780226922683.

Perhaps you long have had your fill of reading Thomas Kuhn's *The Structure of Scientific Revolutions* [*SSR*] (University of Chicago Press, 1962, 1st edition) or one of the later three editions, as well as books or articles by his many philosophical and historical critics. *The Ashtray* by Errol Morris, the illustrious filmmaker and creator of such classics of documentary investigation as *The Thin Blue Line* and *The Fog of War*, provides an account that may reawaken your interest. This book revives an argument that Morris

had with the historian and philosopher of science Thomas Kuhn in 1972. And what a combative revival it is—complete with personal anecdotes, illustrations, film references, and interviews with philosophers and scientists. This book recalls a formative event: the tossing of an ashtray filled with cigarette butts and ash at a belligerent graduate student in the hallowed halls of the Institute for Advanced Study in Princeton, New Jersey—the event that led to Morris's expulsion from Princeton University and ended his intended study of the history of science. One could question: Should we even attempt to revive the past? Morris clearly thinks it is imperative that we do. Is it time, after almost half a century, for a student to take revenge on his former professor? Morris is not obtuse. He intends to launch a personal "vendetta" (p. 3, fn. 5). But why (the ashtray aside)?

In *SSR*, Kuhn outlined a revolutionary model of scientific change and examined the role of the scientific community in preventing and then accepting change. Kuhn's conception of scientific change, occurring through revolutions, undermined (or at least questioned) the traditional scientific goal of finding "truth" in nature. The picture Kuhn presents is one in which exemplary achievements yield a family of techniques constituting a paradigm which, in the course of its extension, proves appropriate for solving certain problems or puzzles.

A paradigm is not specifiable as a list of theoretical propositions or methodological rules; it is not developed by logical deduction from premises. Rather, the exemplar is learned as a model problem solution and is applied by analogy to what are judged as similar phenomena. To the extent that the problems presented by new phenomena are solved, the paradigm continues to be adhered to, expanding and modifying its range as time goes on. This is what Kuhn calls normal science. As exemplary problem solutions, paradigms are learned as ways of seeing and doing. Quite a lot of the process of scientific education, in Kuhn's view, consists of imparting unarticulated skills and interpretive dispositions. The required perceptual and motor abilities that apprentice scientists must learn cannot be fully spelled out as a set of rules.

Clearly there are circularities in Kuhn: "A paradigm is what members of the scientific community share, and conversely a scientific community consists of men [people] who share a paradigm" (*SSR*, 1970 edition, p. 176). The circularity could be avoided, he suggested, if the investigation were to begin with a discussion of the community structure of science. In his effort to explain a community's consideration of a paradigm shift or conversion, Kuhn appealed to

certain extra-scientific factors (or arbitrary elements), particularly the role of psychological factors. This appeal to subjective elements opened the door to an array of other factors: sociological, economic, political, feminist, and religious (worldview).

For Morris, Kuhn's appeal to these subjective factors is an assault on truth and progress, and ultimately leads to a "denial of reality." Kuhn questioned how language attaches to the world and challenged the nature of truth, reference, realism, and progress. For Morris, Kuhn is an avatar of post-modernism. Kuhn is one who advocates "that truth cannot be anything like correspondence to reality." With reference to the recent appeal of "alternative facts," Morris adds, "This book, I hope, will serve as an antidote to those poisonous views" (p. 3, fn. 5).

Morris spells out his own frame of reference: "For me, truth is about the relation between language and the world, a correspondence idea of truth." Other theories of truth such as coherence theories "are of little or no interest to me" (p. 4). Three areas of dispute are central to Morris's account: (1) the character of paradigm change; (2) the question of incommensurability; and (3) the affirmation or denial of reality. In short, Morris argues, Kuhn characterizes paradigm change as irrational, believes communication between those holding different paradigms is impossible, and denies reality.

The Ashtray is a potpourri of Morris's encounters with other scholars. Morris appeals to scholars who affirm his general position, such as Saul Kripke and Steven Weinberg. He enters into dialogue with Stanley Cavell, Noam Chomsky, Hilary Putnam, among others, attempting to understand their reading of Kuhn. One quickly notices that Morris is extremely selective. There is not a hint of recent work by Hans-Jörg Rheinberger or pragmatic thinkers such as Joseph Rouse, Richard Rorty, or Philip Kitcher. In a way, Morris is stuck in the past, attempting, it seems, to resurrect the arguments of the day when he was a graduate student. He is also wedded to an extremely one-sided reading of Kuhn. Kuhn clearly does not deny reality. Puzzle-solving would make no sense if there were not a reality that pushes back. And Kuhn does, in fact, hold to a notion of truth. In his Rothschild lecture (Nov. 19, 1991), Kuhn states:

> [If] the notion of truth has a role to play in scientific development, which I shall … argue that it does, then truth cannot be anything quite like correspondence to reality. (*The Trouble with the Historical Philosophy of Science* [Harvard University Press, 1992], p. 14)

If Morris's reading of Kuhn's *SSR* (a "postmodern bible," p. 20) is indeed accurate—namely that it leads to relativism and a denial of reality—then this could raise a pressing issue for evangelical Christians. As the philosopher James K. A. Smith expresses it in his book *Who's Afraid of Relativism?* (Baker Academic, 2014):

> If all our knowledge is contingent, social, dependent, and relative, then isn't God contingent, a product of our creative impulses … Doesn't Christian faith require that our claims about God "correspond" to the reality of God? (p. 101) [Smith denies that it does, in the sense of a correspondence theory of truth.]

For anyone wanting to relive some of the philosophical arguments from the recent past, see how one's life work could be evaluated, judged, even sabotaged, by a succeeding generation, read this book. *The Ashtray* does provide a challenge. Clearly a naïve realism is no longer viable, but what should take its place? We need, it seems, a richer and more expansive view of truth that encompasses the notion of "factual truth" so dear to the natural sciences, but which is much broader in scope and includes understanding truth as *being* true, as a way of life. Kuhn was aware of that, as he clarifies in *The Road Since Structure* (University of Chicago Press, 2000), "I wasn't saying that I want to know what is true; I was saying I want to know what it is to *be* true. And that's not something that one gets from physics" (p. 278).

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SCIENCE AND RELIGION

A RECKLESS GOD? Currents and Challenges in the Christian Conversation with Science by Roland Ashby, Chris Mulherin, John Pilbrow, and Stephen Ames, eds. Eugene, OR: Wipf & Stock, 2019. 338 pages. Paperback; $37.00. ISBN: 9781532687389.

How do Christians in science around the world think about science and faith? What issues do they find important and why? What strategies do they use to address those issues? How do regional and local perspectives help shape the conversation? *A Reckless God? Currents and Challenges in the Christian Conversation with Science* edited by Roland Ashby, Chris Mulherin, John Pilbrow, and Stephen Ames does not seek to answer these questions—at least not for the entire world. Instead, it seeks to provide a window into the science-faith conversation that has been taking place through the Institute for the Study of Christianity in an Age of Science and Technology (ISCAST), the main organization for Christians in the sciences in Australia. Indeed, it is the first book in the ISCAST Nexus series, published in Australia

Book Reviews

by Morning Star Publishing—a series which at present also includes Mark Worthing's *Unlikely Allies: Monotheism and the Rise of Science* (Morning Star, 2019).

In between Jennifer Wiseman's foreword and Rodney Holder's reflective afterward, *A Reckless God?* consists of a collection of 67 pithy essays, interviews, and book reviews written by 35 mostly Australian contributors, some of which have been published in various forms elsewhere and including a high proportion contributed by the editors themselves. The essays are loosely organized into topics that include the historical relationship between Christianity and science, the New Atheism, natural evils, technology and creation care, psychology and spirituality, biographical examples, reflections on the prospects and state of the science-Christianity relationship, design and fine-tuning, and evolutionary biology and genetics.

Together, the essays touch on almost all aspects of the contemporary academic science and religion conversation, although some topics are noticeably absent and many others are only touched on tangentially or in passing. The book begins with an essay by Peter Harrison arguing that, contrary to myths of conflict between science and Christianity, the historical record suggests the two mutually reinforced each other. Other themes which form a common backdrop to the essays include the importance of Christian theology as a theoretical underpinning for science and a means of answering questions of meaning and existence which lie outside of science; an openness to God's "reckless" working through evolution as consistent with creational theology and the overall plan of redemption revealed in the scriptures; a willingness to see issues as answerable through a combination of reasoned philosophical discussion and the gospel; and the church's living out the gospel in the world.

Collectively, the essays lay out a convincing and impressive case for the consistency of science's picture of reality and orthodox Christianity. Readers who are open to the viewpoints represented will be both exposed to a substantial body of recent science-faith conversation, and also left with an increased appreciation of the importance of science and technology in the church's mission. They will be encouraged to see science as a means of enriching our understanding of God's character and working; to understand science-informed technology as an opportunity for created co-creators to leverage scientific knowledge in stewardship of the created order; and to delight in science-faith dialogue as an opportunity to better

discover how to faithfully live as Christ's disciples in the midst of a secular age.

Despite these impressive achievements, however, the book should not be used haphazardly as a tool to convince either unbelievers or Christians who are apprehensive over nonliteral readings of Genesis. The authors write from a distinctly Anglican background and generally assume that their readers are Christians open to an evolutionary creationist viewpoint. Thus, although some time is spent in carefully arguing for their views against those of the New Atheists, biblical literalists, and the sort of intelligent design arguments put forward by the Discovery Institute, the essayists tend to present their arguments as if to insiders, sometimes creating a seemingly ungracious us-them dynamic.

Several other limitations should be noted. First, the book is written in an informal style and freely invokes Australian public figures and jargon that will be unfamiliar to most North American readers. Second, despite the frequent use of quotations and occasional references to the impressive array of literature that might be cited in support of an idea, *A Reckless God?* lacks any sort of endnotes, footnotes, or index of its own. Third, very little science is explained in depth. Generally, this helps keep the focus on the theological dimensions of the conversation. However, at times it results in a distorted view of the relevant science. Particularly notable instances involve fears of humanity being supplanted by robots, and parapsychology's commendation by a few intellectual luminaries as sufficient reason to render it as a "gift horse," which religion should not dismiss out of hand (p. 153). Finally, the book as a whole could have used much tighter editing. Often there were two very similar essays or a series of essays that repeatedly drove home the same point. Sometimes authors seemed to lose their train of thought, moved from idea to idea without really developing any one of them, trailed off in a barrage of seemingly tangential questions, or allowed a provocative statement to stand without further explanation or development. For example, on page 105, an essay concluded by noting that "we need a genuine, working theology of the computer" without even suggesting how we might go about developing one. On page 112, readers were told that altruistic behavior among hyenas "impinges on our divine mandate to bear the image of God" as if it were self-evident what that might mean.

However, for readers who are willing to look past these weaknesses, the book offers a rich menu of food for thought and, read carefully and perhaps selectively, could serve as an excellent resource

for book discussion groups, college classes, and anyone looking to get a sense of the science and religion conversation or seeking to develop a vision of what themes might be fruitfully integrated into the North American evolutionary creationist science and religion dialogue. In this respect, the authors and editors of *A Reckless God?* are to be commended for their willingness to offer these nuggets from the Australian conversation about science and religion to the wider world.

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TECHNOLOGY

BITWISE: A Life in Code by David Auerbach. New York: Pantheon Books, 2018. 304 pages. Paperback; $16.95. ISBN: 9781101972144.

From its subtitle, one might expect this book to be an autobiography of its author, David Auerbach. It actually includes some of that, but also quite a bit more. The author devotes over half the book to musings concerning the intersection between the humanities and technology. As he says about himself,

> I have kept my feet in multiple social environs simultaneously, most often through a combination of humanities and technology work … The exactitude of computer science provided me with useful checks on linguistic hot air. Humanistic fancy, however, enabled me to figure out what I was doing in this technocratic labyrinth, and to ask myself why I was doing it and where it was going. (pp. 80–81)

As a student, Auerbach's studies included literature and philosophy along with computer science. Professionally, he worked as a software engineer at Microsoft and Google when he was in his twenties, and is currently a writer on technology for a number of publications including *Slate* and, most recently, *Tablet*.

About two-thirds of the way through the book, Auerbach discusses the tension that led to this change in career focus. While working at Google, he became increasingly aware of the difference between a web page as data to be analyzed (the focus of his work at Google) and the *meaning* of that page. He further wrote,

> I was also distressed by the disconnect I felt between my work and reality. The god's-eye view of the world's data had numbed my relations to the world … Even in 2008 there was an increasing sense that we, the engineers, were in a significant way other from the people who used our work. (p. 194)

The author devotes several chapters to developing the key idea behind many of his musings: the contrast between discrete encoding of data (which computers manipulate as numbers), on the one hand, and meaningful descriptions, on the other. He illustrates this contrast by encodings for personality types (e.g., Myers-Briggs), attributes such as gender (57 different options in Facebook as of the time of writing), and role-playing game character attributes. He devotes most of one chapter to an extended discussion of the evolution of the encodings for disorders in the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* in its third, fourth, and fifth editions. (Both the author's parents were psychiatrists, and he became familiar with this system at an early age.)

In the last chapter, Auerbach discusses factors contributing to the drive for discrete encodings:

> The categorization and taxonomizing of human beings was not itself a new trend … the emergence of mass computation in the latter part of the twentieth century enabled large-scale, centralized classification of *individuals* … driven by national defense and advertising. (p. 225)

He takes agencies like the NSA, CIA, and TSA to task for using what he calls a "vacuum cleaner" approach to collecting data while being unable to analyze it properly (p. 226). He cites Facebook as the "centralization point for the *collection* of personal information in order to target individual consumers" (p. 229). He lists 98 axes along which Facebook can segment data; these are sometimes based on information voluntarily posted by users and others based on "information obtained from third-party sources such as car registrations, residential information, and corporate information" (p. 232).

Along the way, Auerbach muses about other matters as well. For example, in the chapter titled "Programming My Child," Auerbach begins by saying, "A few years after leaving Google, I started another long-term engineering project which is still ongoing" (p. 199). He continues by describing his daughter's newly learned skills as "upgrades" and bodily growth as "chassis replacement." This serves as a precursor to musings on similarities between individual humans and network systems such as Google and Facebook. A key characteristic of such systems is that, like persons, while individual algorithms can be replaced, the system as a whole can never be reset once it is started.

For the *PSCF* reader who is concerned about how personal data is increasingly being collected and analyzed by organizations such as Google and Facebook,

this book is an interesting and perhaps frightening exploration, written by a person who has been inside one of them. In this reviewer's opinion, though, it is marred by what seems to me to be overly long and sometimes irrelevant digressions.

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TRANSHUMANISM

TRANSHUMANISM AND THE IMAGE OF GOD: Today's Technology and the Future of Christian Discipleship by Jacob Shatzer. Downers Grove, IL: InterVarsity Press, 2019. 192 pages. Paperback; $22.00. ISBN: 9780830852505.

Most people have thought about how they would like to change themselves—get more sleep, read more, eat healthier, learn a new programming language, or master combinatorial proofs. A growing number of people have radical ideas about improvement: grow a tail; replace their eyes with optics that have zoom capabilities and can capture the infrared and ultraviolet spectrums in addition to what humans normally see; integrate memory chips and internet connectivity directly with their brain; or copy/transfer their mind to a computer or android body.

The book *Transhumanism and the Image of God* examines these more extreme ideas about human improvement. The author, Jacob Shatzer, is a theology professor at Union University in Tennessee. Shatzer's footnotes provide a rich collection of other documents that the interested reader can explore. He defines the related notions of "transhuman" and "posthuman" and carefully introduces the main ideas behind these terms—using the words of their proponents. He also provides the reader with ideas to help consider these topics from a biblical perspective. Here are some brief definitions:

> Posthumanism argues that there is a next stage in human evolution. In this stage, humans will become posthuman because of our interaction with and connection to technology. Transhumanism, on the other hand, promotes values that contribute to this change. … In a way, transhumanism provides the thinking and method for moving toward posthumanism. … Transhumanism is the process, posthumanism the goal. They share a common value system … (pp. 12, 16)

The first half of the book explores, in some depth, the major components of the transhumanist vision. After a chapter that sets forth the basic concepts of transhumanism, there are three chapters that consider "morphological freedom" (using technology to modify and enhance the human body), "augmented

reality" (using technology to modify and enhance the human brain or the mind), and "artificial intelligence (AI) and mind uploading" (creating intelligent nonhuman beings and moving the human mind to a different medium).

The second half of the book examines where we are now. Those chapters look at ways in which our current technologies and habits contribute to a willingness to embrace the transhumanist agenda. He also introduces practices that would counter those inclinations.

Two concepts are foundational to the entire book. First, Shatzer asserts that there are two ideas that are essential to all the variants of transhumanism. He summarizes these two ideas in the following sentence:

> If we had to boil transhumanism down to two features, they would be an optimism regarding the possibility of radically altering human nature via technology and belief in a fundamental right of an individual to use technologies for that purpose. (p. 53)

The belief in a fundamental right to use technology to change oneself places the individual at the center of the transhumanist value system. Shatzer presents statements by transhumanists that indicate a responsibility toward others. The following two extracts from the Transhumanist Declaration indicate the direction of that concern:

> Policy making ought to be guided by responsible and inclusive moral vision, taking seriously both opportunities and risks, respecting autonomy and individual rights, and showing solidarity with and concern for the interests and dignity of all people around the globe. We must also consider our moral responsibility towards generations that will exist in the future. (p. 51)

> We favor allowing individuals wide personal choice over how they enable their lives. This includes use of techniques that may be developed to assist memory, concentration, and mental energy; life extension therapies; reproductive choice technologies; cryonics procedures; and many other possible human modification and enhancement technologies. (p. 53)

But Shatzer argues that ultimately "this final statement in the Transhumanist Declaration makes the primary element in decision making clear: individual choice" (p. 53).

The second foundational idea that underlies the book is that tools are not neutral. Referencing Richard R. Gaillardetz, Shatzer says, "Tools aren't neutral; rather, they encourage us and shape us toward certain goals, and they often do so in hidden ways" (p. 8). This is an assertion that a majority

of my students disagree with upon first encounter. Here are some of the examples that Shatzer uses to reinforce his claim.

• As we play video games, we perform actions, resulting in learning new skills and reflexes (p. 67).

• "Creating a self in a virtual world can lead one to value certain ways of creating the self in the real world. In this way, virtual worlds induce us to be more open to the values of transhumanism" (p. 68).

• Our use of current weak AI predisposes us to value convenience and ease over human interactions (pp. 106, 147). (As I was reading this page of the book, my Roomba was cleaning the floor in an adjacent room.) If it is easier to have an AI respond to my voice commands, why not extend this to having a robot or android personal assistant? We can avoid the messiness of human interactions by using a technological replacement that never has a bad day and never argues with me.

• People are already sharing much about themselves on social media. It may not be too large a leap to consider creating a "mind file" that may eventually be copied onto a computer, thus creating a replica of oneself (p. 107).

• Social media and virtual worlds appear to be providing us with a richer variety of interpersonal contacts. But the reality is often the opposite—we choose a group of people to interact with who are almost identical to ourselves. We select by age, by interests, by shared views, and by income level. This predisposes us to eventually welcome reality filters: for example, a brain enhancement that could filter undesired objects and people from our perception in the same manner that a spam filter hides unwanted email (pp. 148, 79).

• Quoting Naomi Baron, Shatzer writes, "Computers, and now portable digital devices, coax us to skim rather than read in depth, search rather than traverse continuous prose" (p. 160).

• "The internet has led to shorter attention spans and difficulty processing longer written arguments" (p. 162).

• Spending time on internet-connected devices is a way of selling (cheaply) our attention. The point of social media sites such as Facebook is not to connect us to friends; it is to capture detailed information about ourselves that can be sold to marketers. "What we pay attention to shapes who we are, and our technology offers some very immersive ways to pay attention to who others want us to be, and then it provides us with ways to shape ourselves and present ourselves in that vein" (p. 167).

These changes are already shifting our perceptions of reality in dramatic ways. In a recent conversation, my friend said, "Homosexual used to be a behavior; now it is an identity." The implication is that sexual orientation is a fluid construct that a person chooses and can change at any time. This is in line with the transhumanist value of humans having a fundamental right to shape themselves, often using technology, into whatever form they desire.

How does God fit into this? Shatzer introduces a number of key ideas on how we might apply our understanding of and relationship to God to attitudes and practices promoted by transhumanism. One idea that is foundational is to recall that Christians are no longer the central, autonomous decision makers—they owe allegiance to God. His call on our lives takes precedence. We have a calling to fulfil (pp. 29, 30, 97).

In the second half of the book, Shatzer suggests various ancient practices that help center us in the reality that God has created and that help us form genuine communities. He discusses such practices as storytelling, gardening, homemaking/hospitality, communion and shared meals, and attention to friends.

This book is worth a serious read. I chose to read just one chapter per day in order to have time to reflect on the rich collection of ideas in each chapter. If transhumanism is a topic that is unfamiliar to you, this book is a great place to start building a solid understanding.

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