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the author describes himself and his literary task thus: "A man who sets out to justify his existence and activities."

No sensitive Christian reader can pass over those words without a profound sense of sadness. True, Hardy's "justification" is not exactly the δικαιοσυνη of the Epistle to the Romans. Yet, true also, Hardy does not welcome the idea that the real justification at the heart of life is received as an unmerited gift. Indeed, *A Mathematician's Apology* is poignant precisely because it combines the defense of mathematical fame (for those few who are capable of achieving it) with the fear that even this "safest and soundest of investments" may not endure. "How painful it is to feel that, with all these advantages, one may fail …"

Ken Ono's heart-wrenching autobiography bears a subtitle with a double meaning: "How I Learned to Count." On one level, this is a capsule description of the combinatorial aspect of Ono's mathematical work. "Combinatorial" refers to counting patterns or arrangements of some kind, such as the *partitions* which are frequently mentioned in the text: a partition of an integer (such as 6) is simply a way of writing it as a sum of smaller integers (such as 1+2+3). The number of different ways of partitioning a given integer, like 6 in our example, is called $p(6)$, and the behavior of p, the *partition function*, has many surprises and unexpected depths. On another level, this is the story of how the author learns that he himself counts as a human being, and that (contrary to what a reading of Hardy might perhaps suggest) his significance is not measured simply by the abundance of his mathematical achievements. These stories are interwoven with one another and with a third one: Ono's interaction with the work of the enigmatic genius Srinivasa Ramanujan, who was "discovered" by European mathematicians when he wrote to Hardy in 1913 and who, upon his early death from tuberculosis, left for posterity a huge collection of mysterious formulae (most without a sketch of a proof, most subsequently turning out to be both true and profound) which he believed had been revealed to him by the goddess Namagiri. (Ramanujan's story was recently dramatized in the movie *The Man Who Knew Infinity*, and the story of Ono's work as mathematical consultant to this movie serves as a kind of coda to his autobiography.)

Ono shares with us that he was raised by Japanese-American "tiger parents" determined that their son follow the path they had marked out to the goal they had determined was best for him: that of becoming a distinguished professional mathematician. He writes:

> They wanted their boys to be hungry for success, so they starved us of praise … At school, I was a star student; at home, nothing I did was good enough. [My parents] saw no point in acknowledging such insignificant achievements as straight A's on a report card … I awoke each day with painful thoughts. I will never be good enough. I am an impostor. My parents will never love me because I can never live up to their expectations … And so I dropped out. (p. 11)

Today, Ono is indeed a distinguished professional mathematician, although he did not arrive by the path his parents had mapped for him. His book contains heartfelt tributes to friends, family, and professional mentors who helped him recover his life's purpose. Behind all of these stands the figure of Ramanujan, whose story Ono retells in this book: a story which deeply influenced his father's life and subsequently his own. "Ramanujan's story showed me that there might be a way to earn my parent's respect that didn't require following the rigid script that they had written for me" (p. 49). In fact, Ramanujan's story opened his heart, and perhaps his family's heart, to the possibility of grace.

How do I count? How do I *know* that I count? I suggest that in the parables of Luke 15, Jesus shows us that to count is to be embraced by the love of Abba, the Father who runs to welcome the strayed one home. Jesus warns us also, through the figure of the elder son in the story, that we can misperceive this love; we may regard it as something to be earned or "slaved for," and as a result live with a sense of hollowness, of never having done enough. Ono courageously describes his own journey from this hollowness to this grace, and he (raised agnostic from the cradle) chooses to conclude the story with his request to receive baptism and join a church community in 2004, in his middle thirties. This is a brave and passionate autobiography, combining the academic and the deeply personal. Strongly recommended.

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THEOLOGY AND SCIENCE FICTION by James F. McGrath. Eugene, OR: Cascade, 2016. viii + 113 pages, bibliography, no index. Paperback; $17.00. ISBN: 9781498204514.

Is there a Creator God who made all that exists out of nothing? Has God evolved along with the cosmos? Are godlike beings actually advanced aliens whose science and technology appear supernatural? Will humans develop godlike power? Will we be superseded by artificial super-intelligences? Will robots develop souls? Will Christianity survive encounters with extraterrestrial cultures in the spacefaring

future? How will earthly religions change in centuries to come? What if some alien worlds never fell from grace? Such big questions have long been raised by philosophers and scientists, as well as by theologians and science fiction writers.

That science fiction and theology intersect in many ways may surprise, but it shouldn't. Both often express a sense of wonder, and even awe. Both seek self-understanding and awareness of our place in the cosmos. Both are fascinated with the Other and the New, with intimations of the sacred, the transcendent, the divine—with the Mystery beyond human knowing and imagining. Both are curious about life and death, origins and endings, the deep past and far future. Both address changes and continuities in ideas, beliefs, values, and practices. Both address our hopes and fears, anxieties and dreams. When science fiction writers wrestle with moral questions, with the search for "forbidden knowledge" or the powerful possibilities and pitfalls of "playing God," with utopias or dystopias, with vivid apocalypses or epic, multigenerational journeys, with demons or messiahs from the heavens, they signal a deep debt to the Bible as an ancient and continuing source of images, characters, plots, tropes, and themes for storytelling. I have long used my training in biblical exegesis in the analysis and interpretation of science fiction (and scientific) texts; this is but one reason why I found the background of the author of this brief but stimulating discussion so appropriate.

James McGrath is a New Testament scholar and science fiction enthusiast who previously edited a wonderful collection of scholarly essays, *Religion and Science Fiction* (2011), as well as *Religion and Doctor Who* (2013). The slim volume under review (there are only 92 pages of text, with the first and last pages of each chapter filling only a half-page or less—not counting a short preface and three concluding, very short fictions) is full of interest and insight. Each chapter ends with questions for reflection. Mary Shelley completed her incredibly influential novel *Frankenstein* in 1817; it at once established science fiction as *the* literature of the modern age of science and technology and set it upon a century-spanning trajectory of engagement with the world of myth and religion. Sadly, there was no space for McGrath to reflect on this, nor to provide much context or description of texts the reader might not be familiar with.

In his helpful introduction, McGrath defines his terms and the limits of his study. He regards Ian Barbour's famous four-fold typology of science-religion relations as useful for his purposes. I would agree that it makes a good starting point for analysis,

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although the model is quite problematic from a history of science perspective. In his second chapter, McGrath offers a good introduction to the nature of canonicity with respect to the Bible, *Star Wars*, and *Dr. Who*. Also included are practices such as pilgrimages and ritual clothing, which cut across the worlds of religion and science fiction/comic book fandom. "Science Fiction against Theology and as Theology," the focus of chapter three, is a fine discussion deserving of a book-length analysis. Antireligious science fiction is not really addressed, nor satires such as John Kessel's *Good News from Outer Space* (1989) and Marcos Donnelly's *Letters from the Flesh* (2004). A few quibbles: it was shocking to find no account of Olaf Stapledon's mind-blowing 1937 masterpiece, *Star Maker* (see the 2004 scholarly edition, edited by Patrick McCarthy). On p. 45, Christmas is mentioned, but no classic science fiction stories are cited. On p. 46, McGrath quite rightly states that Christians have many ways of incorporating the discovery of extraterrestrial intelligences into their theologies. But he cites none of the theological literature produced by Ted Peters and others; for a recent example, see *Theology and Science*, vol. 15 (May 2017). In a comprehensive treatment of this subject, one would learn about D. G. Compton's *The Missionaries* (1972), Philip José Farmer's *Father to the Stars* (1981), and many other examples.

Chapter four, "Theology against Science Fiction and as Science Fiction," is another brief but illuminating angle on the relationship, addressing such questions as apocalypse, afterlife, miracles, and how theological ideas can be expressed in science fiction. The discussion, given the publisher's constraints on the author, is good, but is neither specific nor detailed enough. The fifth chapter, on philosophical/ethical issues (e.g., soul/mind/sentience/personhood, the Golden Rule, eternal life, digital immortality) is also very interesting—if too general for my taste. The scholarly literature is ignored, as are countless primary texts (to be fair, the author's modest aims are made explicit, e.g., p. 80). The sixth and last nonfiction chapter, on how science fiction can inform theology, and how theological science fiction can critique scientism and dogmatism, was my favorite. McGrath's message of treating "the alien" with hospitality, love, justice, and humility is—given the global refugee crisis—both timely and biblical.

McGrath's bibliography has eighty-three items, with curious omissions. The short story occupies a central place in the field, so it is quite right that *Other Worlds, Other Gods: Adventures in Religious Science Fiction*, edited by Mayo Mohs (1971), is mentioned. But it is a shame that there was no room to cite Roger Elwood's anthologies *Flame Tree Planet* (1973) and

Strange Gods (1974); or Harlan Ellison's *Dangerous Visions* collections (1969–1972); or *Wrestling with Gods* (2015), edited by Liana Kerzner and Jerome Stueart, to name a few. Apocalyptic/post-Apocalyptic stories cut a huge swath in the literature of religious science fiction. Examples are legion: perhaps the classic atomic-age text is *A Canticle for Leibowitz* (1959) by the Catholic writer Walter M. Miller Jr. It is missing from McGrath's book, but I would recommend it highly, along with Rose Secrest's scholarly study *Glorificemus* (2002). C. S. Lewis's *Out of the Silent Planet* (1938) makes the bibliography, but not the rest of his *Space Trilogy: Perelandra* (1943) and *That Hideous Strength* (1945), nor his story collection *The Dark Tower* (1977), nor his essays *Of This and Other Worlds* (1982). McGrath cites Dan Simmons's *Hyperion* (1980) but not the rest of the saga: *The Fall of Hyperion* (1990), *Endymion* (1995), and *The Rise of Endymion* (1997). Mary Doria Russel's brilliant first-contact-with-intelligent-extraterrestrials meditation on faith, science, and theodicy, *The Sparrow* (1996), is included but not its perspective-shifting sequel, *Children of God* (1999). Robert J. Sawyer's *Calculating God* (2000) is listed, but none of his many other books wrestling with moral and theological questions. Although the idiosyncratic beliefs of science fiction giant Philip Dick receive scant attention, McGrath does cite Gabriel Mckee's *Pink Beams of Light from the God of the Gutter: The Science-Fictional Religion of Philip K. Dick* (2004); another scholarly source is the annotated tome, *The Exegesis of Philip K. Dick*, edited by Pamela Jackson and Jonathan Lethem (2011).

McGrath references Frederick A. Kreuziger's *The Religion of Science Fiction* (1986) but neglects his equally pioneering *Apocalypse and Science Fiction* (1982). Also missing are *The Intersection of Science Fiction and Philosophy: Critical Studies,* edited by Robert E. Myers (1983); Stephen May's *Stardust and Ashes: Science Fiction in Christian Perspective* (1998); and Richard A. Burridge, *Faith Odyssey* (rev. ed. 2003), which is a nice companion to George Murphy's 2005 *Pulpit Science Fiction*. Greg Garrett's *Holy Superheroes!* is cited, but not the revised and expanded edition of 2008.

Jewish science fiction, an important subgenre, gets a nod with the citation of *Wandering Stars*, edited by Jack Dann (1974), but not *More Wandering Stars* (1981, also edited by Dann), or *People of the Book*, edited by Rachel Swirsky and Sean Wallace (2010). Among the many missing are Phyllis Gotlieb's collection *Blue Apes* (1995), which begins with the death of the last Jew in the universe; and Paul Levinson's *Borrowed Tides* (2001), which depicts what I believe is the first Passover seder in space.

There is a significant subgenre one might call either acidic satire, anti-religious, or even anti-Christian science fiction. Well-known examples of this challenge to McGrath's creative interaction thesis include Michael Moorcock's *Behold the Man* (1969); James Morrow's linked series *Only Begotten Daughter* (1990), *Towing Jehovah* (1994), *Blameless in Abadon* (1996), and *Bible Stories for Adults* (1996); Gardner Dozois, ed., *Galileo's Children: Tales of Science vs. Superstition* (2005); and Thomas Disch, *The Word of God* (2008).

A few typos appear in McGrath's text, but they are easy to spot. For instance, carbon monoxide (p. 89) should be carbon dioxide. As I have suggested, the author was operating under tight publisher's constraints, limiting his discussion of significant stories and his ability to provide a more comprehensive list of relevant references. The multidisciplinary literature on the complex relations of theology and science fiction is huge, to match the deep and wide primary literature (and filmography). For a brief, sound, interesting introduction to the field, I can certainly recommend this book.

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TECHNOLOGY

THINKING MACHINES: The Quest for Artificial Intelligence and Where It's Taking Us Next by Luke Dormehl. New York: TarcherPerigee, 2017. 275 pages, including bibliographic references and index. Paperback; $16.00. ISBN: 9780143130581.

Thinking Machines is a book that gives you the facts about artificial intelligence (AI) in a well-written and enjoyable way. The book is a good read for those who know little about AI and want to see what all the fuss is about. In this small volume, author Luke Dormehl (author of *The Formula: How Algorithms Solve All Our Problems … and Create More*, and contributor to *Fast Company, Wired*, etc.) introduces the reader to the history of AI, where AI can be found today, and where AI seems to be going in the future.

Chapters 1 and 2 are about the history of AI. AI has had a somewhat "on again, off again" past, with many early attempts to build systems that seemed promising, but ultimately were disappointing. The chapters explain this history and how, ultimately, advances in neural networks led us to where we are today, and the development of tools like Siri, self-driving cars, and Roombas.

Chapter 3 talks about the rise of cognitive agents all around us—in our phones, cars, houses, watches, stores, and work. The author has a brief discussion of the ethics of information collection. What kind of data should we allow others to gather about us? Who owns that data? Will the information collected about us be used to serve us or to serve the companies that collect it? The author ask many questions, but gives no answers.

In chapter 4, Dormehl discusses the rise of service-oriented AIs, such as virtual assistants, Microsoft's Clippy, and others. The chapter contains many entertaining stories and then ends with a discussion of therapeutic, childcare, and eldercare robots. Dormehl makes no mention of the ethics of using these robots or the effects they might have on society and relationships between humans.

What will be the impact of AIs and robots on occupations? Chapter 5 speculates about how AIs and robots will revolutionize the job market, eliminating jobs that are dangerous (mining) and tedious (assembling smartphones), but also those that require a high level of knowledge in a limited domain, such as the practice of law. The author argues, however, that new kinds of jobs are on the rise, especially in the creation of content. The number of jobs is growing by nearly 10% per year in some areas such as vlogging, answering online queries that an AI cannot interpret, and game design. Dormehl argues that jobs like these, jobs that require creativity and social intelligence, will always be what humans are good at and computers are not. Finally, the author notes the rise of products made by humans, such as pottery, that are not all identical and have an artisanal touch.

Chapter 6 contains many fascinating stories about attempts to program computers, robots, and AIs to create. It briefly explores the definition of creativity. One fascinating question is whether a computer can create an invention that can be patented, as a patent requires an "illogical step" from existing invention, and making illogical steps is not a computer's forte.

Chapter 7, "Mindclones," follows, with information about attempts to duplicate a person's mind in a computer. The goal of various projects is to cheat death by storing a person's experiences, through personality capture, lifelogging, and neural networks, to duplicate the human brain. Again, the author describes how these efforts are being done, but never questions whether they could or should be done.

The final chapter of *Thinking Machines* looks at the future, and future risks, of AI. Dormehl notes that visionaries in the field of AI have begun to emphasize the need for safety protocols and ethics panels to guide AI scientists. The author states, "The threat