

Book Reviews

applications of imaginary numbers, he provides the unsatisfactory statements that “God in his wisdom made it so,” and that such numbers “are known by God,” making them “real.” Finally, on occasion in an argument, he has inserted the word “clearly” unnecessarily. For example, he brushes off a common inference as “clearly invalid” (p. 20); the adverb is either redundant or dismissive.

But these issues are minor and perhaps picky concerns. The bigger concern is with the overall argument itself. While I appreciate his anti-reductionist approach, allowing for the complexity and diversity of the created world, I do not find the analogical approach particularly convincing. In my opinion, it is applied too literally. And his oft-repeated refrain of thinking God’s thoughts muddles the distinction between God’s character and the specific way God upholds the creation, not to mention the particular ways that humans observe God’s handiwork. In the end, despite his intention, I find it hard to distinguish his position significantly from a Christianized Platonist approach. Nevertheless, Poythress provides food for thought for those exploring the relationship of faith and mathematics.

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WEAPONS OF MATH DESTRUCTION: How Big Data Increases Inequality and Threatens Democracy by Cathy O’Neil. New York: Crown, 2016. 218 pages, notes, index. Hardcover; \$26.00. ISBN: 9780553418811.

If you are looking for a dispassionate analysis of ethical issues in the use of big data, this book is not it. “Weapons of math destruction” (WMDs) are algorithms whose analyses of human data are used to make decisions that affect people’s lives in nefarious ways. O’Neil’s last chapter opens with the words, “As you know by now, I am outraged by all sorts of WMDs.” So why does O’Neil call some algorithms weapons of math destruction? And why is she so outraged by them?

Here is one of her examples. In 2009, Michelle Rhee was chancellor of Washington, DC’s public schools. She was appointed by a new mayor, Adrian Fenty, who wanted to improve the quality of DC’s schools. His plan was straightforward: “Evaluate the teachers. Get rid of the worst ones, and place the best ones where they can do the most good.” Rhee implemented a teacher assessment tool called IMPACT developed by a consultancy, Mathematics Policy Research, based in Princeton, NJ. It was a value-added model, measuring the educational progress

of students and calculating how much of that could be attributed to the teacher. In 2011, based on its results, 206 teachers were fired, an action which O’Neil regards as unjust. The algorithm was very complex—it took into account not only test scores but other factors as well, such as the presence or absence of learning disabilities and socio-economic background—but the algorithm was not available for review or critique. There were neither independent means to assess the accuracy or effectiveness of the tool nor any means of feedback by which it could be improved. The resulting assessment was based on a small sample, only the 25 or so students in a teacher’s class. And it was vulnerable to cheating. In the case of one fifth grade teacher who was fired, subsequent review of her students’ fourth grade assessment tests suggested that they might have been altered to make the fourth grade teachers look better.

So what makes algorithms WMDs? O’Neil focuses on several characteristics: they define their own reality and use it to justify their results; the underlying models are often opaque or even invisible to those affected by them; they tend to punish the poor; they may use sloppy statistics and biased models that create their own feedback loops; and they are unfair in that they may damage or destroy lives.

Here are two more examples: (1) Crime prediction software such as PredPol and CompStat, and (2) E-scores. These programs illustrate the feedback loop issue: more patrolling in a neighborhood creates more data fingering that neighborhood. They also illustrate the uneven treatment of the poor, as much of the data is for “nuisance crimes” included as relevant because of a purported link between antisocial behavior and crime; yet, the data exclude “white collar” crimes. Thus, the assessments contribute to a system of discrimination against the poor. In the second example, E-scores are scores rapidly computed online to evaluate potential customers. They take into account information such as web browsing history, purchasing patterns, and location of the visitor’s computer. Thus, for instance, at call centers e-scores are used to identify potentially more profitable prospects and funnel them to a human operator. But again there is a nasty feedback loop: people from poor neighborhoods get lower scores, and hence less personal attention, less credit, and higher interest rates. Predatory advertising is also generated through these scores.

Some further examples O’Neil addresses include recidivism models, risk models such as those used by hedge funds, the *US News* college rankings, personality tests sometimes in job application processes, automated resume reviews, use of behavioral data

in advertising, the algorithms used by Facebook to decide who gets to see one's posts, and more. She writes, "I am worried about the separation between technical models and real people, and about the moral repercussions of that separation (p. 48)." Hence, she identifies several sources of the problems that turn algorithms into WMDs. Models may encode human prejudice, misunderstanding, and bias into the software systems. Oftentimes, problems arise from the choice of goals, for example, desire for profit may far outweigh fairness. Many use proxies that are poor substitutes for the data one really wants but cannot measure directly. Opacity is often defended as "intellectual property." Software often does not get feedback on its performance.

O'Neil never plays the role of the neutral observer of algorithms for analyzing big data sets. Her passion for her message is explicit on every page (which for me, made reading her book somewhat exhausting). She does not pay much attention to the benefits these algorithms can provide. To her credit, however, she goes beyond analyzing the problems to propose and discuss solutions, including the use of some type of Hippocratic Oath for modelers, reevaluating metrics of success, identifying and eliminating unfair systems, incorporating positive feedback loops into models, requiring the auditing of algorithms, adapting and enforcing current laws, and requiring that models that have a significant impact on people's lives (e.g., those that assess credit ratings and e-scores) be open to the public and available.

The book is a must-read, I believe, for statisticians, operations researchers, managers of information systems, and anyone studying these fields. Relevant chapters should also be read by people working in or studying human resources, finance, educational assessment, criminal justice, and insurance. The book will also appeal to anyone interested in the impact of technology on culture.

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SHADOW OF OZ: Theistic Evolution and the Absent God by Wayne D. Rossiter. Eugene, OR: Pickwick Publications, 2015. Paperback; \$24.00. ISBN: 9781498220729.

This is an anti-evolutionary book that stands basically within the tradition of the modern intelligent design movement (e.g., Stephen Meyer, Discovery Institute). In particular, Wayne D. Rossiter attempts to argue that theistic evolution is not only scientifi-

cally vacuous, but more seriously it falls far short theologically. From his perspective, "there is no distinguishable difference between theistic evolutionism and atheism when it comes to our physical reality. Neither includes a God that is in any way *detectable* in his creation" (p. 25, my italics).

The notion of so-called "divine detectability" is a long-standing theme of the ID movement. To be more precise, Rossiter and ID theorists confidently proclaim that there are places in nature where God has miraculously intervened during the past. Rossiter openly states that he views God "as an active participant in his creation" and "an evidenced player in the workings of the universe" (p. 17). In appealing to scripture, Rossiter asserts, "In the Bible, God is clearly in the business of doing things that we would see in terms of manipulating physical laws and material quantities" (p. 115).

Of course, Rossiter's approach is another God-of-the-gaps view of divine action, and the history of science has repeatedly shown the failure of such attempts. The purported gaps in nature are, in fact, gaps in the scientific knowledge of those defending these anti-scientific and anti-evolutionary views of nature.

In his criticism of theistic evolution, Rossiter attempts to gather scientific arguments against biological evolution, but it is quite obvious that the foundation of his God-of-the-gaps thesis rests firmly on a concordist hermeneutic, not science. For example, he argues,

The word "kind" appears twelve times in the Genesis 1 account (NIV), and the phrase, "according to their kind" – plural – occurs eight times. Old Testament Jewish authors used such repetition for emphasis of important ideas. It was clearly important to indicate God *directly* made numerous kinds, and not just one. (p. 50, my italics)

However, Rossiter completely fails to appreciate that the category of "kinds" in Genesis 1 is an ancient taxonomical notion reflecting the common belief that living organisms were immutable and created *de novo*. To be more specific, this notion is rooted in an ancient phenomenological perspective. Evidence that Rossiter is completely unaware of the ancient scientific context of scripture appears when he states, "There is nothing in the Bible that teaches that we must see the Earth as the spatial center of creation, nor that the universe should be smaller than it is" (p. 59). It is well established within evangelical biblical scholarship that scripture features a three-tier universe (e.g., John Walton, Paul Seely, Peter Enns, Kenton Sparks, Kyle Greenwood). Christian astronomers today never appeal to this ancient cosmology in their daily work, nor should Christian biologists,