

CATHY O'NEIL, WEAPONS OF MATH DESTRUCTION (Crown, 1st ed. 2016)

September 2, 2016, New York, Crown

ISBN: 978-0-553-41881-1

Price: \$16.16

Page Length: 272 pages

Keywords: Big Data, Mathematical Models, Democracy, Corporate Injustice, Political Injustice

Review by Alex Samaei

Journal of High Technology Law

Suffolk University Law School

Negative Impacts of Data Models

“Welcome to the dark side of Big Data.”¹

The use of large quantities of information to create data models has helped lower costs, increase quality, and streamline processes to benefit all, or so we are told. In *Weapons of Math Destruction*, author Cathy O'Neil focuses on the damage and injustice created by these models on different groups of people, often focusing on harm to minorities and the underprivileged. She effectively uses examples of data models, or as she calls them Weapons of Math Destruction (“WMDs”), mixed with realistic hypotheticals to show the faults in these systems. This review discusses the value of the book's analysis while pointing to some flaws which may arise for a reader who is just being introduced to WMDs.

One of Ms. O'Neil's key strengths is her ability to walk readers through her career path and personal discovery of flaws in big data. Having a PhD in mathematics from Harvard gives

¹ See CATHY O'NEIL, WEAPONS OF MATH DESTRUCTION 13 (1st ed. 2016).

O’Neil academic merit,² but its her dedication to the study of these WMDs which really gains the reader’s confidence. To begin, she uses her experience working for hedge fund D.E. Shaw³ to showcase how financial institutions utilize these models and the negative repercussions which arise. Later in her career O’Neil changed her job title to “Data Analyst” and began working for startups to build algorithms for predicting online shopper’s purchases.⁴ She uses all these experiences to write works such as *Doing Data Science: Straight Talk from the Frontline* (2013),⁵ *On Being a Data Skeptic* (2013),⁶ and her ongoing blog *MathBabe.org*.⁷ Currently O’Neil is active in the “Occupy” movement.⁸

Weapons of Math Destruction covers several industries and discusses the social, political, and legal issues which arise in each by breaking the industries up into different chapters. The introduction engages readers by using a simple WMD to show how school teachers are negatively affected by blind performance ranking systems and presenting O’Neil as a credible source.⁹ This chapter also notes that while there are plenty of proponents of data models, this book would be focusing on the negative aspects of WMDs. The next two chapters give real world examples of everything from baseball to the criminal justice system. This allows patterns to form and WMDs to be broken down into their key elements. O’Neil also adds personal context to these examples

² See Mona Chalbi, *Weapons of Math Destruction: Cathy O’Neil Adds Up the Damage of Algorithms*, THE GUARDIAN (Oct. 27, 2016), archived at <https://perma.cc/D7BM-G422> (stating O’Neil holds a PhD in Mathematics from Harvard).

³ See O’NEIL, *supra* note 1, at 33 (noting O’Neil began work at D.E. Shaw after completing here PhD at Harvard).

⁴ See O’NEIL, *supra* note 1, at 11 (stating O’Neil worked in e-commerce as a data analyst after having a change of heart about the financial industry). (

⁵ See CATHY O’NEIL & RACHEL SCHUTT, *DOING DATA SCIENCE* (O’Reilly Media 2013).

⁶ See CATHY O’NEIL, *ON BEING A DATA SKEPTIC* (O’Reilly Media 2013).

⁷ See Cathy O’Neil, *About*, MATHBABE.ORG (Feb. 20, 2017), archived at <https://perma.cc/3TUM-KFT5> (explaining O’Neil created this blog to help make the world a better place).

⁸ See Chalbi, *supra* note 2 (explaining O’Neil’s involvement in the Occupy movement as a key crucial element in her opinions in *Weapons of Math Destruction*).

⁹ See O’NEIL, *supra* note 1, at 11 (depicting the struggles of a well-received teacher when she was subjected to the school districts blind rating system).

by explaining the role WMDs in the 2008 housing market crash through her own work experience.¹⁰ This helps readers become invested in mathematical models even if they do not yet know how they are directly affected by them.

From this point forward the book uses each chapter to discuss how WMDs are used within and negatively effect different industries. Chapter three discusses the harm of ranking colleges and university because the formulas can be used to make an institution look better than they actually are.¹¹ This introduces the reader to the important concept of a feedback-loop, which occurs when a WMD effects their intended results just by existing.¹² Chapter four shifts the discussion to the use of personal data in predatory advertisements, but flows well from the previous topic because the main focus remains on for-profit universities abusing government subsidized loans to turn a profit.¹³

The next few topics begin to focus on the heart of the matter, discrimination. Chapter five discusses the injustice created by crime predicting WMDs when they tell police to search a specific street, because it causes more data points to appear for that area and in turn creates a feedback-loop. O'Neil uses this opportunity to show Fourth Amendment issues which federal judges have cited when ruling upon some of these practices illegal such as New York City's stop-and-frisk policy.¹⁴ Next, the book flows into how WMDs make these and other groups of people less likely to be selected from a job applicant pool.¹⁵ This section mirrors the discussion in chapter three by

¹⁰ See O'NEIL, *supra* note 1, at 40-42 (explaining the chaos behind the market crash and the role WMDs played within his occurrence).

¹¹ See O'NEIL, *supra* note 1, at 59 (summarizing the shortcomings of U.S. News college rankings).

¹² See O'NEIL, *supra* note 1, at 55 (describing why using proxies in a model allow people to manipulate the data).

¹³ See O'NEIL, *supra* note 1, at 71 (listing for-profit universities whose business model relies on WMDs advertising to students who are like to fall victim to the predatory ads).

¹⁴ See O'NEIL, *supra* note 1, at 93-95 (citing federal cases and the Bloomberg administration's stop-and-frisk policy to describe the unjust racial profiling which stemmed from crime prevention models).

¹⁵ See O'NEIL, *supra* note 1, at 106 (detailing the challenges Kyle Behm faced in applying to part-time jobs because of his bipolar disorder even though that was not directly disclosed on the applications).

focusing on all the data that is considered by the model's designer, while noting significant factors that are left out, such as happiness increasing work productivity.

In chapter eight, O'Neil explores the dangers of corporations trying to recreate credit scores by using WMDs.¹⁶ By delving into how corporate computers analyze these massive amounts of personal data the author manages to show a glimpse of what our futures might be like if WMDs go unchecked. Chapter nine continues by switching to how insurance coverage is calculated, while maintaining many of the same concerns about discrimination.¹⁷ However, these concepts are shown in a different industry in chapter ten where O'Neil discusses how massive amounts of personal information can be used to target individuals more likely to vote.¹⁸ This discussion becomes particularly relevant to the recent 2016 presidential campaign because it shows certain tactics which could theoretically be employed to win the electoral vote. Last, O'Neil concludes her book by urging the policing and maintenance of WMDs because they realistically cannot be eliminated altogether.¹⁹

Weapons of Math Destruction seeks to explain the dangers of mathematical models being used so widely and without regulation. O'Neal accomplishes this goal by dividing the chapters into sub-topics which allow the reader to grasp the magnitude of this issue in a variety of environments. This is especially useful for a general audience, which seems to be who the book is written for. Without going into details about the specific formulas, it is unlikely that this book would be useful by academics, lawyers, or data analysis for anything more than giving context and

¹⁶ See O'NEIL, *supra* note 1, at 142 (explaining how FICO scores are created by formulas running thousands of calculations).

¹⁷ See O'NEIL, *supra* note 1, at 167 (describing Consumer Reports idea to judge drivers on their records and not by comparing them to other drivers with similar backgrounds).

¹⁸ See O'NEIL, *supra* note 1, at 191 (stating Hilary Clinton's campaign used micro-targeting to save money by campaigning to specific groups).

¹⁹ See O'NEIL, *supra* note 1, at 218 (concluding by stating that data is not going away).

a variety of examples. However, this example based approach does make the piece readable even if someone has no prior knowledge in the field.

Additionally, O'Neil adds credibility to her argument by citing a wide variety of sources throughout the book. This helps the reader understand that the allegations being put forth are not just one mathematician's opinions. However, even though the book does warn in its introduction that it will be focusing on the negative aspects of data models, there is a noticeable lack of opposing opinions included. With a few exceptions, many chapters cannot go more than a few paragraphs without explaining why we still use these flawed models. It appears that this would be an important part of the argument to include because without it the reader is left to wondering about the character of those using WMDs and not realizing the driving business aspects. Some WMDs may even be better than the alternative of no data models at all.

Weapons of Math Destruction serves as a valuable introduction to the dangers of big data for anyone who is unfamiliar with the topic. This was presumably O'Neil's goal in writing the piece. While the personal experiences O'Neil mentions throughout the book are the most appealing aspect, they are also the book's greatest flaw. There are no real recommendations for handling WMDs until the conclusion of the book. It also makes certain areas seem overly forced because an average reader understands that there are two sides to every story. Many WMDs may create injustice, but without more information about how each of these industries functioned before implementing the models, and the injustices that were present at that time, it is difficult to fully blame the WMDs. In fact many of the referenced issues seem like they could be handled not only by restricting and managing WMDs, as O'Neil suggests, but also by expanding them to account for more socio-economic factors. To be fair the book does point out right at the beginning, and periodically throughout, that there are positive aspects of each model as well.

This book is an entertaining read, and informative about the logistics behind many discriminating practices. Many of the examples cited are well-known events that anyone who watches the news would be aware of, but *Weapons of Math Destruction* provides a certain mathematical insight which is rarely discussed. It covers this in a pleasant manner which does not intimate those who are less than “math-savvy.” As long as the audience is aware they are reading a one-sided argument, I would recommend this book to those interested in social justice, mathematics, or legal injustices.