**RD01 Response**

3/19/24

**Summarize the key takeaways of this chapter for a friend. This does not need to be exhaustive, but maybe a paragraph or two highlighting the main ideas.**

In the first chapter of "Weapons of Math Destruction" by Cathy O'Neil, we are introduced to the concept of a model. O’Neil broadly defines a model to be an abstract representation of a process that uses past data to predict future responses. The first model she discusses is a baseball model, or the way in which baseball teams use statistics/mathematical models to plan defensive tactics when playing different teams. O’Neil says that the models used in baseball are not discriminatory because everyone has access to the statistics and methods of analysis. There is no hiding how baseball teams are analyzing players to make strategic game plans. O’Neil also touches on how models can be internal. She gives the example of a family meal model in which she has knowledge in her head of what her family likes to eat, as well as her goals for healthiness and satisfaction. Her internal model is constantly being updated every time she makes a meal, and receives feedback from her family.

O'Neil then introduces us to her idea of “Weapons of Math Destruction” (WMDs). WMDs are mathematical models that have three characteristics: they impact many people by having a large scale, they are opaque and methods are often kept secret, and they can cause harm, especially to vulnerable populations. She argues that these models are created without much consideration for their consequences.

The chapter provides several examples of WMDs in various areas such as education, policing, and the job market. O'Neil discusses how algorithms used in these areas can reinforce inequalities, and discrimination. She highlights the importance of understanding the societal impact of these mathematical models and calls for greater accountability in their use.

**Based on your reading of the chapter, what are some things an algorithm or model would need to ensure in order to not cause harm. Answer in terms of the three components of a WMD O'Neil lists (opacity, scale, damage).**

The three components of a WMD according to Cathy O’Neil are: opacity, scale, and damage. In order to ensure that a given model will not cause harm, we need to eliminate or reduce the presence of these three components in the model.

In order to reduce the amount of people a model is impacting (the scale of the model), the algorithm should evaluate a smaller and more targeted group of people. Narrowing the scope of an algorithm would give it better validity and reliability, and minimize the potential for harming marginalized groups of people.

Opacity in algorithms leads to distrust, and a lack of accountability. So, it is important for models used in areas such as education, policing, and the job market to strive for the opacity seen in the baseball model. There should be no secrets kept about how a model works. Affected individuals should be able to understand the factors that influence the outcome a model provides them. This builds trust, and empowers people to challenge decisions that seem unfair. Transparency will lead to trust, accountability, and fairness.

In order to reduce the amount of damage a model causes, there must be mechanisms in place to hold organizations responsible for the consequences of algorithmic decisions. There must be regular evaluation on the algorithm’s impact on different demographic groups in order to identify biases. One thing that O’Neil emphasizes in this chapter is that a model will never be perfect. Mistakes will be made, so it is important that algorithm writers are aware of this, and consistent reevaluations of an algorithm’s performance and fairness should become the norm.