

### **Executive Summary**

The following annotated bibliography is centered around the theme of diversity in hiring and employment in the data science industry. As expressed by the [leaky pipeline](#) metaphor, a lack of diverse hiring is a product of failures at all levels, starting from early education and continuing throughout higher education, in hiring, and in the workforce. As such, the articles in this annotated bibliography touch on all aspects of this process. Some of the articles are primarily focused on the state of diversity across various dimensions, most commonly gender and race, while others focus on the causes of the lack of diversity.

The choice of this topic was motivated by my own interest, but also somewhat by Eduardo's comments on the matter when he was leading class. He said that he would only be interested in working at a company that valued diversity, regardless of the other positives and negatives of the company – it was a must-have for him. I had heard of the leaky pipeline metaphor, referenced above, but wanted to learn more about the causes and impacts of the lack of diversity in the data science community, and the wider technology industry.

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This annotated bibliography is divided into several categories of papers by content. In this more extended summary I will describe the contents of each category in some detail.

**State of the problem:** this category describes the state of the problem of diversity in data science in various ways. Susan Fowler's blog post explicitly details the problems that she faced in Uber with respect to sexual harassment and a culture of disrespecting women. The post also describes a generally toxic environment in the company. Anna Weiner's *Uncanny Valley* is more of a narrative format and uses a series of vignettes to impart the feeling of her experience at a Silicon Valley startup. The final piece in the category uses a series of charts and statistics to provide some quantitative context to the current state of being in the industry in terms of diversity across several dimensions.

**Mechanisms of discrimination:** this category covers many of the mechanisms for bias and a lack of diversity. Several of these papers are academic in nature. The most common topic is in hiring, with several of papers concerning the ways in which gender and race influence the hiring process. The mechanisms studied include the reading of names to personal interactions in which gender and race are inferred. Professional interactions are also considered, such as the rate with which various entrepreneurs are successful in their pitches on the basis of their gender and attractiveness, as well as the likelihood that an employee is recommended to receive a raise on the basis of their gender.

**How to fix the problem:** these papers provide some form of a solutions to the problem of a lack of diversity in the technology industry. The paper titled *Knowing is Half the Battle* finds that teaching about stereotype threat is a successful tactic for decreasing the impact of stereotype threat. The Airbnb article describes ways in which the research on the mechanisms of gender

bias can be put into practice in order to combat discrimination. The Berman and Bourne article encourages a holistic view, in which the entire pipeline is considered as a whole, and therefore attracting those from underrepresented groups is prioritized.

Public articles and Advocacy: the final two categories cover articles that are written in public platforms and the writing of advocacy groups that are trying to address the problems. Of particular interest is the article by Code 2040, a group that is dedicated to increasing the representation of “Black and Latinx technologists” in the industry. Their website contains many posts, and the one that I included covers ten ways in which their members and readers can improve their chances for success in the technology industry.

### **Top Three**

Susan Fowler’s February 2017 blog post ([link](#)) about her disturbing experiences at Uber catalyzed major changes at her former company, most prominently the forced resignation of the CEO and founder, Travis Kalanick. The toxic culture throughout the culture described in the blog post included the perpetuation of sexual harassment (facilitated by a complacent HR department), unfair treatment of women in the workplace, and a general culture that encouraged back-stabbing and self-promotion at the expense of company success. I remember reading the blog post as it began to go viral on Twitter and feeling a sense of awe as it proceeded to be the spark that created change at the young company. The post is rather forthright in its indictment of the state of Uber’s culture, and provides a sense of how public outcry can create positive change.

Anna Weiner’s piece, Uncanny Valley ([link](#)), is a narrative of her time in Silicon Valley working at a startup. The piece features a series of vignettes that impart a sense of hopelessness as the reader gets an increasing sense of the isolation, loneliness, and dysphoria that Weiner is left feeling due to her experience in and around her company. The writing is somewhat subtle and detached at times but expresses the deep impacts that the harmful culture of Silicon Valley can have on a person. The title is a great encapsulation of her experience in the referenced Valley, along with her feeling of dysphoria caused by the male-dominated odd culture of the space.

An early 2016 Tech Crunch article on the increase in gender diversity of Airbnb’s engineering team ([link](#)) is a short but sweet indication of how diversity problems can be fixed by those who have the willingness to address their problems. The article is a recap of the 2015 changes implemented by the company, which led to their new hires being 47% female, which increased the proportion of their engineering department from 15% female to 30% female. Clearly that leaves much to be desired, but it was a strong and important step in the right direction. The company realized that they themselves were a hole in the leaky pipeline, given that roughly half of their applicants were female. They used their knowledge of the research to address their hiring problem. As studied in other papers in this bibliography, one mechanism for the introduction of bias is reading names, so they made applicant project reviews not include names. Additionally, they ensured that there was always a female member of interview committees.

## Citations

### State of the problem

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### How to fix the problem

Johns et al., *Knowing is half the battle: teaching stereotype threat as a means of improving women's math performance*, Psychological Science, <https://www.ncbi.nlm.nih.gov/pubmed/15733195>

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Francine Berman and Philip Bourne, *Let's Make Gender Diversity in Data Science a Priority Right from the Start*, Public Library of Science, <http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1002206>

Adam Butler, *The Gender Gap in Data Analytics*, Harnham, <https://www.harnham.com/us/the-gender-gap-in-data-analytics>

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Vivian Zhang, *Breaking Down The Gender Gap In Data Science*, Forbes, <https://www.forbes.com/sites/womensmedia/2017/08/03/breaking-down-the-gender-gap-in-data-science/#7e6faed94287>

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