



# INVISIBLE WOMEN: STUDY GUIDE

EXPOSING DATA BIAS  
IN A WORLD DESIGNED  
FOR MEN

STUDY GUIDE 1/2: INTRODUCTION,  
PART I, PART II, PART III

PREPARED BY  
**DATA FEMINISM  
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# INTRODUCTION: THE DEFAULT MALE

## Meet the Author!



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Seeing men as the default is fundamental to the structure of human society (1). From anthropology, to history, to language itself, male dominance permeates. In gendered languages, when the gender is unknown or when the group is mixed, the generic masculine is used, making male quite literally the default (7). **The result of our deeply male-dominated culture is that “the male experience [and] the male perspective, have come to be seen as universal - while the female experience - that of half the global population, after all, is seen as, well, niche”** (12). Male dominance has also created the gender data gap; “because male data makes up the majority of what we know, what is male comes to be seen as universal” (23). **With a niche identity and subjective point of view, women are framed to be forgettable, ignorable, and dispensable from culture, from history, and from data** (23). As Criado-Perez puts it, “it’s time for women to be seen” (24).

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# PART I: DAILY LIFE

## Chapter 1: Can Snow-Clearing Be Sexist?

The question of whether snow-clearing can be sexist started out as a joke, something that the "gender people" would surely keep their noses out of. But let's look at the facts: **it's a fact that we lack consistent, sex-disaggregated data from every country, but the data we do have makes it clear that women are far more likely than men to walk and utilize public transport** (29). Men are more likely to drive a car and if a household owns a car, men have the dominant access (30). Another factor to consider is travel patterns. Men tend to have simple travel patterns (to and from work), whereas women have more complicated travel patterns (30). This stems from the fact that **women do 75% of the world's unpaid care work and this affects their travel needs**. While men travel on their own, women travel with babies, children, and elderly relatives who they are caring for. Unplowed roadways, therefore, have a significant negative impact on these women. **So yes, snow plowing can be sexist.**

## Chapter 2: Gender Neutral with Urinals

Urban design, even when intended to be "equal", is far from equitable. **For women, waiting in a long line for the bathroom after a movie finishes is a common occurrence. Men, on the other hand, don't seem to have this same issue.** That's because women on average take 2.3 times longer in the bathroom than men (48). Plus, women are more likely to be accompanied by children, differently-abled people, or elderly people and there is a 20-25% chance that women of childbearing age may be on their period at any one time, thus needing extra time to change a tampon or sanitary pad (49). In an attempt to make their washrooms gender-neutral, a cinema replaced the male bathroom with the sign "gender-neutral with urinals" and the female bathroom to "gender-neutral with cubicles" (48). Men were able to use the bathroom with urinals and the one with cubicles, however, women were limited to the bathroom with cubicles (48). **This is an example of where the complex needs of women and people who don't use urinals were ignored and, as a result, were further disadvantaged.**

**A third of the world's population lacks adequate toilet provision** (49). Women around the world are at risk of sexual assault when finding or using a toilet, especially when they have to walk far distances in the dark. **Urban planning that disregards women's risk of sexual assault is a violation of their equal right to public spaces** (57). This is just one of the many ways that urban planners exclude women (57). **When planners don't account for gender, "public spaces become male spaces by default"** (66). Governments may think they are saving money by failing to provide public toilets, but a 2015 Yale study in the town of Khayelitsha, South Africa, found that the reduced social and policing costs of adding 11,300 more toilets would leave the Township \$5 million better off (51). All in all, "designing the female half of the world out of public spaces is not a matter of resources, it's a matter of priorities" (66)

## Not-So-Fun Facts!

- When the generic masculine is used (man, he/his, etc.) people are more likely to recall famous men than famous women; to estimate a profession as male-dominated; and to suggest male candidates for jobs and political appointments (5)
- Women are less likely to apply, and less likely to perform well in interviews, for jobs that are advertised using the generic masculine (5)
- Only when the lead of a film is female do men and women appear about as often as each other (10)
- Thirty years of language and grammar textbook studies in countries including Germany, the US, Australia, and Spain have found that men outnumber women in example sentences (on average by about 3:1)
- Women will buy books by and about men, but men won't buy books by and about women (or at least not many) (15)
- An analysis of how gender affected support for Trump revealed that "the more hostile voters were toward women, the more likely they were to support Trump" (24)
- According to the UN, one in three women lack access to safe toilets, and WaterAid reports that girls and women collectively spend 97 billion hours a year finding a safe place to relieve themselves (49)



# PART II: THE WORKPLACE

## Chapter 3: The Long Friday

October 1975 came to be known as “the long Friday” by Icelandic men. On this day, 90% of Icelandic women took part in a strike where they did no work (paid and unpaid) to let the men see how they coped without the invisible work they do every day to keep the country moving” (69). **Around the globe, 75% of unpaid work is done by women, who spend between three and six hours per day on it compared to men’s average thirty minutes to two hours (70). The imbalance of work has a negative impact on women’s health.** Studies show that it’s unhealthy to work more than forty hours a week, but women work well over 40 hours. Stress affects mental health and over time actually affects women’s hospitalization and mortality rates. **Women’s overload of paid work plus unpaid care work is ultimately harming them, both mentally and physically.**

Some women who must care for their families accept part-time work because they can't afford to fully quit the workforce. They are often forced to accept a lower job than they are qualified for because of the more accessible hours a part-time job offers. There is also the issue of maternity leave, as **“not all maternity leave policies are made equal” (78).** Some countries and jobs offer paid leave for both mothers and fathers, while others offer nothing. **Studies show that the gender pay gap widens over the years after a woman has a child.** The pay gap in the US across mothers and married fathers is three times as high as the pay gap between men and women who don’t have children (76). In a US University context, “married mothers with young children are 35% less likely than married fathers of young children to get tenure-track jobs, and among tenured faculty 70% of men are married with children compared to 44% of women” (83). A few factors workplaces should consider to decrease the gender pay gap are paid paternity leave (in addition to paid maternity leave), as well as after-school programs for children, daycare, and conveniences like laundry services.

The culture of paid work “needs to take into account that **women are not the unencumbered workers the traditional workplace has been designed to suit**, and that while men are more likely to fit into this automaton ideal, increasing numbers of them no longer want to” (91). Nothing and nobody could function without the invisible, unpaid work carers do (91). To start, workplaces need to be designed to account for invisible and unpaid work (91).

## Chapter 4: The Myth of Meritocracy

Meritocracy is a system where the highest positions and rankings are based on merit, talent, or achievement, not necessarily race, wealth, or social class. It's thought to be fair and unbiased, and to justify who is at the top upon them simply being the best. **Meritocracy, however, is really just an “insidious myth” that “provides cover to institutional white male bias”** (93). Essentially, standards of success are based on, you guessed it, the white man. A study of 248 performance reviews collected from a variety of US-based tech companies found that women receive personality criticism that men do not (93). When women try and live up to the male-biased standard, they are told to “watch their tone, to step back” and they are called “bossy, abrasive, strident, aggressive, emotional and irrational” (93). The only word among this list that appeared in male reviews was “aggressive” (93). In addition, white men are rewarded at a higher rate than equally performing women and minoritized ethnicities, with one study of a financial corporation revealing a 25% difference in performance-based bonuses between men and women in the same job (93-94). **This is why more than 40% of women leave tech companies after ten years compared to only 17% of men. A “belief in meritocracy may be all you need to induce bias”** (94).

Along with the burden of never being able to fulfill the male-biased standard of success, female professors are also accustomed to unpaid work at work. For example, female professors are the ones students feel more comfortable turning to when they have problems and they are asked to do more unvalued admin work because they fear seeming unlikeable if they say no (97). Apparently, women are seen as unlikeable no matter what they do. An analysis of 14 million reviews on the website RateMyProfessors.com found that female professors are more likely to be “mean, unfair, strict and annoying” while male professors are more likely to be described as “brilliant, intelligent, smart and a genius (99-100). Part of this has to do with **“brilliance bias”, the association of brilliance as a male trait**. Women are far less likely to be considered a genius, something Criado-Perez partially attributes to the fact that “we have written so many female geniuses out of history, they just don't come to mind as easily” (100).

Brilliance bias is something children learn at school. Studies show that by the time girls turn six, they start “doubting their gender” (101). If a game is presented to children as intended for those “who are really, really smart” five-year-old girls are equally likely to want to play it as **boys, but six-year-old girls are “suddenly uninterested”** (101). **This reveals that schools are spreading the message to little girls that “brilliance doesn’t belong to them”** (101). What happens, then, when a requirement for a job is “brilliance”? A study on language in a job posting revealed drastic differences in rates of women applicants. The job posting with an emphasis on “aggressiveness and competitiveness” brought in 5% of women applicants whereas a job posting with an emphasis on enthusiasm and innovation brought the number up to 40% (110).

The solution to decreasing bias in hiring and promotions? Accountability and transparency (111).

## Chapter 5: The Henry Higgins Effect

Men are considered a standard that women simply fail to live up to. **It is assumed that many problems women face can be solved if women are trained to be more like men.** This tendency is known as the Henry Higgins effect and is based on the character in My Fair Lady who sang “why can’t a woman be like a man”. If you’re not a cis man and you work in an office, have you ever noticed that your office feels way too cold? It could be shorts weather outside, yet you’re bundled up inside? This is because the formula to determine a standard office temperature was developed in the 1960’s around the metabolic resting rate of the average forty-year old, 70 kg man (113). A recent study found that the “metabolic rate of young adult females performing light office work is significantly lower” than the standard rate for men doing the same type of activity. The formula may “overestimate female metabolic rates by 35%” which means that current offices are on average five degrees too cold for women (113).

Another context where we rely on studies done on men as if they apply to women is occupational health research. **Serious injuries for men at work have been decreasing while for women they have been increasing. This is due to gender data gaps in occupational health research.** Injuries are caused by harsh chemicals that women absorb differently than men, improperly fitting PPE (a bulletproof vest that doesn’t fit over breasts), and equipment not made for women (plows). We have a need for data that is separated and analysed by sex, and for physical effects to be measured for women themselves, not men (120). As a result of this gender gap in occupational research, “women are dying” (120). The women who do work in male-dominated industries have been treated as ‘confounding factors’ and data on them went uncollected.



## Chapter 6: Being Worth Less Than a Shoe

The title of this chapter reflects the reality that many minoritized women face: being worth less than a shoe. This comes from a story about a nail technician, Qing Lin, who accidentally splashed nail polish remover on a customer's Prada shoe. The amount of the shoe was deducted from Qing's paycheck and she was fired. **When women are worth less than a shoe, they're not only disposable but are subject to unsafe work conditions.** Who is going to complain about these conditions? Not the women themselves. **Women who work in nail salons, auto-plastic factories, and a vast range of hazardous workplaces, "are some of the most vulnerable workers you can find.** They are poor, working-class, often immigrants who can't afford to put their immigration status at risk. And this makes them ripe for exploitation" (131).

Part-time and precarious work are more common for women and can have a particularly severe impact on them (134). Beyond unintended side effects of part-time and precarious work, there are "weaker rights intrinsic to a gig economy" (135). There is often no access to maternity leave, short notice for shifts, and inconsistent hours (135). Last-minute scheduling is harder for women who take care of people (135).

Another danger women face at work is sexual harassment. For many, it is considered "part of the job" (138). **Workplaces that are male-dominated or have male-dominated leadership are typically the worst for sexual harassment** (137). There is a large global data gap on sexual assault in the workplace both due to lack of research and because women don't report it. Organizations do not have adequate procedures to deal with sexual assault and many women don't feel comfortable reporting due to social stigma (139).

Workplace design has a significant impact on the violence women face at work. One example is hospital designs. The typical hospital design with long hallways isolates workers and scatters them far away from one another, making them more susceptible to violence.

**From work's location, to its hours, to its regulatory standards, it has been designed around the lives of men and it is no longer fit for purpose** (142). Women's work, both visible and invisible, paid and unpaid, "is the backbone of our society and our economy" (142).

## Not-So-Fun Facts!

- In the UK, up to 70% of all unpaid dementia carers are women, and female carers are more likely to help with bathing, dressing, using the toilet, and managing incontinence (71)
- Men, on average, have more leisure time than women (depends on the country) (71)
- The UK's Health and Safety Executive revealed that women were 53% more stressed than men (73)
- Data from France, Germany, Sweden, and Turkey shows that even after accounting for social transfers that some countries employ to recognize unpaid care work, women earn between 31% and 75% less than men over their lifetimes (76-77)
- Men picture a man 80% of the time they think of a 'person' (95)
- Even though female economists publish just as much as male economists, men are twice as likely to receive tenure (97)
- After ten years of working in a job where a woman is exposed to either mammary carcinogens or an endocrine disrupting chemical, her risk of developing breast cancer increases by 42% (118)
- When Always menstrual pads were tested in 2014 they were found to include "a number of chemicals [...] that have been identified as either carcinogens or reproductive and developmental toxins" (119)
- A 2016 TUC report found that "less than 10% of women working in the energy sector and just 17% in construction currently wear PPE designed for women" (125)
- 75% of UK families on low to middle incomes work outside standard hours, but most formal day care is only available between 8am and 6pm (135)
- The UN estimates (estimates are all we have) that up to 50% of women in EU countries, 80% of women in China, and 60% of female nurses in Australia have been sexually harassed at work (137)

# PART III: DESIGN

## Chapter 7: The Plough Hypothesis

Male bias in the definition of 'labour' leads to a substantial data gap. Historically, in farming communities where the plough was used, men dominated agriculture and this resulted in unequal societies in which men had the power and privilege. The plough, like many other devices, was built without women in mind. It's not that women aren't involved in labor, but rather their involvement looks different than men's. The Food and Agriculture Organization (FAO) determines an individual as being in the agricultural labor force if he or she reports that agriculture is their main economic activity (148). As we learned in other chapters, part-time work and unpaid care is more common for women, so it is the case that agricultural labor is not their main economic activity. This lack of acknowledgment of women's contribution to the labor force creates data gaps in efforts to better agriculture and its technology. As a result, women are further disadvantaged (150).

### **Development planners across many sectors need to start consulting women.**

Development agencies have been trying to introduce "clean" stoves since the 1950s (151). Traditional stoves cause indoor air pollution, which is the eighth leading contributor to the overall global disease burden (151). "Clean stoves", however, have nearly been rejected by all users. The primary users of stoves are, you guessed it, women. The clean stoves increased cooking time and required more attending which prevented women from multitasking and thus increased their workload. The recommendation from developers was to fix the women, not the stoves. **Developers and researchers eventually found success by talking to women and finding a solution based on their needs.** This exemplifies what can be achieved when designers start from the basis of closing the gender gap (156).

## Chapter 8: One-Size-Fits-Men

The “one-size-fits-men” approach to supposedly gender-neutral products is disadvantaging women in many ways (158). For example, a woman’s average hand span is between seven and eight inches, which makes the standard forty-eight inch keyboard a challenge. The size of a standard piano makes it harder for women to match the level of acclaim reached by their male colleagues and it affects their health, as they suffer disproportionately from work-related injuries (158). Apple iPhone’s are too big for women’s hands, even though research shows women are more likely to own an iPhone than men (159). Apple developers justify that women like bigger phones because they put them in their handbags, but handbags are utilized so heavily because women’s clothes lack adequate pockets (159). Voice recognition software is another example of male biased technology. In cars, voice recognition is designed to make driving safer, but this is not the case when it doesn’t work as well for women (162). Manufacturing companies’ solutions are to train women so the voice recognition software works, not to redesign the software. **Our current approach to product design is making the world easier for men and harder for women** (167). The more that male biased technology is integrated, the more unequal our world becomes.

## Chapter 9: A Sea of Dudes

It’s no secret that men dominate Venture Capitalists, and that, well, **“men back men”** (171). A substantial amount of tech start-ups are funded by venture capitalists, of which 93% are men (171). **When technology is targeted towards women, companies and start-ups have a harder time being taken seriously.** The breast pump industry is estimated at a value of \$700 million with room to grow and products don’t currently serve needs, yet investors still are not going for it (170). Ida Tin, founder of menstrual-tracking app Clue, faced problems when finding an alternative to traditional contraception. This is because there is a lack of data around menstruation; “it has not just been overlooked but borderline actively ignored” (175). Without solid data, it’s harder to convince people (ie. men) that traditional contraceptives are an issue if they don’t encounter it themselves (175). The situation is a bit of a catch 22, “in a field where women are at a disadvantage specifically because they are women (and therefore can’t hope to fit a stereotypically male “pattern”), data will be particularly crucial for female entrepreneurs” (175).



Just like standard keyboards and pianos, **many popular products in the tech industry that are marketed as gender-neutral are in fact male-biased** (176). Some examples: Apple's comprehensive health tracker that couldn't track periods, smartwatches that are too big for women's wrists, and VR headsets too big for the average woman's head. When it comes to the tech that ends up in our pockets, it all has to do with who is making the decisions (180). Across the professional computing profession in the US, 26% of jobs are held by women compared to the 57% of jobs women hold across the entire US workforce (180). In the UK, women represent 14% of the STEM workforce (180).

A more deadly data gap is cars. Men are more likely than women to be involved in a car crash, however, when a woman is in a car crash, she is 47% more likely to be seriously injured than a man, and 71% more likely to be moderately injured (186). Women are also 17% more likely to die (186). Why? Because cars design has a long history of ignoring women (186). There are a few reasons that make women more susceptible to serious injuries and death. One is that women sit further than men while driving because their legs tend to be shorter. This makes women "out of position drivers", as sitting close to the wheel is not the standard seating position. "The willful deviation from the norm" puts women at greater risk of injury or death (186). Another reason is that women have less muscle in their necks and upper torso than men which makes them more vulnerable to whiplash (186). And one of the most significant reasons is that car-crash test dummies are based on the "average" male (186). It wasn't until 2011 that the US started using a female car-crash test dummy. **When female car-crash test dummies have been used, they are just smaller male dummies and don't account for women's different muscle-mass distribution, vertebrae spacing, lower bone density, and differently swaying bodies** (188). Cars are even more dangerous for pregnant women because seatbelts are not properly designed for them (188). "Designers may believe they are making gender neutral products", but in actuality, they are mainly for men (191). "It's time to start designing women in" (191).



## Not-So-Fun Facts!

- The FAO estimates that if women had the same access to productive resources as men, yields on their farms could increase by up to 30% (149)
- Several studies have found that female pianists run an approximately 50% higher risk of pain and injury than male pianists (158)
- Rachel Tatman, a research fellow at the University of Washington found that Google's speech recognition software was 70% more likely to accurately recognize male speech than female speech (162)
- A University of Washington study similarly found that women were underrepresented on Google Images across the forty-five professions they tested, with CEO being the most divergent result: 27% of CEOs in the US are female, but women made up only 11% of the Google Image search results (165)
- According to the Guardian 72% of US CVs never reach human eyes (166)
- 93% of venture capitalists are men (171)
- A woman is 47% more likely to be seriously injured in a car crash than a man, 71% more likely to be moderately injured, and 17% more likely to die (186)



# Discussion Questions

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1. What makes the gender data gap so dangerous? And if it is so dangerous, why is it not talked about more?
2. In what ways are trans people, non-binary people, and agender people further disadvantaged by data and algorithms? How can we ensure that spaces, products, and services are designed with all genders in mind?
3. Is there such thing as un-biased data? Is un-biased data the solution to the inequalities Criado-Perez addresses?
4. How has the gender data gap impacted your daily life or your line of work?
5. Can you think of other things that are "gender neutral" in theory but are more beneficial for men in reality?

