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Invisible Women

Exposing Data Bias in
a World Designed for Men

VINTAGE

Preface

Most of recorded human history is one big data gap. Starting with the theory of Man the Hunter, the chroniclers of the past have left little space for women's role in the evolution of humanity, whether cultural or biological. Instead, the lives of men have been taken to represent those of humans overall. When it comes to the lives of the other half of humanity, there is often nothing but silence.

And these silences are everywhere. Our entire culture is riddled with them. Films, news, literature, science, city planning, economics. The stories we tell ourselves about our past, present and future. They are all marked – disfigured – by a female-shaped 'absent presence'. This is the gender data gap.

The gender data gap isn't just about silence. These silences, these gaps, have consequences. They impact on women's lives every day. The impact can be relatively minor. Shivering in offices set to a male temperature norm, for example, or struggling to reach a top shelf set at a male height norm. Irritating, certainly. Unjust, undoubtedly.

But not life-threatening. Not like crashing in a car whose safety measures don't account for women's measurements. Not like having

your heart attack go undiagnosed because your symptoms are deemed 'atypical'. For these women, the consequences of living in a world built around male data can be deadly.

One of the most important things to say about the gender data gap is that it is not generally malicious, or even deliberate. Quite the opposite. It is simply the product of a way of thinking that has been around for millennia and is therefore a kind of *not* thinking. A double not thinking, even: men go without saying, and women don't get said at all. Because when we say human, on the whole, we mean man.

This is not a new observation. Simone de Beauvoir made it most famously when in 1949 she wrote, 'humanity is male and man defines woman not in herself, but as relative to him; she is not regarded as an autonomous being. […] He is the Subject, he is the Absolute – she is the Other.'[1] What is new is the context in which women continue to be 'the Other'. And that context is a world increasingly reliant on and in thrall to data. Big Data. Which in turn is panned for Big Truths by Big Algorithms, using Big Computers. But when your big data is corrupted by big silences, the truths you get are half-truths, at best. And often, for women, they aren't true at all. As computer scientists themselves say: 'Garbage in, garbage out.'

This new context makes the need to close the gender data gap ever more urgent. Artificial intelligence that helps doctors with diagnoses, that scans through CVs, even that conducts interviews with potential job applicants, is already common. But AIs have been trained on data sets that are riddled with data gaps – and because algorithms are often protected as proprietary software, we can't even examine whether these gaps have been taken into account. On the available evidence, however, it certainly doesn't look as if they have.

Numbers, technology, algorithms, all of these are crucial to the story of *Invisible Women*. But they only tell half the story. Data

is just another word for information, and information has many sources. Statistics are a kind of information, yes, but so is human experience. And so I will argue that when we are designing a world that is meant to work for everyone we need women in the room. If the people taking decisions that affect all of us are all white, able-bodied men (nine times out of ten from America), that too constitutes a data gap – in the same way that not collecting information on female bodies in medical research is a data gap. And as I will show, failing to include the perspective of women is a huge driver of an unintended male bias that attempts (often in good faith) to pass itself off as 'gender neutral'. This is what de Beauvoir meant when she said that men confuse their own point of view with the absolute truth.

The female-specific concerns that men fail to factor in cover a wide variety of areas, but as you read you will notice that three themes crop up again and again: the female body, women's unpaid care burden, and male violence against women. These are issues of such significance that they touch on nearly every part of our lives, affecting our experiences of everything from public transport to politics, via the workplace and the doctor's surgery. But men forget them, because men do not have female bodies. They, as we will see, do only a fraction of the unpaid work done by women. And while they do have to contend with male violence, it manifests in a different way to the violence faced by women. And so these differences go ignored, and we proceed as if the male body and its attendant life experience are gender neutral. This is a form of discrimination against women.

Throughout this book I will refer to both sex and gender. By 'sex', I mean the biological characteristics that determine whether an individual is male or female. XX and XY. By 'gender', I mean the social meanings we impose upon those biological facts – the way women are treated because they are *perceived* to be female. One

is man-made, but both are real. And both have significant conse-
quences for women as they navigate this world constructed on male
data.

But although I talk about both sex and gender throughout, I
use *gender* data gap as an overarching term because sex is not the
reason women are excluded from data. Gender is. In naming the
phenomenon that is causing so much damage to so many women's
lives, I want to be clear about the root cause and, contrary to many
claims you will read in these pages, the female body is not the
problem. The problem is the social meaning that we ascribe to that
body, and a socially determined failure to account for it.

Invisible Women is a story about absence – and that sometimes
makes it hard to write about. If there is a data gap for women overall
(both because we don't collect the data in the first place and because
when we do we usually don't separate it by sex), when it comes to
women of colour, disabled women, working-class women, the data
is practically non-existent. Not simply because it isn't collected,
but because it is not separated out from the male data – what is
called 'sex-disaggregated data'. In statistics on representation from
academic jobs to film roles, data is given for 'women' and 'ethnic
minorities', with data for female ethnic minorities lost within each
larger group. Where they exist, I have given them – but they barely
ever do.

The point of this book is not psychoanalysis. I do not have direct
access to the innermost thoughts of those who perpetuate the gen-
der data gap, which means that this book cannot provide ultimate
proof for why the gender data gap exists. I can only present you
with the data, and ask you as a reader to look at the evidence. But
nor am I interested in whether or not the person who produced a
male-biased tool was a secret sexist. Private motivations are, to a
certain extent, irrelevant. What matters is the pattern. What mat-
ters is whether, given the weight of the data I will present, it is

reasonable to conclude that the gender data gap is all just one big coincidence.

I will argue that it is not. I will argue that the gender data gap is both a cause and a consequence of the type of unthinking that conceives of humanity as almost exclusively male. I will show how often and how widely this bias crops up, and how it distorts the supposedly objective data that increasingly rules our lives. I will show that even in this super-rational world increasingly run by super-impartial supercomputers, women are still very much de Beauvoir's *Second Sex* – and that the dangers of being relegated to, at best, a sub-type of men, are as real as they have ever been.

Introduction: The Default Male

Seeing men as the human default is fundamental to the structure of human society. It's an old habit and it runs deep – as deep as theories of human evolution itself. In the fourth century BC Aristotle was already baldly articulating male default as unarguable fact: 'The first departure from type is indeed that the offspring should become female instead of male', he wrote in his biological treatise *On the Generation of Animals.* (He did allow that this aberration was, however, 'a natural necessity'.)

Over two thousand years later, in 1966, the University of Chicago held a symposium on primitive hunter-gatherer societies. It was called 'Man the Hunter'. Over seventy-five social anthropologists from around the world gathered to debate the centrality of hunting to human evolution and development. The consensus was that it is pretty central.[1] 'The biology, psychology, and customs that separate us from the apes – all these we owe to the hunters of time past', claimed one of the papers published in the resulting book. Which is all very well, only, as feminists pointed out, this theory poses something of a problem for female evolution. Because, as the

book made clear, hunting was a male activity. So if 'our intellect, interests, emotions, and basic social life – all are evolutionary products of the success of hunting adaptation', what does that mean for women's humanity? If human evolution is driven by men, are women even human?

In her now classic 1975 essay, 'Woman the Gatherer', anthropologist Sally Slocum challenged the primacy of 'Man the Hunter'.[2] Anthropologists, she argued, 'search for examples of the behaviour of males and assume that this is sufficient for explanation'. And so she asked a simple question to fill the silence: 'what were the females doing while the males were out hunting?' Answer: gathering, weaning, caring for children during 'longer periods of infant dependency', all of which would similarly have required cooperation. In the context of this knowledge, the 'conclusion that the basic human adaptation was the desire of males to hunt and kill,' objects Slocum, 'gives too much importance to aggression, which is after all only one factor of human life.'

Slocum made her critique over forty years ago now, but the male bias in evolutionary theory persists. 'Humans evolved to have an instinct for deadly violence, researchers find', read a 2016 headline in the *Independent.*[3] The article reported on an academic paper called 'The phylogenetic roots of human lethal violence', which claimed to reveal that humans have evolved to be six times more deadly to their own species than the average mammal.[4]

This is no doubt true of our species overall – but the reality of human-on-human lethal violence is that it is overwhelmingly a male occupation: a thirty-year analysis of murder in Sweden found that nine out of ten murders are committed by men.[5] This holds with statistics from other countries, including Australia,[6] the UK[7] and the US.[8] A 2013 UN homicide survey found that 96%[9] of homicide perpetrators worldwide are male. So is it humans who are murderous,

or men? And if women aren't on the whole murdering, what are we to think of female 'phylogenetics'?

The male-unless-otherwise-indicated approach to research seems to have infected all sorts of ethnographic fields. Cave paintings, for example, are often of game animals and so researchers have assumed they were done by men – the hunters. But new analysis of handprints that appear alongside such paintings in cave sites in France and Spain has suggested that the majority were actually done by women.[10]

Even human bones are not exempt from male-unless-otherwise-indicated thinking. We might think of human skeletons as being objectively either male or female and therefore exempt from male-default thinking. We would be wrong. For over a hundred years, a tenth-century Viking skeleton known as the 'Birka warrior' had – despite possessing an apparently female pelvis – been assumed to be male because it was buried alongside a full set of weapons and two sacrificed horses.[11] These grave contents indicated that the occupant had been a warrior[12] – and warrior meant male (archaeologists put the numerous references to female fighters in Viking lore down to 'mythical embellishments'[13]). But although weapons apparently trump the pelvis when it comes to sex, they don't trump DNA and in 2017 testing confirmed that these bones did indeed belong to a woman.

The argument didn't, however, end there. It just shifted.[14] The bones might have been mixed up; there might be other reasons a female body was buried with these items. Naysaying scholars might have a point on both counts (although based on the layout of the grave contents the original authors dismiss these criticisms). But the resistance is nevertheless revealing, particularly since male skeletons in similar circumstances 'are not questioned in the same way'.[15] Indeed, when archaeologists dig up grave sites, they nearly always find more males, which, as noted anthropologist Phillip

Walker drily noted in a 1995 book chapter on sexing skulls, is 'not consistent with what we know about the sex ratios of extant human populations'.[16] And given Viking women could own property, could inherit and could become powerful merchants, is it so impossible that they could have fought too?[17]

After all, these are far from the only female warrior bones that have been discovered. 'Battle-scarred skeletons of multiple women have been found across the Eurasian steppes from Bulgaria to Mongolia' wrote Natalie Haynes in the *Guardian*.[18] For people such as the ancient Scythians, who fought on horseback with bows and arrows, there was no innate male warrior advantage, and DNA testing of skeletons buried with weapons in more than 1,000 Scythian burial mounds from Ukraine to Central Asia have revealed that up to 37% of Scythian women and girls were active warriors.[19]

The extent to which male-unless-otherwise-indicated permeates our thinking may seem less surprising when you realise that it is also embedded in one of the most basic building blocks of society: language itself. Indeed, when Slocum criticised male bias in anthropology, she pointed out that this bias appeared 'not only in the ways in which the scanty data are interpreted, but in the very language used'. The word 'man', she wrote, 'is used in such an ambiguous fashion that it is impossible to decide whether it refers to males or to the human species in general'. This collapse in meaning led Slocum to suspect that 'in the minds of many anthropologists, 'man', supposedly meaning the human species, is actually exactly synonymous with 'males'. As we shall see, the evidence suggests that she was probably right.

In Muriel Rukeyser's poem 'Myth', an old, blind Oedipus asks the Sphinx, 'Why didn't I recognize my mother?' The Sphinx replies that Oedipus answered her question (what walks on four legs in the morning, two in the afternoon and three in the evening) incorrectly. '[Y]ou answered, Man. You didn't say anything about

woman.' But, replies Oedipus, when you say man, 'you include women too. Everyone knows that.'

But in fact the Sphinx was right and Oedipus is wrong. When you say man you don't 'include women too', even if everyone *does* technically 'know that'. Numerous studies in a variety of languages over the past forty years have consistently found that what is called the 'generic masculine' (using words like 'he' in a gender-neutral way) is not in fact read generically.[20] It is read overwhelmingly as male.

When the generic masculine is used people are more likely to recall famous men than famous women;[21] to estimate a profession as male-dominated;[22] to suggest male candidates for jobs and political appointments.[23] Women are also less likely to apply, and less likely to perform well in interviews, for jobs that are advertised using the generic masculine.[24] In fact the generic masculine is read so overwhelmingly as male that it even overrides otherwise powerful stereotypes, so that professions such as 'beautician', which are usually stereotyped female, are suddenly seen as male.[25] It even distorts scientific studies, creating a kind of meta gender data gap: a 2015 paper looking at self-report bias in psychological studies found that the use of the generic masculine in questionnaires affected women's responses, potentially distorting 'the meaning of test scores'.[26] The authors concluded that its use 'may portray unreal differences between women and men, which would not appear in the gender-neutral form or in natural gender language versions of the same questionnaire'.

And yet in the face of decades of evidence that the generic masculine is anything but clear, official language policy in many countries continues to insist that it is purely a formality whose use must continue for the sake of … clarity. As recently as 2017, the Académie française, France's ultimate authority on the French language, was thundering against 'the aberration of "inclusive

writing" ', claiming that 'the French language finds itself in mortal danger' from workarounds for the generic masculine. Other countries including Spain[27] and Israel[28] have faced similar rows.

Because English is not a grammatically gendered language, the generic masculine is fairly restricted in modern usage. Terms like 'doctor' and 'poet' used to be generic masculine (with specifically female doctors and poets referred to – usually derisively – as poetesses and doctoresses), but are now considered gender neutral. But while the formal use of the generic masculine only really clings on in the writings of pedants who still insist on using 'he' to mean 'he or she', it has made something of a comeback in the informal usage of Americanisms such as 'dude' and 'guys', and, in the UK, 'lads' as supposedly gender-neutral terms. A recent row in the UK also showed that, for some, male default still matters an awful lot: when in 2017 the first female head of London's Fire Brigade, Dany Cotton, suggested that we should replace 'fireman' with the now standard (and let's face it, much cooler) 'firefighter', she received a deluge of hate mail.[29]

Languages such as French, German and Spanish, however, are what is called 'gender-inflected', and here the concept of masculine and feminine is woven into the language itself. All nouns are gendered either masculine or feminine. A table is feminine, but a car is masculine: *la mesa roja* (the red table); *el coche rojo* (the red car). When it comes to nouns that refer to people, while both male and female terms exist, the standard gender is always masculine. Try searching Google for 'lawyer' in German. It comes back '*Anwalt*', which literally means male lawyer, but is also used generically as just 'lawyer'. If you want to refer to a female lawyer specifically you would say '*Anwältin*' (incidentally, the way female terms are often, as here, modified male terms is another subtle way we position the female as a deviation from male type – as, in de Beauvoir's terms, 'Other'). The generic masculine is also used when referring to groups of people: when the gender is unknown, or if it's a mixed

group the generic masculine is used. So a group of one hundred female teachers in Spanish would be referred to as '*las profesoras*' – but as soon as you add a single male teacher, the group suddenly becomes '*los profesores*'. Such is the power of the default male.

In gender-inflected languages the generic masculine remains pervasive. Job vacancies are still often announced with masculine forms – particularly if they are for leadership roles.[30] A recent Austrian study of the language used in leadership jobs ads found a 27:1 ratio of masculine to 'gender-fair forms' (using both the male and female term).[31] The European Parliament believes it has found a solution to this problem, and since 2008 has recommended that '(m/f)' be added on the end of job ads in gender-inflected languages. The idea is that this makes the generic masculine more 'fair' by reminding us that women exist. It's a nice idea – but it wasn't backed up by data. When researchers *did* test its impact they found that it made no difference to the exclusionary impact of using the generic masculine on its own – illustrating the importance of collecting data and *then* creating policy.[32]

Does all this arguing over words make any real world difference? Arguably, yes. In 2012, a World Economic Forum analysis found that countries with gender-inflected languages, which have strong ideas of masculine and feminine present in almost every utterance, are the most unequal in terms of gender.[33] But here's an interesting quirk: countries with genderless languages (such as Hungarian and Finnish) are not the most equal. Instead, that honour belongs to a third group, countries with 'natural gender languages' such as English. These languages allow gender to be marked (female teacher, male nurse) but largely don't encode it into the words themselves. The study authors suggested that if you can't mark gender in any way you can't 'correct' the hidden bias in a language by emphasising 'women's presence in the world'. In short: because men go without saying, it matters when women literally can't get said at all.

It's tempting to think that the male bias that is embedded in language is simply a relic of more regressive times, but the evidence does not point that way. The world's 'fastest-growing language',[34] used by more than 90% of the world's online population, is emoji.[35] This language originated in Japan in the 1980s and women are its heaviest users:[36] 78% of women versus 60% of men frequently use emoji.[37] And yet, until 2016, the world of emojis was curiously male.

The emojis we have on our smartphones are chosen by the rather grand-sounding 'Unicode Consortium', a Silicon Valley-based group of organisations that work together to ensure universal, international software standards. If Unicode decides a particular emoji (say 'spy') should be added to the current stable, they will decide on the code that should be used. Each phone manufacturer (or platform such as Twitter and Facebook) will then design their own interpretation of what a 'spy' looks like. But they will all use the same code, so that when users communicate between different platforms, they are broadly all saying the same thing. An emoji face with heart eyes is an emoji face with heart eyes.

Unicode has not historically specified the gender for most emoji characters. The emoji that most platforms originally represented as a man running, was not called 'man running'. It was just called 'runner'. Similarly the original emoji for police officer was described by Unicode as 'police officer', not 'policeman'. It was the individual platforms that all interpreted these gender-neutral terms as male.

In 2016, Unicode decided to do something about this. Abandoning their previously 'neutral' gender stance, they decided to explicitly gender all emojis that depicted people.[38] So instead of 'runner' which had been universally represented as 'male runner', Unicode issued code for explicitly male runner and explicitly female runner. Male and female options now exist for all professions and athletes. It's a small victory, but a significant one.

It's easy to slam phone manufacturers and social media platforms as sexist (and, as we shall see, they are, if often unknowingly), but the reality is that even if they had somehow managed to design an image of a 'gender neutral' runner, most of us would still have read that runner as male, because we read most things as male unless they are specifically marked as female. And so while it is of course to be hoped that angry grammarians will come round to the idea that saying 'he and she' (or even, God forbid, 'she and he') instead of just 'he' may not be the worst thing that has ever happened to them, the truth is that getting rid of the generic masculine would only be half the battle: male bias is so firmly embedded in our psyche that even genuinely gender-neutral words are read as male.

A 2015 study identified the top five words used to refer to people in human–computer interaction papers published in 2014 and found that they are all apparently gender neutral: user, participant, person, designer and researcher.[39] Well done, human–computer interaction academics! But there is (of course) a catch. When study participants were instructed to think about one of these words for ten seconds and then draw an image of it, it turned out that these apparently gender-neutral words were not perceived as equally likely to be male or female. For male participants, only 'designer' was interpreted as male less than 80% of the time (it was still almost 70% male). A researcher was more likely to be depicted as of no gender than as a female. Women were slightly less gender-biased, but on the whole were still more likely to read gender-neutral words as male, with only 'person' and 'participant' (both read by about 80% of male participants as male) being about 50/50.

This rather disheartening finding tallies with decades of 'draw a scientist' data, where participants overwhelmingly draw men (the bias has historically been so extreme that media around the world celebrated as great progress a recent paper which found that 28%

of children now draw women).[40] It also tallies, perhaps more disturbingly, with a 2008 study in which Pakistani students (aged nine and ten) who were asked to draw an image of 'us'.[41] Hardly any of the female students drew women and none of the male students did.

We don't even allow non-humans to escape our perception of the world as overwhelmingly male: when researchers in one study attempted to prompt participants to see a gender-neutral stuffed animal as female by using female pronouns, children, parents and carers still overwhelmingly referred to the animal as 'he'.[42] The study found that an animal must be 'super-feminine' before 'even close to half of participants will refer to it as she rather than he'.

To be fair, it's not an entirely unreasonable assumption: often it really is a he. A 2007 international study of 25,439 children's TV characters found that only 13% of non-human characters are female (the figure for female human characters was slightly better, although still low at 32%).[43] An analysis of G-rated (suitable for children) films released between 1990 and 2005 found that only 28% of speaking roles went to female characters – and perhaps even more tellingly in the context of humans being male by default, women made up only 17% of crowd scenes.[44]

Men don't just have more roles, they also spend twice as much time on screen – this rises to nearly three times as much when, as most films do, the film has a male lead.[45] Only when the lead is female do men and women appear about as often as each other (as opposed to women getting, as you might expect, the majority of screen time). Men also get more lines, speaking twice as much as women overall; three times as much in films with male leads; and almost twice as much in films with male and female co-leads. Again it is only in the few films with female leads where male and female characters drew even on screen time.

This imbalance is found not just in films and TV. It's everywhere.

It's in statues: when I counted all the statues in the UK's Public Monuments and Sculptures Association database I found that there were more statues of men called John than there were of historical, named, non-royal women (the only reason adding royal women to the figure just beats the Johns is down to Queen Victoria, whose enthusiasm for putting up statues of herself I have a grudging respect for).

It's on banknotes: in 2013 the Bank of England announced they were replacing the only female historical figure on their banknotes with another man (I fought a successful campaign against it and campaigns have cropped up in other countries, including Canada and the US).[46]

It's in the news media: every five years since 1995, the Global Media Monitoring Project has evaluated the world's print and broadcast media for its representation of women. Its latest report, published in 2015, found that 'women make up only 24% of the persons heard, read about or seen in newspaper, television and radio news, exactly as they did in 2010'.[47]

It's even in school textbooks. Thirty years of language and grammar textbook studies in countries including Germany, the US, Australia, and Spain have found that men far outnumber women in example sentences (on average by about 3:1).[48] A US study of eighteen widely used high-school history textbooks published between 1960 and 1990 found that pictures of named men outnumbered pictures of named women by a ratio of about 18 to 100 and that only 9% of the names in the indexes were women (a figure that persisted into the 2002 edition of one of the textbooks).[49] More recently, a 2017 analysis of ten introductory political-science textbooks found that an average of only 10.8% of pages per text referenced women (some texts were as low as 5.3%).[50] The same level of male bias has been found in recent analyses of Armenian, Malawian, Pakistani, Taiwanese, South African and Russian textbooks.[51]

So widespread is this cultural bias towards representing men that the makers of the classic sci-fi action game series, *Metroid*, relied on it when they wanted to surprise their users. 'We wondered what would surprise everyone and talked about removing [main character] Samus's helmet. Then someone said, 'It would be a shocker if Samus turned out to be a woman!' they recalled in a recent interview.[52] And to make sure everyone really got it, they put her in a pink bikini and hip-jutting pose.

Metroid was – and remains – something of an outlier in gaming. Although a 2015 Pew Research Center report[53] found that equal numbers of American men and women play video games, only 3.3%[54] of the games spotlighted at press conferences during 2016's E3 (the world's largest annual gaming expo) starred female protagonists. This is actually lower than the figure for 2015 which, according to Feminist Frequency, was 9%.[55] If female playable characters do make it into a game they are still often framed as just another feature. At E3 2015 the director of *Fallout 4*, Todd Howard, revealed how easy it was to switch between male and female playable characters – only to switch back to the male version for the rest of the demo.[56] As Feminist Frequency remarked when they released their data on E3 2016, 'heroes are male by default'.[57]

The result of this deeply male-dominated culture is that the male experience, the male perspective, has come to be seen as universal, while the female experience – that of half the global population, after all – is seen as, well, niche. It is because what is male is universal that when a professor at Georgetown University named her literature course 'White Male Writers', she hit the headlines, while the numerous courses on 'female writers' pass unremarked.[58]

It is because what is male is universal (and what is female is niche) that a film about the fight of British women for their right to vote is slammed (in the *Guardian*, no less) as 'peculiarly hermetic' for not covering the First World War – sadly proving that Virginia Woolf's

1929 observation ('This is an important book, the critic assumes, because it deals with war. This is an insignificant book because it deals with the feelings of women in a drawing-room') is still relevant today.[59] It is why V. S. Naipaul criticises Jane Austen's writing as 'narrow', while at the same time no one is expecting *The Wolf of Wall Street* to address the Gulf War, or Norwegian writer Karl Ove Knausgaard to write about anyone but himself (or quote more than a single female writer) to receive praise from the *New Yorker* for voicing 'universal anxieties' in his six-volume autobiography.

It is why the England national football team page on Wikipedia is about the men's national football team, while the women's page is called the England women's national football team, and why in 2013 Wikipedia divided writers into 'American Novelists' and 'American Women Novelists'. It is why a 2015 study of multiple language Wikipedias found that articles about women include words like 'woman', 'female' or 'lady', but articles about men don't contain words like 'man', 'masculine' or 'gentleman' (because the male sex goes without saying).[60]

We class the fourteenth to seventeenth centuries as 'the Renaissance' even though, as social psychologist Carol Tavris points out in her 1991 book *The Mismeasure of Woman*, it wasn't a renaissance for women, who were still largely excluded from intellectual and artistic life. We call the eighteenth century 'the Enlightenment', even though, while it may have expanded 'the rights of man', it 'narrowed the rights of women, who were denied control of their property and earnings and barred from higher education and professional training'. We think of ancient Greece as the cradle of democracy although the female half of the population were explicitly excluded from voting.

In 2013, British tennis player Andy Murray was lauded across the media for ending Britain's '77-year wait' to win Wimbledon, when in fact Virginia Wade had won it in 1977. Three years later,

Murray was informed by a sports reporter that he was 'the first person ever to win two Olympic tennis gold medals' (Murray correctly replied that 'Venus and Serena have won about four each').[61] In the US it is a truth universally acknowledged that its soccer team has never won the World Cup or even reached the final – except it has. Its women's team has won four times.[62]

Recent years have seen some laudable attempts to address this relentless male cultural bias, but these are often met with hostility. When Thor was reinvented as a woman by Marvel Comics,[63] fans revolted – although as *Wired* magazine pointed out, 'no one uttered a peep' when Thor was replaced by a frog.[64] When the *Star Wars* franchise released two films in a row with a female lead howls of outrage reverberated around the manosphere.[65] One of the UK's longest-running television shows (*Doctor Who*) is a sci-fi fantasy series about a shape-shifting alien who periodically morphs into a new body, and the alien's first twelve incarnations were all male. But in 2017, for the first time, the doctor morphed into a woman. In response, former doctor Peter Davison expressed 'doubts' about the wisdom of casting a woman in the role of Doctor Who.[66] He preferred the idea of the doctor as 'a boy' and mourned 'the loss of a role model for boys'. Upset men took to Twitter calling for a boycott of the show, condemning the decision as 'PC' and 'liberal' virtue-signalling.[67]

Colin Baker, the body into whom the Peter Davison doctor had morphed, disagreed with his predecessor. Boys have 'had fifty years of having a role model', he argued. And in any case, he mused, do you have to be the same gender as someone to be a role model? 'Can't you be a role model as people?' Not really, Colin, because as we've seen, 'people' tends to be read as male. And in any case, while there is evidence that women can to a certain extent accept men as role models, men won't do the same for women. Women will buy books by and about men, but men won't buy books by and about

women (or at least not many).[68] When adventure video game series *Assassin's Creed* announced in 2014 that it would not be possible to play as a female assassin in their new cooperative multiplayer mode, some male players were pleased with the decision.[69] Playing as a woman would alienate them from the game, they argued.

Journalist Sarah Ditum has little time for this argument. 'Come on now,' she chided in a column. 'You've played games as a blue hedgehog. As a cybernetically augmented space marine. As a sodding dragon-tamer. [...B]ut the idea that women can be protagonists with an inner life and an active nature is somehow beyond your imaginative capacities?'[70] Ditum is of course technically right. It *should* be easier to imagine yourself as a woman than as a blue hedgehog. But on the other hand she's also wrong, because that blue hedgehog has one particularly important similarity with male players, even more so than species alignment, and that is that Sonic the hedgehog is male. We know this because he isn't pink, he doesn't have a bow in his hair, and he doesn't simper. He is the standard, unmarked gender, not the atypical one.

This kind of negative reaction to the introduction of women is witnessed all over the cultural landscape. When in 2013 I campaigned to have a female historical figure on the back of English banknotes some men got so angry that they felt compelled to threaten me with rape, mutilation and death. Not all the men who disliked the campaign went that far, of course, but the sense of injustice was still clear in the more measured responses I got. I remember one man expostulating, 'but women are everywhere now!' Clearly, given I was having to campaign so hard for the inclusion of one woman, they aren't, but his perspective was nevertheless telling. These men were experiencing even minor female representation as an iniquity. As far as they were concerned, the playing field was already level, and the entirely male line-up was just an objective reflection of merit.

Before they caved, the Bank of England's case for their all-male line-up also rested on the meritocracy argument: historical figures were, they said, chosen using an 'objective selection criteria'. To join the 'gilded list' of 'key figures from our past', a person must fulfil the following: have broad name recognition; have good artwork; not be controversial; and have made 'a lasting contribution which is universally recognised and has enduring benefits'. Reading these subjective designations of worth, I realised how the Bank had ended up with five white men on its banknotes: the historical gender data gap means that women are just far less likely to be able to fulfil any of these 'objective' criteria.

In 1839 the composer Clara Schumann wrote in her diary, 'I once thought that I possessed creative talent, but I have given up this idea; a woman must not desire to compose – not one has been able to do it, and why should I expect to?' The tragedy is, Schumann was wrong. Women before her *had* been able to do it, and they included some of the most successful, prolific and influential composers of the seventeenth and eighteenth centuries.[71] It's just that they didn't have 'broad name recognition', because a woman barely has to die before she is forgotten – or before we consign her work to the gender data gap by attributing it to a man.

Felix Mendelssohn published six of his sister Fanny Hensel's pieces under his own name and in 2010 another manuscript previously thought to be his was proven to be Hensel's.[72] For years classical scholars argued that the Roman poet Sulpicia couldn't possibly have written the verses signed with her name – they were too good, not to mention too smutty.[73] Judith Leyster, one of the first Dutch women to be admitted to an artists' guild, was renowned in her time, but after her death in 1660 she was erased, her work attributed to her husband. In 2017, new works by nineteenth-century artist Caroline Louisa Daly were discovered – they had been previously attributed to men, one of whom was not even an artist.[74]

At the turn of the twentieth century, award-winning British engineer, physicist and inventor Hertha Ayrton remarked that while errors overall are 'notoriously hard to kill [...] an error that ascribes to a man what was actually the work of a woman has more lives than a cat'. She was right. Textbooks still routinely name Thomas Hunt Morgan as the person who discovered that sex was determined by chromosomes rather than environment, despite the fact that it was Nettie Stevens' experiments on mealworms that established this – and despite the existence of correspondence between them where Morgan writes to ask Stevens for details of her experiment.[75] Cecilia Payne-Gaposchkin's discovery that the sun is predominantly composed of hydrogen is often credited to her male supervisor.[76] Perhaps the most famous example of this kind of injustice is Rosalind Franklin, whose work (she had concluded via her X-ray experiments and unit cell measurements that DNA consisted of two chains and a phosphate backbone) led James Watson and Francis Crick (now Nobel Prize-winning household names) to 'discover' DNA.

None of this means that the Bank of England deliberately set out to exclude women. It just means that what may seem objective can actually be highly male-biased: in this case, the historically widespread practice of attributing women's work to men made it much harder for a woman to fulfil the Bank's requirements. The fact is that worth is a matter of opinion, and opinion is informed by culture. And if that culture is as male-biased as ours is, it can't help but be biased against women. By default.

The case of the Bank's subjective selection criteria also shows how male default can be both a cause and a consequence of the gender data gap. By neglecting to account for the historical gender data gap, the Bank's selection procedure for historical figures was designed around the kind of success typically achieved by men; even a requirement as seemingly benign as that the figure

not be controversial, well, as the historian Laurel Thatcher Ulrich famously put it, 'well-behaved women seldom make history'. The result was that the Bank not only failed to correct for the historical gender data gap: it perpetuated it.

Such subjective designations of worth masquerading as objectivity crop up all over the place. In 2015 a British A level student called Jesse McCabe noticed that of the sixty-three set works included in her music syllabus, not a single one was by a woman. When she wrote to her exam board, Edexcel, they defended the syllabus. 'Given that female composers were not prominent in the western classical tradition (or others for that matter),' they wrote, 'there would be very few female composers that could be included.' The phrasing here is important. Edexcel doesn't mean that there simply aren't any female composers – after all, the *International Encyclopaedia of Women Composers* alone has more than 6,000 entries. What they are talking about here is 'the canon', that is, the body of works generally agreed to have been the most influential in shaping western culture.

Canon formation is passed off as the objective trickle-down of the musical marketplace, but in truth it is as subjective as any other value judgment made in an unequal society. Women have been locked out of the canon wholesale because what success looked like in composing has historically been almost impossible for women to achieve. For most of history, if women were allowed to compose at all, it was for a private audience and domestic setting. Large orchestral works, so crucial for the development of a composer's reputation, were usually off limits, considered 'improper'.[77] Music was an 'ornament' for women, not a career.[78] Even by the twentieth century, Elizabeth Maconchy (who was the first woman ever to chair the Composers' Guild of Great Britain), was being curtailed in her ambitions by publishers such as Leslie Boosey, who 'couldn't take anything except little songs from a woman'.

Even if the 'little songs' women were allowed to write were enough to earn you a place in the canon, women simply didn't have the resources or position to ensure their legacy. In her book *Sounds and Sweet Airs: The Forgotten Women of Classical Music*, Anna Beer compares the prolific seventeenth-century composer Barbara Strozzi (who 'had more music in print in her lifetime than any other composer of the era') to one of her male contemporaries, Francesco Cavalli. As head of music at St Mark's in Venice (a position not open to women at the time), Cavalli had the money and the stature to ensure all his works, including the many he did not publish in his lifetime, were kept in a library. He could pay for an archivist to look after them, and he could, and did, pay for the Masses he composed to be sung on the anniversary of his death. In the face of such inequality of resources, Strozzi never stood a chance of being remembered on an equal footing. And to continue to insist on the primacy of a canon that excludes women like her is to perpetuate the male-biased injustices of the past.

As well as going some way to explaining their exclusion from cultural history, the exclusion of women from positions of power is often given as an excuse for why, when we teach them about the past, we teach children almost exclusively about the lives of men. In 2013, a battle raged in Britain over what we mean by 'history'. On one side was the then British Secretary of State for Education, Michael Gove, brandishing his proposed new 'back to basics' national history curriculum.[79] An army of twenty-first-century Gradgrinds, he and his supporters insisted that children needed 'facts'.[80] They needed a 'foundation of knowledge'.

This 'foundation of knowledge', the 'basic' blocks of 'facts' which every child should know, was notable, amongst other gaps, for its almost wholesale absence of women. No women appeared in Key Stage 2 (ages seven to eleven) at all, other than two Tudor queens. Key Stage 3 (ages eleven to fourteen) included only five women,

four of whom (Florence Nightingale, Mary Seacole, George Eliot and Annie Besant) were lumped together under 'The Changing Role of Women' – rather implying, not without reason, that the rest of the curriculum was about men.

In 2009, prominent British historian David Starkey criticised female historians for, in his opinion, focusing too much on Henry VIII's wives rather than the king himself who, he railed, should be 'centre stage'.[81] Dismissing the 'soap opera' of his personal life as secondary to the formal political consequences of his rule, such as the Reformation, Starkey insisted that '[i]f you are to do a proper history of Europe before the last five minutes it is a history of white males because they were the power players, and to pretend anything else is to falsify'.

Starkey's position rests on the assumption that what takes place in the private realm is unimportant. But is that a fact? The private life of Agnes Huntingdon (born after 1320) is revealed through snippets in public documents from the court cases concerning her two marriages.[82] We discover that she was a victim of domestic abuse, and that her first marriage was disputed because her family disapproved of her choice. On the evening of 25 July 1345 she ran away from her second husband after he attacked her; later that night he turned up at her brother's house with a knife. Is the abuse (and lack of freedom of choice) of a fourteenth-century woman private irrelevancies, or part of the history of female subjugation?

The arbitrary division of the world into 'private' and 'public' is in any case arguably a false distinction. Invariably both bleed into each other. When I spoke to Katherine Edwards, a history teacher who was heavily involved in the fight against Gove's reforms, she pointed to recent research on women's role in the American Civil War. Far from being an irrelevance, 'women and their conception of their own role completely undermined the whole Confederate war effort'.

Elite women, brought up to believe absolutely in the myth of their own helplessness, simply could not get over their understanding of work as intrinsically unfeminine. Unable to bring themselves to take up the jobs vacated by enlisted men, they wrote to their husbands begging them to desert, to come home and protect them. Poorer women proved a headache in a more proactive way, as they organised resistance to Confederate policies, 'because they were starving basically, and they needed to feed their families'. Excluding women from an analysis of the outcome of the American Civil War not only constitutes a gender data gap, but also a data gap in the understanding of the construction of the United States itself. That seems like a 'fact' worth knowing.

The history of humanity. The history of art, literature and music. The history of evolution itself. All have been presented to us as objective facts. But the reality is, these facts have been lying to us. They have all been distorted by a failure to account for half of humanity – not least by the very words we use to convey our half-truths. This failure has led to gaps in the data. A corruption in what we think we know about ourselves. It has fuelled the myth of male universality. And that *is* a fact.

The persistence of this myth continues to affect how we see ourselves today – and if the past few years have shown us anything it is that how we see ourselves is not a minor concern. Identity is a potent force that we ignore and misread at our peril: Trump, Brexit and ISIS (to name just three recent examples) are global phenomena that have upended the world order – and they are all, at heart, identity-driven projects. But misreading and ignoring identity is exactly what obfuscating maleness under the guise of gender-neutral universality causes us to do.

A man I briefly dated tried to win arguments with me by telling me I was blinded by ideology. I couldn't see the world objectively, he said, or rationally, because I was a feminist and I saw everything

through feminist eyes. When I pointed out that this was true for him too (he identified as a libertarian) he demurred. No. That was just objective, common sense – de Beauvoir's 'absolute truth'. For him, the way he saw the world was universal, while feminism – seeing the world from a female perspective – was niche. Ideological.

I was reminded of this man in the wake of the 2016 US presidential election, when it felt you couldn't move for tweets, speeches and op-eds by (usually) white men decrying the ills of what they called 'identity politics'. Ten days after Donald Trump's victory, the *New York Times* published an article by Mark Lilla, professor of humanities at Columbia University, that criticised Clinton for 'calling out explicitly to African American, Latino, LGBT and women voters'.[83] This left out, he said, 'the white working class'. Lilla presented Clinton's 'rhetoric of diversity' as mutually exclusive with 'a large vision', linking this 'narrow' vision (clearly, Lilla has been reading his V. S. Naipaul) with what he felt he was witnessing with college students. Students today, he claimed, were so primed to focus on diversity that they 'have shockingly little to say about such perennial questions as class, war, the economy and the common good'.

Two days after this was published, ex-Democratic candidate Bernie Sanders was in Boston at a stop on his book tour[84] explaining that 'It is not good enough for someone to say, I'm a woman! Vote for me!'[85] In Australia, Paul Kelly, editor of the *Australian*, described Trump's victory as 'a revolt against identity politics',[86] while over in the UK, Labour MP Richard Burgon tweeted that Trump's inauguration was 'what can happen when centre/left parties abandon transformation of economic system and rely on identity politics'.[87]

The *Guardian*'s Simon Jenkins concluded the *annus horribilis* that was 2016 with a diatribe against 'the identity apostles', who had been 'over-defensive' of minorities, and thus killed off liberalism.

'I have no tribe,' he wrote. He could not 'join the prevailing hysteria'. What he wanted was 'to re-enact the glorious revolution of 1832' – which resulted in the extension of the British franchise to a few extra hundred thousand men of property.[88] Heady days, indeed.

These white men have in common the following opinions: that identity politics is only identity politics when it's about race or sex; that race and sex have nothing to do with 'wider' issues like 'the economy'; that it is 'narrow' to specifically address the concerns of female voters and voters of colour; and that working class means white working-class men. Incidentally, according to the US Bureau of Labor Statistics, the coal mining industry, which during the 2016 election became the shibboleth for (implicitly male) working-class jobs, provides 53,420 jobs in total, at a median annual wage of $59,380.[89] Compare this to the majority female 924,640-strong cleaning and housekeeper workforce, whose median annual income is $21,820.[90] So who's the real working class?

These white men also have in common that they are white men. And I labour this point because it is exactly their whiteness and maleness that caused them to seriously vocalise the logical absurdity that identities exist only for those who happen not to be white or male. When you have been so used, as a white man, to white and male going without saying, it's understandable that you might forget that white and male is an identity too.

Pierre Bourdieu wrote in 1977 that 'what is essential goes without saying because it comes without saying: the tradition is silent, not least about itself as a tradition'.[91] Whiteness and maleness are silent precisely because they do not need to be vocalised. Whiteness and maleness are implicit. They are unquestioned. They are the default. And this reality is inescapable for anyone whose identity does not go without saying, for anyone whose needs and perspective are routinely forgotten. For anyone who is used to jarring up against a world that has not been designed around them and their needs.

The way whiteness and maleness go without saying brings me back to my bad date (OK, dates), because it is intrinsically linked to the misguided belief in the objectivity, the rationality, the, as Catherine Mackinnon has it, 'point-of-viewlessness' of the white, male perspective. Because this perspective is not articulated as white and male (because it doesn't need to be), because it is the norm, it is presumed not to be subjective. It is presumed to be objective. Universal, even.

This presumption is unsound. The truth is that white and male is just as much an identity as black and female. One study which looked specifically at white Americans' attitudes and candidate preferences found that Trump's success reflected the rise of 'white identity politics', which the researchers defined as 'an attempt to protect the collective interests of white voters via the ballot box'.[92] White identity, they concluded, 'strongly predicts a preference for Trump'. And so did male identity. 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'.[93] In fact, hostile sexism was nearly as good at predicting support for Trump as party identification. And the only reason this is a surprise to us is because we are so used to the myth of male universality.

The presumption that what is male is universal is a direct consequence of the gender data gap. Whiteness and maleness can only go without saying because most other identities never get said at all. But male universality is also a *cause* of the gender data gap: because women aren't seen and aren't remembered, because male data makes up the majority of what we know, what is male *comes* to be seen as universal. It leads to the positioning of women, half the global population, as a minority. With a niche identity and a subjective point of view. In such a framing, women are set up to be forgettable. Ignorable. Dispensable – from culture, from history, from data. And so, women become invisible.

Invisible Women is the story of what happens when we forget to account for half of humanity. It is an exposé of how the gender data gap harms women when life proceeds, more or less as normal. In urban planning, politics, the workplace. It is also about what happens to women living in a world built on male data when things go wrong. When they get sick. When they lose their home in a flood. When they have to flee that home because of war.

But there is hope in this story too, because it's when women are able to step out from the shadows with their voices and their bodies that things start to shift. The gaps close. And so, at heart, *Invisible Women* is also a call for change. For too long we have positioned women as a deviation from standard humanity and this is why they have been allowed to become invisible. It's time for a change in perspective. It's time for women to be seen.