4 "What Gets Counted Counts"

Principle: Rethink Binaries and Hierarchies

Data feminism requires us to challenge the gender binary, along with other systems of counting and classification that perpetuate oppression.

"Sign in or create an account to continue." At a time in which every website seems to require its own user account, these words often elicit a groan—and the inevitability of yet another password that will soon be forgotten. But for people like Maria Munir, the British college student who famously came out as nonbinary to then president Barack Obama on live TV, the prospect of creating a new user account is more than mere annoyance.[1] Websites that require information about gender as part of their account registration process almost always only provide a binary choice: "male or female."[2] For Munir, those options are insufficient. They also take an emotional toll: "I wince as I'm forced to choose 'female' over 'male' every single time, because that's what my passport says, and ... being non-binary is still not legally recognised in the UK," Munir explains.[3]

For the millions of nonbinary people in the world—that is, people who are not *either* male *or* female, men *or* women—the seemingly simple request to "select gender" can be difficult to answer, if it can be answered at all.[4] Yet when creating an online user account, not to mention applying for a national passport, the choice between "male" or "female," and only "male" or "female," is almost always the only one.[5] These options (or the lack thereof) have consequences, as Munir clearly states: "If you refuse to register non-binary people like me with birth certificates, and exclude us in everything from creating bank accounts to signing up for mailing lists, you do not have the right to turn around and say that there are not enough of us to warrant change."[6]

"What gets counted counts," feminist geographer Joni Seager has asserted, and Munir is one person who understands that.[7] What is counted—like being a man or a woman—often becomes the basis for policymaking and resource allocation. By contrast, what is not counted—like being nonbinary—becomes invisible (although there are also good reasons for being invisible in some contexts, and we'll come back to

those shortly). Seager's research focus is gender, the environment, and policy (see figure 4.1), and she points out that there is more global data on gender being collected than ever before. And yet, these data collection efforts often still leave many people out, including nonbinary people, lesbians, and older women. Even among those who are counted, they tend to be asked very narrow questions about their lives. "Women in poor countries seem to be asked about 6 times a day what kind of contraception they use," Seager quipped in a lecture at the Boston Public Library. "But they are not asked about whether they have access to abortion. They are not asked about what sports they like to play."[8]

The process of converting qualitative experience into data can be empowering, and even has the potential to be healing, as we address toward the end of this chapter. When thoughtfully collected, quantitative data can be empowering too. So many issues of structural inequality are problems of scale, and they can seem anecdotal until they are viewed as a whole. For instance, in 2014, when film professors Shelley Cobb and Linda Ruth Williams set out to count the women involved in the film industry in the United Kingdom, they encountered a woman screenwriter who had never before considered the fact that in the United Kingdom, women screenwriters are outnumbered by screenwriters of other genders at a rate of four to one.[9] She expressed surprise: "I didn't even know that because screenwriters never get to meet each other."[10]

A similar situation occurred in the example of ProPublica's reporting on maternal mortality in the United States, as discussed in chapter 1. The investigative team set out to count all the mothers who had died in childbirth or from complications shortly thereafter. They interviewed many families of women who had died while giving birth, but, like the screenwriter, few of the families were aware that the phenomenon extended beyond their own daughters and sisters, partners and friends. This lack of data, like the issue of maternal mortality itself, is another structural problem, and it serves as an example of why feminist sociologists like Ann Oakley have long advocated for the use of quantitative methods alongside qualitative ones. Without quantitative research, Oakley explains, "it is difficult to distinguish between personal experience and collective oppression."[11]

But before collective oppression can be identified through analyses like the one that ProPublica conducted, the data must exist in the first place. Which brings us back to Maria Munir and the importance of collecting data that reflects the population it purports to represent. On this issue, Facebook was ahead of the curve when, in 2014, it expanded the gender categories available to registered users from the standard two to over fifty choices, ranging from "Genderqueer" to "Neither"—a move that was widely praised by a range of LGBTQ+ advocacy groups (figure 4.2a).[12] One year later, when the

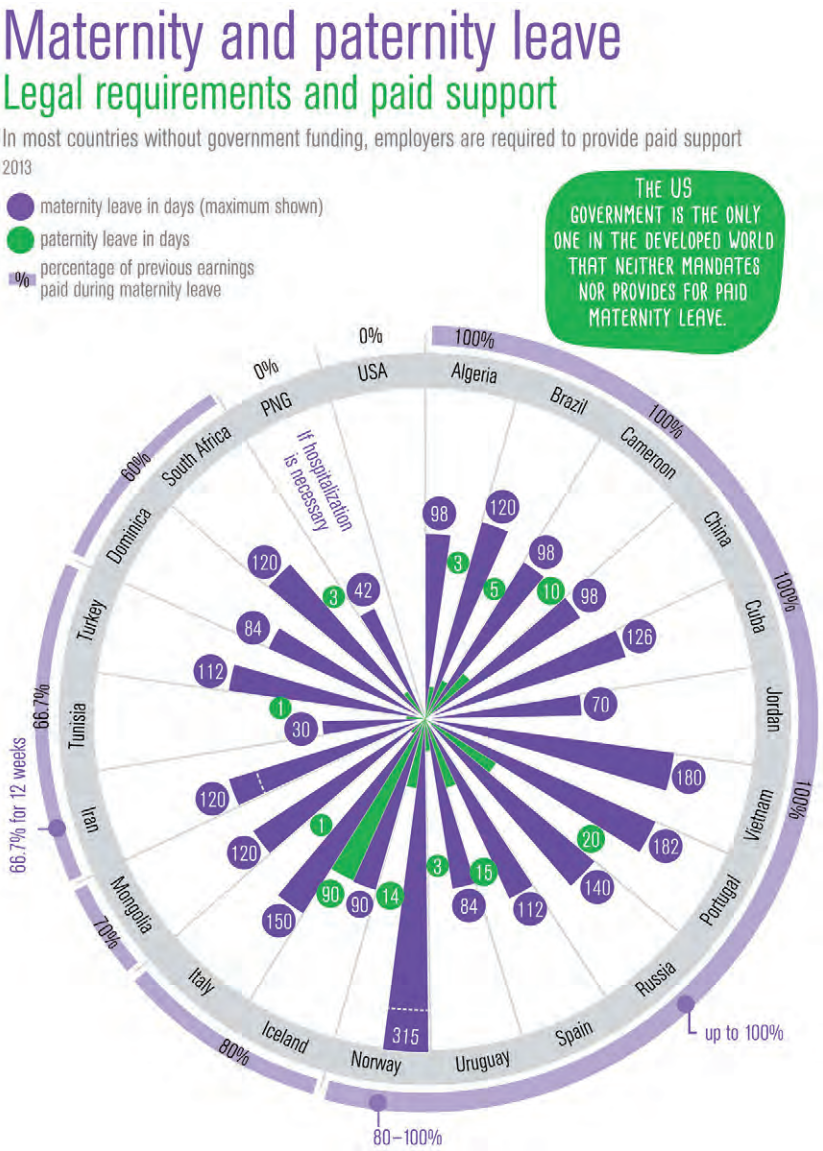


Figure 4.1
Maternity and paternity leave around the globe from *The Women's Atlas*, 5th edition (2018). Joni Seager and Annie Olson started working on the first women's atlas in 1980, when there was very little global data on women. The book is now in its fifth edition, but Seager highlights that there are still huge gender data gaps. Image courtesy of Joni Seager and Penguin Books.

company abandoned its select-from-options model altogether, replacing the "Gender" dropdown menu with a blank text field, the decision was touted as even more progressive (figure 4.2b).[13] Because Facebook users could input any word or phrase to indicate their gender, they were at last unconstrained by the assumptions imposed by any preset choice.[14]

But additional research by information studies scholar Rena Bivens has shown that below the surface, Facebook continues to resolve users' genders into a binary: either "male" or "female."[15] Evidently, this decision was made so that Facebook could allow its primary clients—advertisers—to more easily market to one gender or the other. Put another way, even if you can choose the gender that you show to your Facebook friends, you can't change the gender that Facebook provides to its paying customers (figure 4.3). And this discrepancy leads right back to the issues of power we've been discussing since the start of this book: it's corporations like Facebook, and not individuals like Maria Munir, who have the power to control the terms of data collection. This remains true even as it is people like Munir who have personally (and often painfully) run up against the limits of those classification systems—and who best know how they could be improved, remade, or in some cases, abolished altogether.

Feminists have spent a lot of time thinking about classification systems because the criteria by which people are divided into the categories of man and woman is exactly that: a classification system.[16] And while the gender binary is one of the most widespread classification systems in the world today, it is no less constructed than the Facebook advertising platform or, say, the Golden Gate Bridge. The Golden Gate Bridge is a physical structure; Facebook ads are a virtual structure; and the gender binary is a conceptual one. But all these structures were created by people: people living in a particular place, at a particular time, and who were influenced—as we all are—by the world around them.[17]

Many twentieth-century feminist scholars attempted to address the social construction of gender by treating gender as something separate from sex. But that distinction is increasingly breaking down. Both gender and sex are social constructs, as it turns out. Even sex, which today is sometimes still considered in biologically essential terms, has a distinct cultural history. It can be traced to a place (Europe) and a time (the Enlightenment) when new theories about democracy and what philosophers called "natural rights" began to emerge. Before then, there was a *hierarchy* of the sexes, with men on the top and women on the bottom. (Thanks, Aristotle![18]) But there wasn't exactly a *binary* distinction between those two (or any other) sexes. In fact, according to historian of sex and gender Thomas Laqueur, most people believed that women were just inferior men, with penises located inside instead of outside of their bodies and that—for reals!—could descend at any time in life.[19]

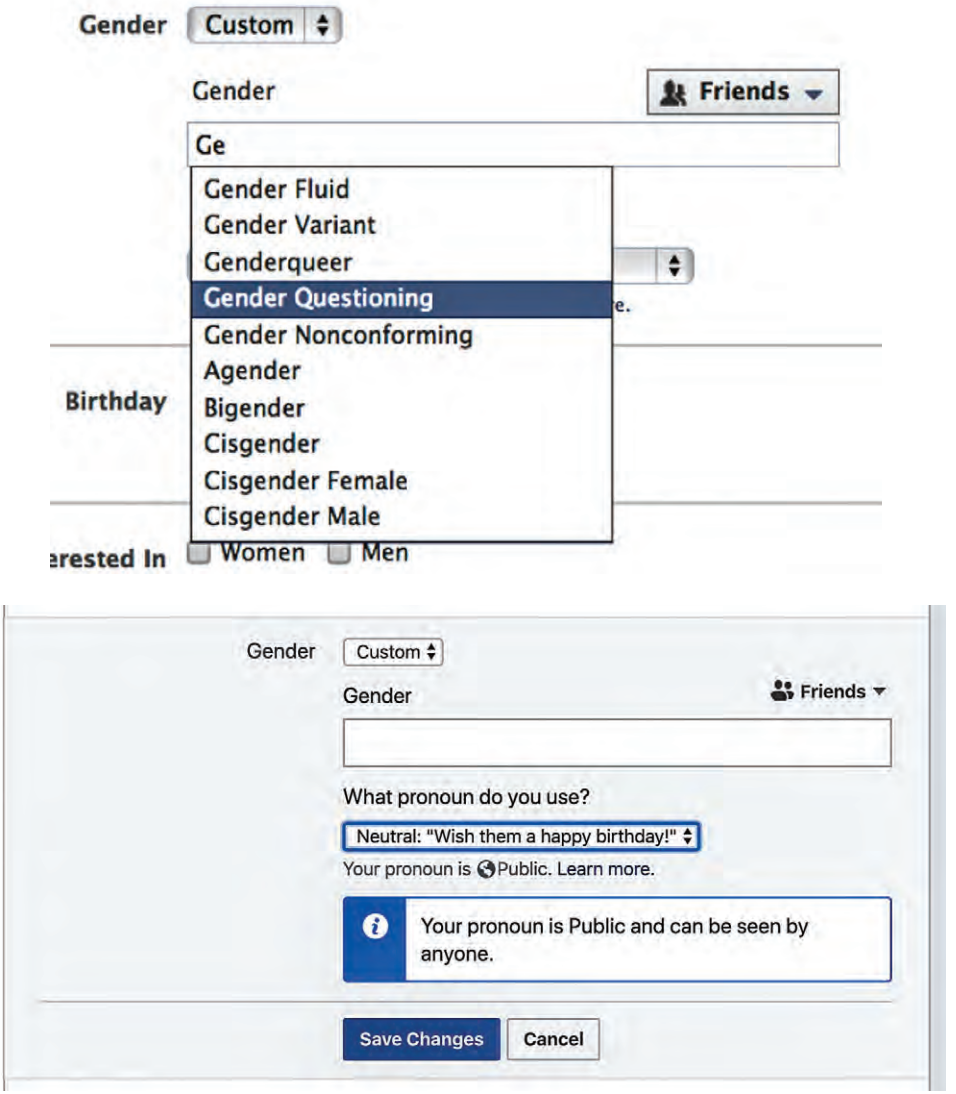


Figure 4.2
(a) Facebook's initial attempt to allow users to indicate additional genders, circa 2014. Image courtesy of *Slate*. (b) Facebook's updated gender field, circa 2018. Screenshot by Lauren F. Klein.

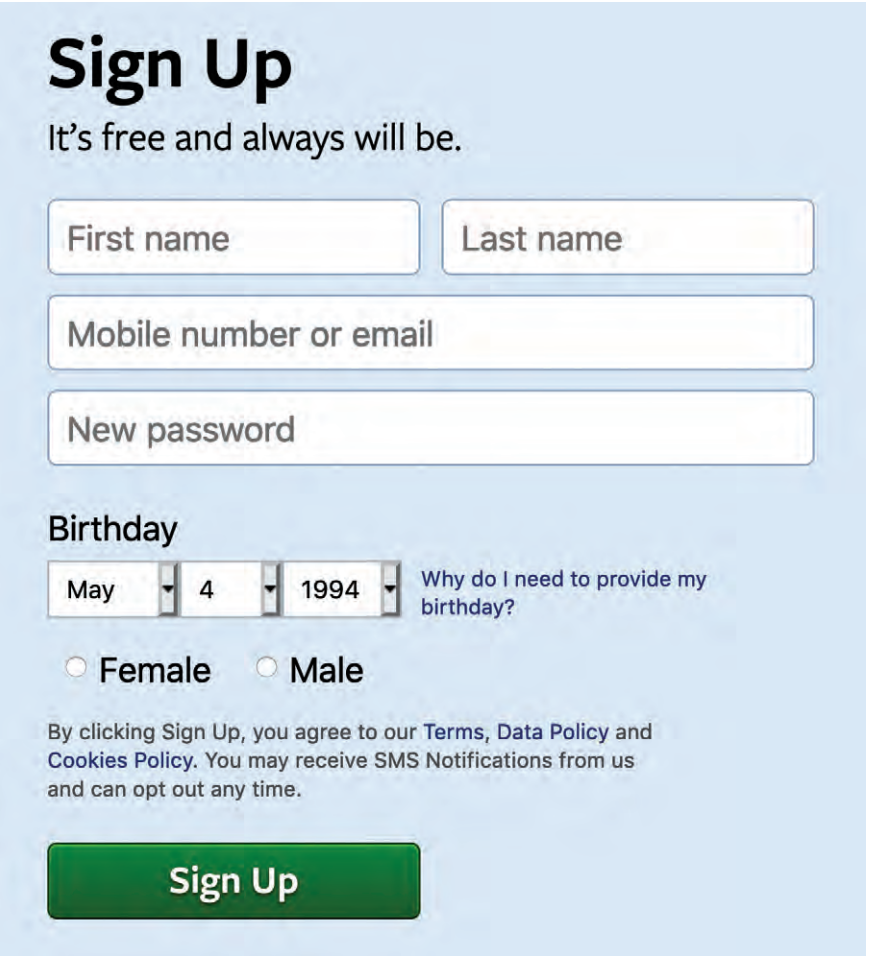


Figure 4.3
Detailed view of Facebook's new account creation page, circa 2018. Note that you still have to choose "Female" or "Male"—a binary choice—when you sign up. Screenshot by Lauren F. Klein.

For the idea of a sex binary to gain force, it would take figures like Thomas Jefferson declaring that all men were created equal, and entire countries like the United States to be founded on that principle. Once that happened, political leaders began to worry about what, exactly, they had declared: to whom did the principle of equality apply? All sorts of systems for classifying people have their roots in that era—not only sex but also, crucially, race.[20] Before the eighteenth century, Western societies understood race as a concept tied to religious affiliation, geographic origin, or some combination of

both. Race had very little to do with skin color until the rise of the transatlantic slave trade, in the seventeenth century.[21] And even then, race was still a hazy concept. It would take the scientific racism of the mid-eighteenth century for race to begin to be defined by Western societies in terms of black and white.

Take Carl Linnaeus, for example, and the revolutionary classification system that he is credited with creating.[22] Linnaeus's system of binomial classification is the one that scientists still use to today to classify humans and all other living things. But Linnaeus's system didn't just include the category of *homo sapiens*, as it turns out. It also incorrectly—but as historians would tell you, unsurprisingly—included five subcategories of humans separated by race. (One of these five was set aside for mythological humans who didn't exist in real life, in case you're still ready to get behind his science.) But Linnaeus's classification system wasn't even the worst of the lot. Over the course of the eighteenth century, increasingly racist systems of classification began to emerge, along with pseudosciences like comparative anatomy and physiognomy. These allowed elite white men to provide a purportedly scientific basis for the differential treatment of people of color, women, disabled people, and gay people, among other groups. Although those fields have long since been discredited, their legacy is still visible in instances as far-ranging as the maternal health outcomes that we've already discussed, to the divergent rates of car insurance that are offered to Black vs. white drivers, as described in an investigation conducted by ProPublica and Consumer Reports.[23] What's more, as machine learning techniques are increasingly extended into new domains of human life, scientific racism is itself returning. Pointing to and debunking one machine learning technique that employs images of faces in an attempt to classify criminals, three prominent artificial intelligence researchers—Blaise Agüera y Arcas, Margaret Mitchell, and Alexander Todorov—have asserted that scientific racism has "entered a new era."[24]

A simple solution might be to say, "Fine, then. Let's just not classify anything or anyone!" But the flaw in that plan is that data must be classified in some way to be put to use. In fact, by the time that information becomes data, it's already been classified in some way. Data, after all, is information made *tractable*, to borrow a term from computer science. "What distinguishes data from other forms of information is that it can be processed by a computer, or by computer-like operations," as Lauren has written in an essay coauthored with information studies scholar Miriam Posner.[25] And to enable those operations, which range from counting to sorting and from modeling to visualizing, the data must be placed into some kind of category—if not always into a conceptual category like gender, then at the least into a computational category like *Boolean* (a type of data with only two values, like true or false), *integer* (a type of

number with no decimal points, like 237 or –1), or *string* (a sequence of letters or words, like "this").

Classification systems are essential to any working infrastructure, as information theorists Geoffrey Bowker and Susan Leigh Star have argued in their influential book *Sorting Things Out*.[26] This is true not only for computational infrastructures and conceptual ones, but also for physical infrastructures like the checkout line at the grocery store. Think about how angry a shopper can get when they're stuck in the express line behind someone with more than the designated fifteen items or less. Or, closer to home, think of the system you use (or should use) to sort your clothes for the wash. It's not that we should reject these classification systems out of hand, or even that we could if we wanted to. (We're pretty sure that no one wants all their socks to turn pink.) It's just that once a system is in place, it becomes naturalized as "the way things are." This means we don't question how our classification systems are constructed, what values or judgments might be encoded into them, or why they were thought up in the first place. In fact—and this is another point made by Bowker and Star—we often forget to ask these questions until our systems become objects of contention, or completely break down.

Bowker and Star give the example of the public debates that took place in the 1990s around the categories of race employed on the US Federal Census. At issue was whether people should be able to choose multiple races on the census form. Multiracial people and their families were some of the main proponents of the option, who saw it as a way to recognize their multiple identities rather than forcing them to squeeze themselves into a single, inadequate box. Those opposed included the Congressional Black Caucus as well as some Black and Latinx civil rights groups that saw the option as potentially reducing their representative voice.[27] Ultimately, the 2000 census did allow people to choose multiple races, and millions of people took advantage of it. But the debates around that single category illustrate how classification gets complicated quickly, and with a range of personal and political stakes.[28]

Classification systems also carry significant material consequences, and the US Census provides an additional example of that. Census counts are used to draw voting districts, make policy decisions, and allocate billions of dollars in federal resources. The recent Republican-led proposal to introduce a question about citizenship status on the 2020 census represents an attempt to wield this power to very pointed political ends. Because undocumented immigrants know the risks, like deportation, that come with being counted, they are less likely to complete the census questionnaire. But because both political representation and federal funding are allocated according to the number and geographic areas of people counted in the census, undercounting

undocumented immigrants (and the documented immigrants they often live with) means less voting power—and fewer resources—accorded to those groups. This is a clear example of what we term the *paradox of exposure*: the double bind that places those who stand to significantly gain from being counted in the most danger from that same counting (or classifying) act.

In each of these cases, as is true of any case of not fitting (or not wanting to fit) neatly into a box, it's important to ask whether it's the categories that are inadequate, or whether—and this is a key feminist move—it's the system of classification itself. Lurking under the surface of so many classification systems are false binaries and implied hierarchies, such as the artificial distinctions between men and women, reason and emotion, nature and culture, and body and world. Decades of feminist thinking have taught us to question why these distinctions have come about; what social, cultural, or political values they reflect; what hidden (or not so hidden) hierarchies they encode; and, crucially, whether they should exist in the first place.

Questioning Classification Systems

Let's spend some time with an actual person who has started to question the classification systems that surround him: one Michael Hicks, an eight-year-old Cub Scout from New Jersey. Why is Mikey, as he's more commonly known, so concerned about classification? Well, Mikey shares his name with someone who has been placed on a terrorist watch list by the US federal government. As a result, Mikey has also been classified as a potential terrorist and is subjected to the highest level of airport security screening every time that he travels. "A terrorist can blow his underwear up and they don't catch him. But my 8-year-old can't walk through security without being frisked," his mother lamented to Lizette Alvarez, a reporter for the *New York Times* who covered the issue in 2010.[29]

Of course, in some ways, Mikey is lucky. He is white, so he does not run the risk of racial profiling—unlike, for example, the many Black women who receive TSA pat-downs due to their natural hair.[30] Moreover, Mikey's name sounds Anglo-European, so he does not need to worry about religious or ethnic profiling either—unlike, for another example, people named Muhammad who are disproportionately pulled over by the police due to their Muslim name.[31] But Mikey the Cub Scout still helps to expose the brokenness of some of the categories that structure the TSA's terrorist classification system; the combination of first and last name is simply insufficient to classify someone as a terrorist or not.

Or, consider another person with a history of bad experiences at the (literal) hands of the TSA. Sasha Costanza-Chock is nonbinary, like Maria Munir. They are also a design professor at MIT, so they have a lot of experience both living with and thinking through oppressive classification systems. In a 2018 essay, "Design Justice, A.I., and Escape from the Matrix of Domination," they give a concrete example of why design justice is needed in relation to data.[32] The essay describes how the seemingly simple system employed by the operators of those hands-in-the-air millimeter-wave airport security scanning machines is in fact quite complex—and also fundamentally flawed.

Few cisgender people are aware of the fact that before you step into a scanning machine, the TSA agent operating the machine looks you up and down, decides whether you are a man or a woman, and then pushes a button to select the corresponding gender on the scanner's touchscreen interface. That human decision loads the algorithmic profile for either male bodies or female ones, against which your body's measurements are compared. If your measurements diverge from the statistical norm of that gender's body—whether the discrepancy is because you're concealing a deadly weapon, because your body doesn't fit neatly into either of the two categories that the system has provided, or because the TSA agent simply made the wrong choice—you trigger a "risk alert." Then, in an act of what legal theorist Dean Spade terms *administrative violence*, you are subjected to the same full-body pat-down as a potential terrorist.[33] Here it's not that the scanning machines rely upon an insufficient number of categories, as in the case of Mikey the Cub Scout, or that they employ the wrong ones, as Mikey's mom would likely say. It's that the TSA scanners shouldn't rely on gender to classify air travelers to begin with. (And while we're going down that path, how about we imagine a future without a state agency that systematically pathologizes Black women and trans people and Cub Scouts in the first place?)

So when we say that what gets counted counts, it's folks like Sasha Costanza-Chock or Mikey Hicks or Maria Munir that we're thinking about. Because flawed classification systems—like the one that underlies the airport scanner's risk-detection algorithm or the one that determines which names end up on terrorist watch lists or simply (simply!) the gender binary—are not only significant problems in themselves, but also symptoms of a more global condition of inequality. The matrix of domination, which we introduced in chapter 1, describes how race, gender, and class (among other things) intersect to enhance opportunities for some people and constrain opportunities for others.[34] Under the matrix of domination, normative bodies pass through scanners, borders, and bathrooms with ease; these systems have been designed by people like them, for people like them, with an aim—sometimes explicit—of keeping people not like them out.[35]

As these examples help to show, the forces that operate through the matrix of domination are sneaky and diffuse. And they show up everywhere—even in pockets on pants. A recent journalistic investigation of the size of pockets in eighty pairs of men's and women's jeans confirmed what women (and men and nonbinary people who wear women's jeans) have been saying anecdotally for years: that their pants pockets just aren't big enough (figure 4.4).[36] More specifically, the pockets of jeans designed for women are 48 percent shorter and 6.5 percent narrower than the pockets of jeans designed for men. This size does matter! According to the same study, only 40 percent

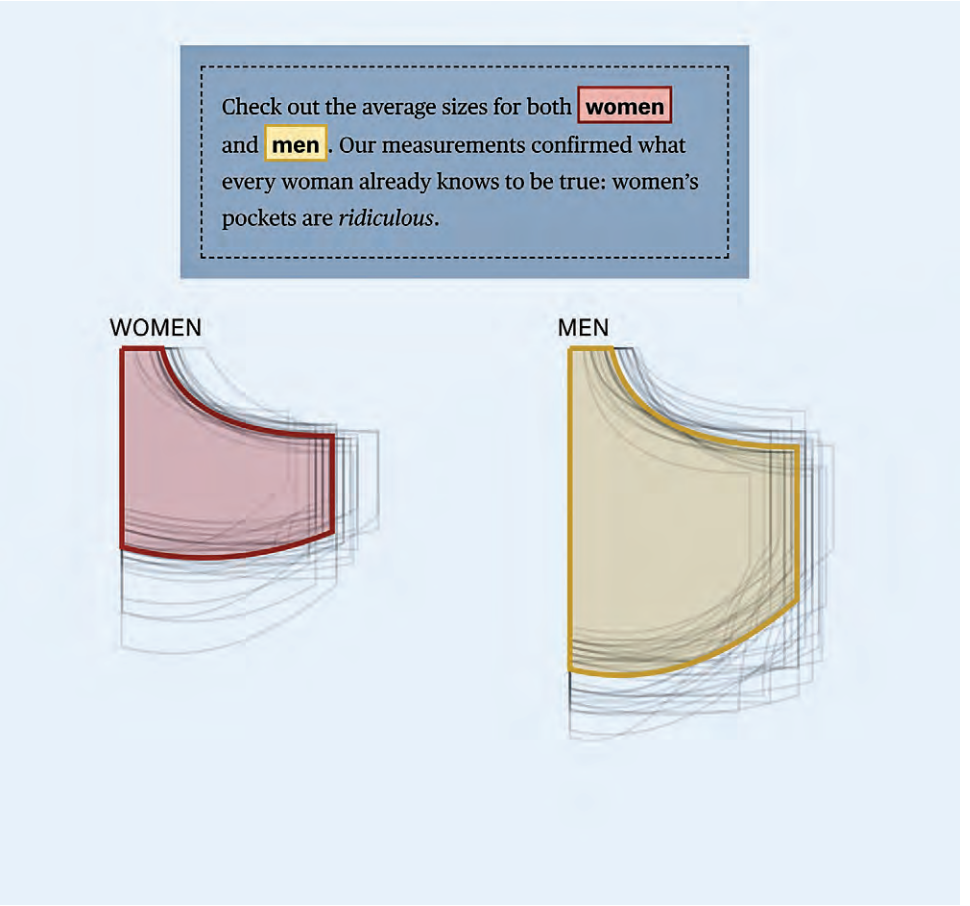


Figure 4.4
From "Someone Clever Once Said Women Were Not Allowed Pockets," a comparative study of pockets in women's and men's jeans by The Pudding (2018). Visualization by Jan Diehm and Amber Thomas for The Pudding.

of the front pockets of women's jeans can fit a smartphone, and less than half "can fit a wallet *specifically* designed to fit in front pockets." Hence the thriving market for women's handbags (to hold the aforementioned front-pocket wallet) and for replacement smartphone screens (for when your phone invariably falls out of your too-small pocket and cracks).

Now, the designers of any particular pair of women's jeans are almost certainly not thinking: "Let's oppress women by making their pockets too small." They are probably only thinking about what looks nice. But what looks nice has a history too. Before the seventeenth century, "pockets" were external sacks on strings that could be tied above or below other garments. But starting in the 1600s, men's clothing began to feature internal pockets. Meanwhile, women's clothing became increasingly close-cut. By the late eighteenth century, the women's pocket reached its breaking point, resulting in emergence of a new fashion item called a reticule, otherwise known as a purse. These tiny handbags were made out of cloth and, according to the Victoria and Albert Museum's helpful online history of pockets, could not hold very much.[37] And yet, as the museum curators point out, in an era in which most people shared all of their shelves and dressers, these reticules were one of the few places for women to store any items they wanted to keep to themselves. Fast forward to the present, and women (and people who wear women's fashion) must still carry their belongings outside of their clothes and on public display. They're also limited in their ability to use both of their hands at the same time. It's (mostly) a minor annoyance, but it's one way among many that the *patriarchy*—a term that describes the combination of legal frameworks, social structures, and cultural values that contribute to the continued male domination of society—inadvertently and invisibly reproduces itself. In this case, it's pants—perhaps even the ones you're wearing right now—that compound and consolidate the patriarchy's oppressive force.

In addition to pants pockets, one of the other things that upholds the patriarchy is, as it turns out, our ideas about gender itself. We've already asserted that *gender is a social construct*, but what does this phrase really mean? Queer theorist Judith Butler has long maintained that gender is best understood as a repeated performance, a set of categories that cohere by, for instance, wearing jeans with small pockets (or no pockets at all) or by participating in an activity that is similarly gender-coded, like child-rearing, or—importantly for Butler—having heterosexual sex.[38] These *performative acts*, as she terms them, repeated so many times that they become taken as fact, are what define the gender categories that we have today. Butler's idea of gender as performative moves away from an essentialist conception of the term: the idea that there is some innate or "essential" criteria that makes one, for instance, a woman or man. But these

performances still reinforce the *categories* of gender, she reminds us, even if the actions and activities that determine them are not innate.

Gender is certainly complicated. This is one thing about which most contemporary scholars of gender largely agree. Conceptions of gender in health and clinical fields are also evolving as well. For example, the American Medical Association now calls gender a "spectrum" rather than a binary, and as of 2018 it issued a firm statement that "sex and gender are more complex than previously assumed."[39] But it's important to remember that there have always been more variations in gender identity and expression than most Anglo-Western societies have cared to acknowledge or to collectively remember. This is evidenced in the range of regional and vernacular terms, such as *kothi*, *hijra*, and *dhurani*, that are currently used to describe the genders of people across South Asia that fall outside the binary; we see it in the additional umbrella terms, such as *two-spirit*, that describe people in some North American Indigenous communities; and many more.[40] Not to mention that some people are gender-fluid, meaning their gender identity may shift from day to day, year to year, or situation to situation. And yet—at least in a US context—gender data is still almost always collected in the binary categories of "male" and "female" and visually represented by some form of binary division as well.[41] This remains true even as a 2018 Stanford study found that, when given the choice among seven points on a gender spectrum, more than two-thirds of the subjects polled placed themselves somewhere in the middle.[42]

As survey designers, and data scientists more generally, there would seem to be an obvious response to the Stanford report: collect gender data in more than binary categories, making sure to disaggregate the data—that is, compare the data by genders during the analysis phase. One recent alternative to the binary, developed by Public Health England in collaboration with LGBTQ+ organizations in the United Kingdom, is in evidence in figure 4.5. This two-item questionnaire was designed for use in routine national surveillance of HIV in England and Wales to determine self-identified gender and cis or trans status in a public health context. The designers offer three named genders, a catch-all fourth category, and an option for not disclosing gender identity. In a separate question, they ask about gender at birth, again giving an option for not disclosing. The survey design uses sensitive wording and inclusive terminology to allow trans and genderqueer populations to be counted. These questions are being considered for expanded use across other national health records and data collection systems in the United Kingdom.

Should all future gender data collection use this model? Not necessarily, and here's why: In a world in which quantification always leads to accurate representation, and accurate representation always leads to positive change, then always counting gender

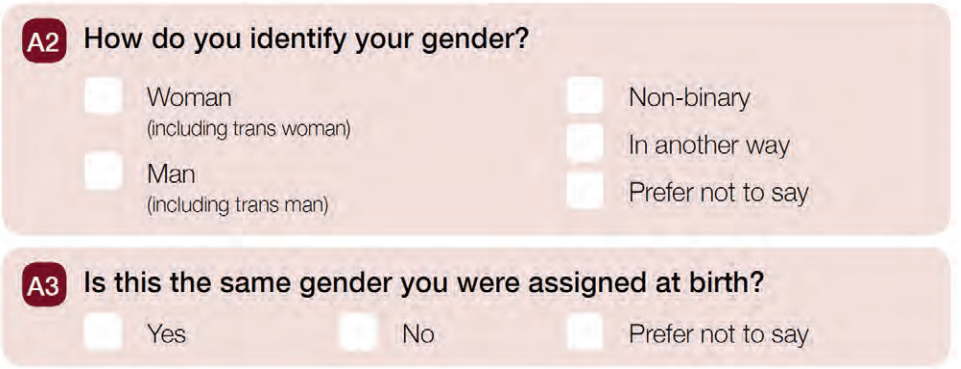


Figure 4.5
From the Positive Voices survey of people living with HIV in England and Wales developed by Public Health England in collaboration with several partner organizations. This represents current best practices for collecting nonbinary gender data in an Anglo-Western public health context, but it's still important to recognize that different decisions might be warranted depending on the context. Courtesy of Peter Kirwin, Public Health England, 2018.

identities outside the binary makes perfect sense. But being represented also means being made visible, and being made visible to the matrix of domination—which continuously develops laws, practices, and cultural norms to police the gender binary—poses significant risks to the health and safety of minoritized groups. Under the current administration in the United States, for example, transgender people are banned from serving in the military and, once identified as such, denied access to certain forms of healthcare.[43] This demonstrates some of the risks of having one's gender counted as something other than man or woman—risks that can occur in many contexts, depending on what data are being collected, by whom, and whether they are personally identifiable (or easily deanonymized). It's also important to recognize how trans and nonbinary people may possibly be identified even within otherwise large datasets simply because there are fewer of them relative to the larger population. This possibility poses additional risks, in the form of unwanted attention in the case of people who would prefer not to disclose their gender identity, or in the form of discrimination, violence, or even imprisonment, depending on the place they live.

As data scientists, what should we do amid these potential harms? Depending on the circumstances and the institution that is doing the collecting, the most ethical decision can vary. It might be to avoid collecting data on whether someone is cis or transgender, to make all gender data optional, to not collect gender data at all, or even

to stick with binary gender categories. Social computation researcher Oliver Haimson has asserted that "in most non-health research, it's often not necessary to know participants' assigned gender at birth."[44] Heath Fogg Davis agrees: his book *Beyond Trans* argues that we don't need to classify people by sex on passports and licenses, for bathrooms or sports, among other things.[45] By contrast, J. Nathan Matias, Sarah Szalavitz, and Ethan Zuckerman chose to keep gender data in binary form for their application FollowBias, which detects gender from names, in order to avoid making a person's gender identity public against their wishes.[46]

The ethical complexity of whether to count gender, when to count gender, and how to count gender illuminates the complexity of acts of classification against the backdrop of structural oppression. Because when it comes to data collection, and the categories that structure it, there are power imbalances up and down, side to side, and everywhere in between. Because of these asymmetries, data scientists must proceed with awareness of context (discussed further in chapter 6) and an analysis of power in the collection environment (discussed further in chapter 1) to determine whose interests are being served by being counted, and who runs the risk of being harmed.

Rethinking Binaries in Data Visualization

A feminist critique of counting, and of the binary classification systems that often structure those acts, is not limited to a focus on gender alone. A binary logic also pervades our thinking about race, for example, as feminist scholars Brittney Cooper and Margaret Rhee explain. Drawing from ideas about intersectionality, they call for "hacking" the Black/white binary that, on the one hand, helps to expose the racism experienced by Black people in the United States and, on the other, erases the other forms of racism experienced by Indigenous as well as Latinx, Asian American, and other minoritized groups. "Binary racial discourses elide our struggles for justice," they state plainly.[47] By challenging the binary thinking that erases the experiences of certain groups while elevating others, we can work toward more just and equitable data practices and consequently toward a more just and equitable future.

Sometimes, however, the goal of challenging binary thinking can be constrained by the realities of the field. Visualization designers, for example, do not typically have control over the collection practices of the data they are asked to visualize. They often inherit binary data that they then need to "hack" from within. What might this look like? We might point to the reporters on the Lifestyle Desk of the *Telegraph*, a British newspaper, who, in March 2018, were considering how to honor International Women's Day and were struck by the significant gender gap in the United Kingdom in terms

of education, politics, business, and culture.[48] As journalists, they were working with multiple sources of data collected by other agencies, which all came in binary form. But they wanted to ensure that they didn't further reinforce any gender stereotypes. They paid particular attention to color. One line of designer logic would favor cultural convention for interpretability, like using pink for women and blue for men, but a feminist line would use color choices to hack those same conventions (figure 4.6).

Pink and blue is, after all, another hierarchy, and the goal of the *Telegraph* team members was to mitigate inequality, not reinforce it. So they took a different source for inspiration: the Votes for Women campaign of early twentieth-century England, in which purple was employed to represent freedom and dignity and green to represent

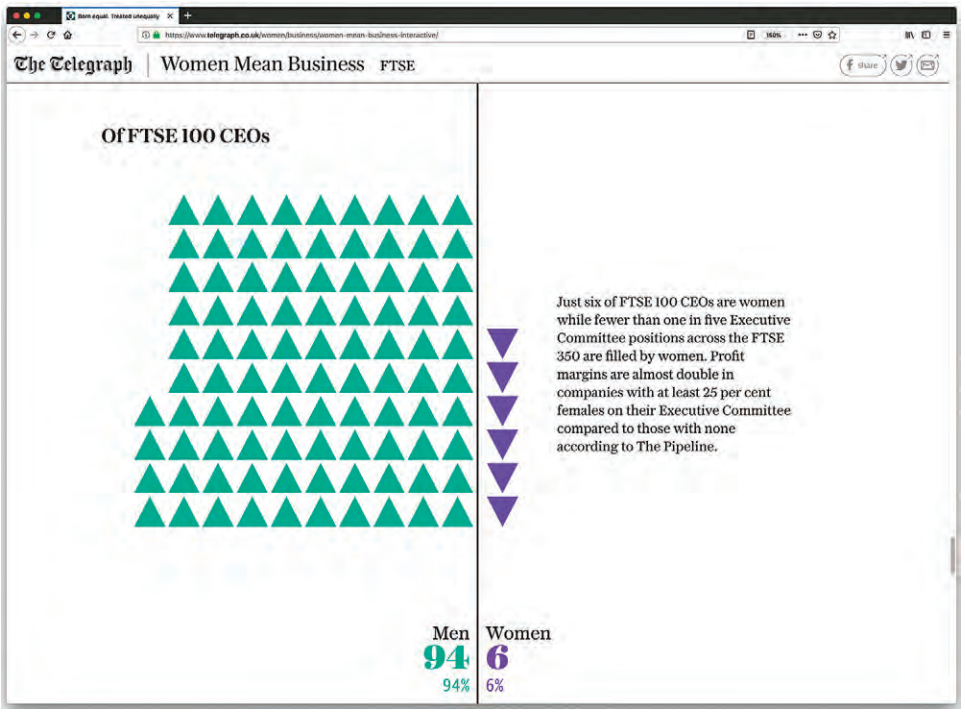


Figure 4.6
"Born Equal. Treated Unequally" was an interactive feature in the *Telegraph* in 2018 that examined the gender gap in the United Kingdom along a number of dimensions. Although the authors treated gender as a binary category, they used color to challenge stereotypically man/woman color coding. Feature by Claire Cohen, Patrick Scott, Ellie Kempster, Richard Moynihan, Oliver Edgington, Dario Verrengia, Fraser Lyness, George Ioakeimidis, and Jamie Johnson, for the *Telegraph*.

hope. When thinking about which of these colors to assign to each gender, they took a perceptual design principle as their guide: "Against white, purple registers with far greater contrast and so should attract more attention when putting alongside the green [sic], not by much but just enough to tip the scales. In a lot of the visualisations men largely outnumber women, so it was a fairly simple method of bringing them back into focus," Fraser Lyness, the *Telegraph*'s director of graphic journalism told visualization designer Lisa Charlotte Rost.[49] Here, one hierarchy—the hierarchy in which colors are perceived by the eye—was employed to challenge another one: the hierarchy of gender. When put into practice, this simple method had the result of communicating clearly without reinforcing stereotypes.

But the *Telegraph* journalists could have gone one step further to rethink binaries. They had an opportunity to communicate to the public that gender is not a binary by spelling that out—in the text of the story or in a caption under the graphics or by showing visually that there was no data for nonbinary people. Their colleagues at the *Guardian* recently adopted this latter strategy in their interactive piece "Does the New Congress Reflect You?" about the 2018 US midterm elections.[50] The piece presents three categories: cis male, cis female, and trans + nonbinary. When you click on "trans + nonbinary," as in figure 4.7, the interactive map displays all of the districts in grey, because "0 people in Congress are like you." The absence of data becomes an important takeaway, as meaningful as the data themselves.[51]

These examples have shown gender as a dimension of analysis, but how might we visually represent gender itself? This is a challenge of visualizing complexity of the highest degree, and Amanda Montañez, a designer for *Scientific American*, took this challenge head on (figure 4.8). She was tasked with creating an infographic to accompany an article on the evolving science of gender and sex—categories that she, like most people, viewed as distinct but related.[52] As she explains in a blog post on the *Scientific American* website, she first envisioned a simple spectrum, or perhaps two spectrums: one for sex and one for gender.[53] But she soon found confirmation of what we've been saying so far in this chapter: that few things in life can be truly reduced to binaries, and that insisting on binary categories of data collection—with respect to gender, to sex, to their relation, or to anything else—fails to acknowledge the value of what (or who) rests in between and outside.

We have already established that gender is more than binary; but it's less commonly acknowledged that sex is more than a binary too. As feminist biologist Anne Fausto-Sterling confirms, "There is no single biological measure that unassailably places each and every human into one of two categories—male or female."[54] Intersex people, who constitute an estimated 1.7 percent of the population, may have ovaries and a penis,

Figure 4.7
"Does the New Congress Reflect You?" is a 2018 interactive that appeared in the *Guardian*. Users select their own demographic characteristics to see how many people like them are in the 2018 Congress. Clicking on "trans + nonbinary" leads to a blank map showing zero people in Congress like you. Image by Sam Morris, Juweek Adolphe, and Erum Salam for the *Guardian*.

or "mosaic genetics" in which some of one's cells have XX chromosomes and some have XY.[55] It's also increasingly acknowledged that that sex, like gender, and sometimes together with gender, is multilayered and continuously unfolding throughout a person's life.

To begin to represent this complexity, Montañez had to begin by rejecting much of the data and research that she and her research assistant turned up, either on account of flawed categories or on account of flawed collection practices. She decided to focus on sex, and after an extensive design process, which included consulting with domain experts, Montañez and the design firm Pitch Interactive, which helped finalize the diagram, arrived at the result. *Beyond XX and XY* is a complex diagram, which employs a color spectrum to represent the sex spectrum, a vertical axis to represent change over

time, and branching arrows to connect to text blocks that provide additional contextual information. The design offers a beautifully executed visual challenge to the scientifically incorrect idea that there are only two sexes, and even that the concepts of sex and gender are wholly distinct. Visualization is often thought of as a way to reduce complexity, but here it operates in the reverse—to push simple, oppressive ideas to be more complex, nuanced, and just.

Refusing Data, Recovering Data

Montañez's graphic made what was already counted count. In other words, she took what scientists and theorists knew to be true about the nature of sexual differentiation and made that knowledge more accessible and public. But counting in itself is not necessarily an unmitigated good, nor is putting it on public display. We have already introduced the idea of the paradox of exposure where people are harmed by being made visible to a system. But because system designers from dominant groups do not experience the harms of being counted or of being made visible without consent—this is the privilege hazard, once again—they rarely anticipate these needs or account for them in the design process. This is the reason that questions about counting must be accompanied by questions about consent, as well as of personal safety, cultural dignity, and historical context.

It's Facebook, once again, that helps to prove this point. Information studies scholars Oliver Haimson and Anna Lauren Hoffman have studied the effects of the company's "real name" policy, under which the platform determines each user's registered name to be either "real" and authentic or simply "fake."[56] (In our teacher voices, we now say: Does anyone note the problem with this binary thinking here?) Haimson and Hoffman point out that trans and queer people may choose to have multiple online identities, which may be fluid and contextual and possibly necessary to protect themselves. As another example, abuse survivors may need to take steps to make themselves unfindable through search, even as they still want to be connected to their loved ones.

Figure 4.8 (following two pages)
Beyond XX and XY (2017) visualizes the known factors that contribute to sexual differentiation at different stages of human life, from conception to birth to puberty and beyond. Contrary to received wisdom, sex is not a binary that is fixed at birth, but rather a layered and time-based process of differentiation, with more than two possible outcomes. Reproduced with permission.

BEYOND XX AND XY

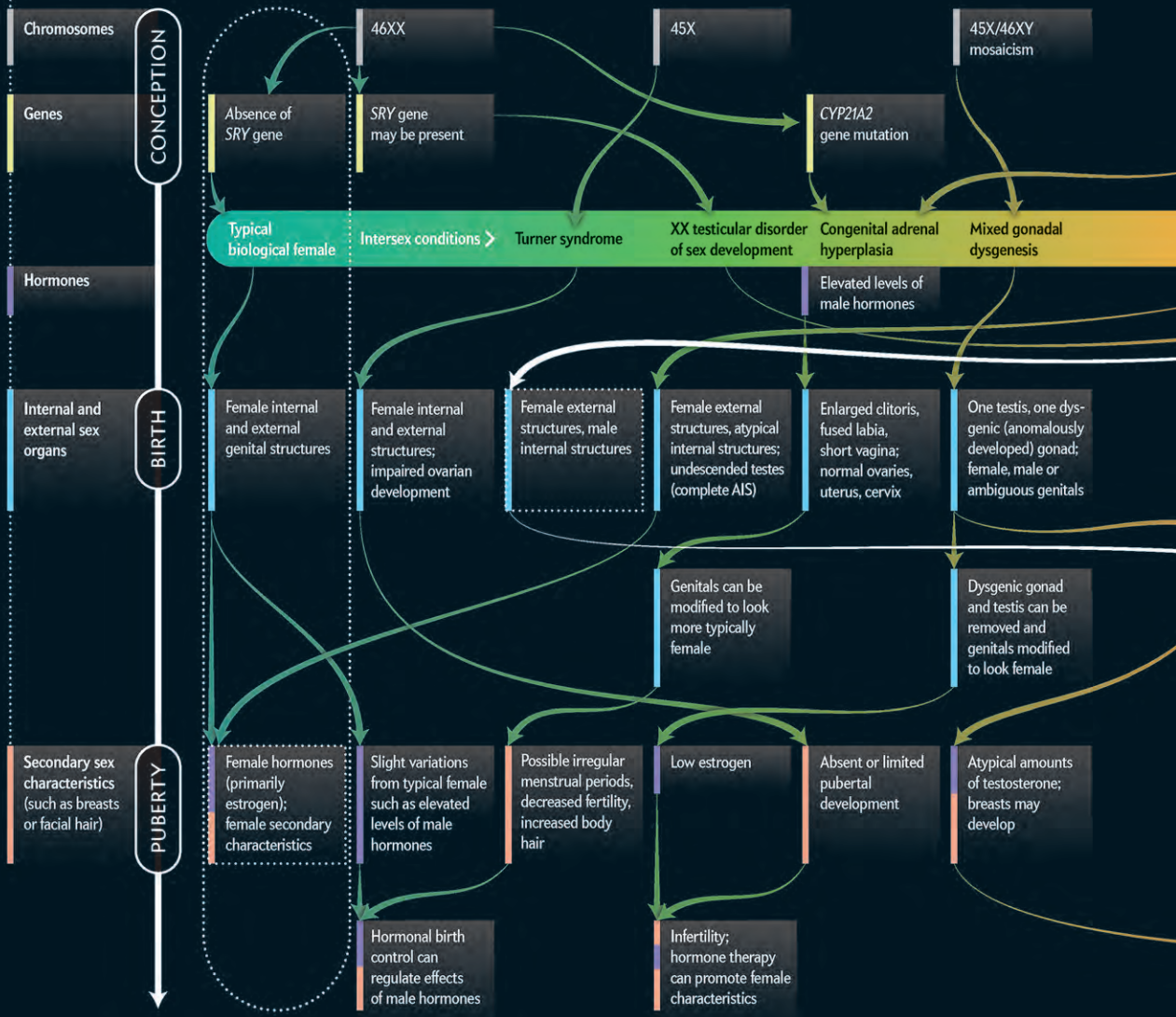
A host of factors figure into whether someone is female, male or somewhere in between

Humans are socially conditioned to view sex and gender as binary attributes. From the moment we are born—or even before—we are definitively labeled "boy" or "girl." Yet science points to a much more ambiguous reality. Determination of biological sex is staggeringly complex, involving not only anatomy but an intricate choreography of genetic and chemical factors that unfolds over time. Intersex individuals—those for whom sexual development follows an atypical trajectory—are characterized by a diverse range of conditions, such as 5-alpha reductase deficiency (*circled*). A small cross section of these conditions and the pathways they follow is shown here. In an additional layer of complexity, the gender with which a person identifies does not always align with the sex they* are assigned at birth, and they may not be wholly male or female. The more we learn about sex and gender, the more these attributes appear to exist on a spectrum.

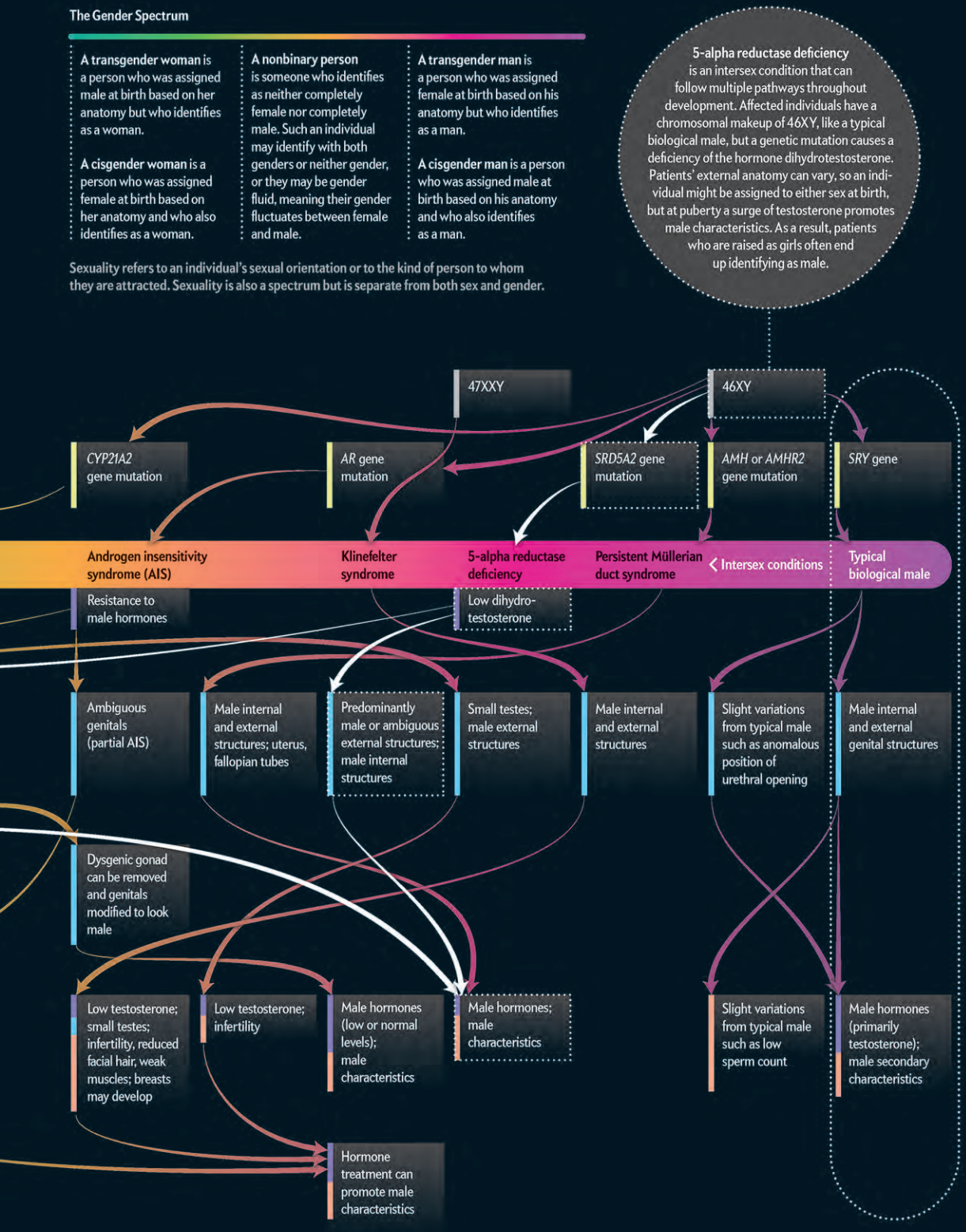
—*Amanda Montañez*

FACTORS THAT DETERMINE SEX*

**The English language has long struggled with the lack of a widely recognized nongendered third-person singular pronoun. A singular form of "they" has grown in widespread acceptance, and many people who do not identify with a binary gender use it.*



Graphic by Pitch Interactive and Amanda Montañez



SOURCE: RESEARCH BY AMANDA HOBBS; EXPERT REVIEW BY AMY WISNIEWSKI, University of Oklahoma Health Sciences Center

Compounding the contextual nature of these factors, Facebook enforces its real name policy algorithmically—flagging names with "too many" words or with unusual capital letters. Haimson and Hoffman note that Facebook's algorithms disproportionately flag Native American names for violation because those names often differ in structure and form from Anglo-Western names (the subject position of the systems' designers, and therefore presumed to be the default; the privilege hazard once again). What's more, users can also report other users for not having real names, resulting in—for example—a single person systematically targeting several hundred drag queens' profiles for removal. Facebook claims that the real name policy exists for safety, but Haimson and Hoffman clearly show that the policy actively imperils the safety of some of the platform's most marginalized users. As we've already begun to suggest, sometimes the most ethical thing to do is to help people be obscure, hidden, and invisible.[57] The example of Facebook demonstrates the fundamental importance of obtaining consent when counting and of enabling individuals to refuse acts of counting and classification in light of potential harms.

Acts of counting and classification, especially as they relate to minoritized groups, must always balance harms and benefits. When data are collected about real people and their lives, risks ranging from exposure to violence are always present. But when deliberately considered, and when consent is obtained, counting can contribute to efforts to increase valuable and desired visibility. The Colored Conventions Project (CCP), led by a team of students and faculty at the University of Delaware, demonstrates how to thoughtfully navigate this balance in the present by looking at the past.[58] Among the goals of the project is to create a machine-readable corpus of meeting minutes from the nineteenth-century Colored Conventions: events in which Black Americans, fugitive and free, gathered to strategize about how to achieve legal, social, economic, and educational justice. These meeting minutes are valuable because they have yet to be counted, so to speak, in the stories commonly told about the movement to end slavery in the nineteenth-century United States. Those stories tend to privilege the actions of white abolitionists because theirs were the stories that were recorded in print. But the Colored Conventions help to document the vital role of the Black activists who were working within their own communities to end slavery and achieve liberation.

The creation of the corpus enables these important activists to be counted, as well as have their words (as recorded in the meeting minutes) analyzed and incorporated into the historical record. But the process of converting the meeting minutes into data strongly recalls the original violence that accompanied the slave trade, when human lives—in fact, the very ancestors of these activists—were reduced to numbers and

names. In recognition of this irreconcilable tension, the CCP requires that all those who download the corpus commit to a set of principles, including "a use of data that humanizes and acknowledges the Black people whose collective organizational histories are assembled" in the corpus, and a request to "contextualize and narrate the conditions of the people who appear as 'data' and to name them when possible."[59]

There is a second tension that the CCP navigates in an exemplary fashion, which has to do with the content of the corpus itself. Because it is derived from the conventions' official meeting minutes, it records only the "official" participants in the conventions and the discussions they initiated. These participants were almost exclusively men. To address this disparity, the CCP team asks its teaching partners to sign a Memo of Understanding (MoU) before introducing students to the project. The MoU requests that all instructors introduce a woman involved in the conventions, such as a wife, daughter, sister, or fellow church member, alongside every male delegate who is named (figure 4.9).[60] From this work of recovery, the CCP is creating a second dataset of the women's names—those who would otherwise go uncounted and therefore unrecognized for their work. They are using data collection to make these contributions count.

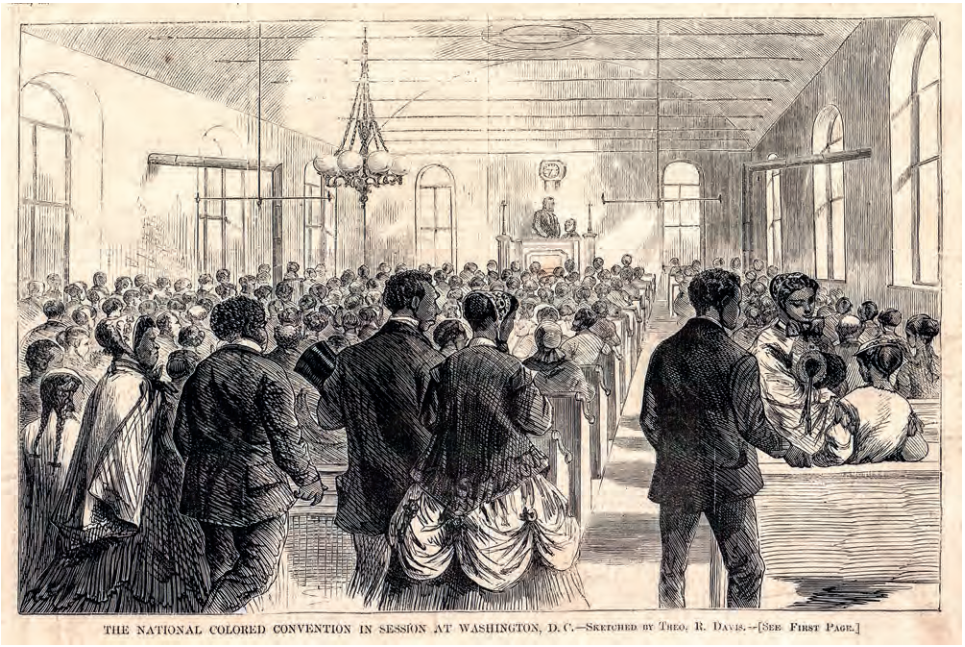


Figure 4.9
An engraving of an 1869 Colored Convention, published in *Harper's Weekly*, showing men at the podium and women seated and standing in the rear. Image courtesy of Jim Casey.

Counting as Healing, Counting as Accountability

In the nineteenth century, as today, so many of the disparities introduced into datasets had to do with much larger and much more profound asymmetries of power. The asymmetries are often directly reflected in the power dynamics between who is doing the counting and who is being counted. But when a community is counting for itself, about itself, there is the potential that data collection can be not only be empowering but also healing. One example of this that draws from the personal experience of one of the authors of this book. It was 2014, and Catherine was a student and nursing her baby daughter at the time, as well as struggling to pump breastmilk for her in unsavory places like server rooms and bathroom floors. Frustrated, she and six student colleagues came together to publish a call for ideas and stories that could help to improve breast pump technology.[61] These stories led to a research paper about breast pump design, as well as the creation of the Make the Breast Pump Not Suck Hackathon (figure 4.10)—an

Figure 4.10
The 2018 Make the Breast Pump Not Suck Hackathon was the second gathering of the community at MIT and focused on racial equity in breastfeeding, as well as shifting paid leave policy in the United States. Photo by Rebecca Rodriguez and Ken Richardson, MIT Media Lab.

ongoing forum for sharing stories, hacking pumps, and reengineering the postpartum ecosystem that surrounds them.[62]

Although innovation spaces had long been holding hackathons for health technology, the 2014 event was one of the first about birth and breastfeeding. As such, it led to participants sharing stories in a space that was (temporarily) free of the stigma surrounding breastfeeding. These stories pointed to common experiences and patterns in the spirit of "the personal is political" consciousness-raising events. Participants recognized these stories as data that could be used—and in fact were used—to demand more from breast pump makers, from workplaces, and from society, to help transform the self-blame that women often experience as a result of difficulties with birth and breastfeeding into collective political action.[63]

But action by whom, and action for whom? Following the 2014 event, we (meaning the organizers) reflected on its successes and its limitations—in particular, its lack of an intersectional approach.[64] In the United States, maternal health carries significant race and class inequities, as discussed in chapter 1. The first hackathon did not consider those inequities; it centered the needs of some the most privileged mothers and produced designs that favored their experiences. We decided to try again. In 2017 and 2018, we multiplied the single event into a participatory research project, a policy summit, and a community innovation program, as well as a hackathon. In all of these, we deliberately centered the needs and the participation of parents of color, low-income parents, and LGBTQ+ parents. When we arrived at the hackathon the second time around, it was the result of over a year of relationship building and identity work on the part of the organizers with our community partners.

Ensuring that the 2018 hackathon would fully welcome the participation of these families required multiple forms of accountability. Guided by Jenn Roberts, our lead organizer for equity and inclusion, we wrote a values statement and convened an advisory board with leaders in breastfeeding, equity, and maternal health. We also developed a set of metrics to shape the demographics of the event.[65] These metrics were designed to prioritize racial diversity, gender diversity, diversity of sexual orientation, geographic diversity, and domain diversity, with additional priority given for young people and newcomers. On the application form, potential participants were encouraged to self-identify their gender and race, specify their location, and choose multiple options from a list of predefined domain expertise categories (like "parent" or "designer/artist"). We also invited them to write about why they wanted to attend, and if they chose to disclose information about their sexual orientation or their financial position, then we considered that information in the process.

Were these categories reductive? Of course they were. No person can fit their whole self into a form, regardless of how many blank text fields are provided. Did the form reflect the true nature of each person's intersecting identities and how those identities impact that person's being in the world? The answer to this question is also unsurprising: of course it did not. But the process of collecting this demographic data—which was, crucially, undertaken voluntarily and from within the community itself—resulted in an event that was indeed guided by the knowledge and experience of the groups that our coalition had hoped to center.[66]

Catherine shared this experience with Lauren as we were beginning to draft this book, and we decided to use a similar process to help hold ourselves accountable to the values that we wanted to inform *Data Feminism* and the criteria by which certain projects and texts would be selected for inclusion. We determined specific numbers and percentages that, in our view, would help keep us accountable to those values, as well as the categories of data collection that would be required to determine whether the metrics had been met. (These are viewable in the appendix, Our Values and Our Metrics for Holding Ourselves Accountable.) At two phases in the process—first when we posted the draft of the manuscript online, and second after we submitted the manuscript for copyediting—one of our research assistants, Isabel Carter, audited the projects and citations of the book. (They describe their research methods in more detail in "Auditing *Data Feminism*," included as another appendix.) As with the hackathon, these metrics were not the only method we employed for holding ourselves accountable. We also interviewed the creators of many of the projects we reference, cleared our quotes and portrayals of their work with them, and published a draft of the book online for open peer review, among other approaches.

Was our method of counting perfect? Of course not. We are certain we have made mistakes. This is among the reasons that we decided to keep our disaggregated data private, even as we published the aggregated results. What about the idea to count people and projects in the first place? Shouldn't that be viewed as contributing to the same reduction in complexity that we have argued against thus far in this book? As this chapter has demonstrated, counting is always complicated. But undertaken deliberately, tailored to specific goals, and with issues of privacy and potential harms always in mind, counting can be used to support accountability—as one method, among many, of working toward a larger goal.

Rethink Binaries and Hierarchies

Counting and classification can be powerful parts of the process of creating knowledge. But they're also tools of power in themselves. Historically, counting and classification

have been used to dominate, discipline, and exclude. This is where the fourth principle of data feminism, *rethink binaries and hierarchies*, enters in. The gender binary offers a key example of how classification systems are constructed by cultures and societies and reflect both their values and their biases. The cases of the TSA airport scanners, Facebook user profiles, and plain old pants show us how gender and sex binaries—along with scientifically incorrect understandings of both gender and sex—get encoded into technical systems (and also jeans)! Those systems, in turn, recirculate erroneous and harmful ideas.

An intersectional feminist approach to counting insists that we examine and, if necessary, rethink the assumptions and beliefs behind our classification infrastructure, as well as consistently probe who is doing the counting and whose interests are served. Counting and measuring do not always have to be tools of oppression. We can also use them to hold power accountable, to reclaim overlooked histories, and to build collectivity and solidarity. When we count within our own communities, with consideration and care, we can work to rebalance unequal distributions of power.

Data Feminism

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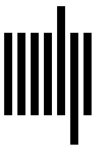

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