

Constructing Situated and Social Knowledge: Ethical, Sociological, and
Phenomenological Factors in Technological Design
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1. Introduction

Designers, programmers, and others in the fields of technology and engineering are—recently, and with increasing speed and urgency—coming to understand that there are many ways that human biases can become problems within the fields of engineering, programming, algorithmic systems, machine learning, artificial intelligence, and design. In order to understand bias and how it gets instantiated in our technological systems, we have to understand various social, psychological, and philosophical frameworks that encompass concepts such as intersectionality, intersubjectivity, epistemic valuation, phenomenological experience, and how all of these things come together to form the bases for our moral behavior and social interactions. Fundamentally, if we want to make a world and technologies which work for as many people as possible, we must consult with and understand many different groups of people’s lived experiences and value them as valid systems of knowledge and behavior. This paper represents an attempt at starting down the path toward this understanding, a path which begins when we consider just a few questions:

- How do you walk home? Where are your keys?
- What do you do when a police officer pulls you over?
- What kinds of things about your body do you struggle with whether and when you should tell a new romantic partner?
- If you are able to stand, for how long?
- What strategies do you have for keeping yourself out of institutional mental care?
- Without looking, how many exits are there in your building, and how fast can you reach them, encountering the fewest people possible?
- What is the highest you can reach, unassisted?
- What is the best way to reject someone’s romantic advances such that it is less likely that they will physically assault you?

Each of those questions represents a category of knowledge developed out of the lived experience of members of a group of people. Formulating these lived experiences as questions provides a means by which to: interrogate assumptions about design; prompt those encountering them to think in a mode that may be unfamiliar to them; and recognize that those who embody these lived experiences have sets of life or death concerns we may never have considered. Once we recognize this, we can then understand that the design, programming, training, and deployment of technologies such as algorithmic learning systems for setting bail or criminal sentencing, sorting search engine results, autonomous vehicles, or artificial intelligence, is also done via knowledge bases built out of the lived experiences and assumptions about the world held by their trainers and programmers. To really understand this, we have to explore the term “phenomenology,” and how it plays into how we build our systems of knowledge.

By “Phenomenology,” all I mean is the lived experiences we have, and our felt-sense understanding of the world. Many theorists of race, gender, and disability have built on the foundation laid by philosophers like Edmund Husserl¹ and Maurice Merleau-Ponty² to demonstrate how the sociocultural implications of particular embodied contexts alter these

¹ Husserl, Edmund. *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy – First Book: General Introduction to a Pure Phenomenology*. [1913]. Kersten, F., trans. The Hague: Martinus Nijhoff, 1982.

² Merleau-Ponty, Maurice. *Phenomenology of Perception*. London: Routledge, 1962.

felt-senses and lived experiences. But every lived experience of the world is also in some way mediated by things like the technology we use, the sociological constructions that surround us, and even our own sense experience. This is the perspective of “*Post-Phenomenology*.” Theorists such as Don Ihde have argued that we can never have an unmediated experience, the technology we use shapes and is shaped by our perceptions and the context in which it was made, along with the knowledge we build from our engagement with this technology.³

When considering how we build the technologies that impact our lives, the phenomenological and post-phenomenological accounts demonstrate that systems different mediated lived experiences will necessarily produce both different pictures of the world and different knowledge systems by which to navigate them. These different systems of knowledge will, in turn, necessarily provide different internally consistent answers in different situations, generating different beliefs about, ways of understanding, and modes of living in, the world. In order to understand these different modes, we will need to be able to clearly assess the biases we hold, and the likely implications they will have on our thinking and behavior; this is a process that Husserl and other phenomenologists, religious studies theorists, and social scientists refer to as “Bracketing.”⁴ Additionally, we will need to intentionally engage in the intersubjective aspects of our knowledge, in which understandings are shared between individuals and *groups* of individuals who regard each other as legitimate subjects, rather than as objects.

Briefly, intersubjectivity is the idea that whatever knowledge we build from our subjectively valued lived experiences is also changed and affected by what other knowers, believers, and experiencers expect, what we all learn to believe, and what we all, together, agree upon as meaningful and true and real. This largely unconscious set of agreements then becomes the foundational world we all experience together, and from which we generate new knowledge and beliefs. We can find examples of intersubjectivity in non-Western philosophies such as Buddhism and Advaita Vedanta Hinduism as well as western theorists like Husserl and Edith Stein.⁵

But what does all of this have to do with how we create and deploy technologies? When we combine the mediation that takes place in a post-phenomenological perspective with the intersubjective construction of knowledge based on the lived experiences of the people and groups involved, we generate bias, and that bias finds its way into everything we create and do. In this way, a person can understand that “bias” is another word for “perspective,” and that, as such, the generation of intersectional and phenomenological frameworks may be seen as crucial to the generation of values and norms. Systems and technologies generated by humans will have artefacts of human bias, within them. What kinds of strategies can we undertake to bracket out—that is, be aware of and account for—our biases? This paper aims toward an assessment of and an attempt at addressing these questions.

In Section 2 of this paper, I will explore how bias makes its way into far-reaching algorithmic systems, from online search, to bail and criminal sentencing recommendations, to digital imaging and police surveillance. In Section 3, we will discuss how that bias stems from structures and systems of assumptions and prejudices such as sexism, ableism, racism, homophobia and transphobia, and more, and what it means that the lived experiences of these

³ Ihde, Don. *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*. Bloomington: Indiana University Press, 1991.

⁴ Cf. Husserl, Edmund. *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy – First Book: General Introduction to a Pure Phenomenology*. [1913]. Kersten, F., trans. The Hague: Martinus Nijhoff, 1982; Sharpe, Eric J. *Comparative Religion: A History*. London: UK: Gerald Duckworth & Co. Ltd., 2003; Tufford, Lea, and Peter Newman. “Bracketing in Qualitative Research.” *Qualitative Social Work* 11, no. 1 (January 2012): 80–96. doi:[10.1177/1473325010368316](https://doi.org/10.1177/1473325010368316).

⁵ Behnke, Elizabeth A. “Edmund Husserl: Phenomenology of Embodiment.” The Internet Encyclopedia of Philosophy. <https://www.iep.utm.edu/husspemb/>

groups and individuals are very often excluded from being counted as valid sources of knowledge. And in Section 4, I conclude with a call to bring all of these understandings together, and finally, I'll explore ways of implementing these understandings to help us mitigate the damage done by uninterrogated human bias.

2. Algorithmic Bias

In just the past few years, multiple studies demonstrate that and how human biases work their way into various technological systems, and how the proliferation of algorithmic systems amplifies and augments this problem. When we consider resumé sorting algorithms, it's easy to understand how, by training them on the biased habits of human resume reviewers, humans teach these programs to automate the process of failing to select submissions from qualified candidates with “feminine” or “Black-sounding” names.⁶ Relatedly, the word association systems underlying many automated sentiment analysis programs have been shown to replicate gendered and racial biases, such as “Man:Doctor::Woman:Nurse.”⁷ And ProPublica's “Breaking the Black Box” examines how neural networks learn from, replicate, and iterate upon the biases found in the sentences handed out in the American justice system.

According to ProPublica, the Compas Recidivism Algorithm was trained on the sentences and bail rates handed out to nearly 12,000 defendants, scored across 47 categories, in Broward County Florida, and then deployed to help automate the decisions of county judges.⁸ The system—one which had been trained on and designed to emulate the decisions and recommendations of judges, prosecutors, police and correctional officers, and other human trial data—quickly displayed race-based inequalities. Take the example of Bernard Parker and Dylan Fugett: Mr. Parker had only one prior offense, for resisting arrest without violence and zero subsequent offenses at the time he encountered the courts, again, on felony drug possession charges. The Compas system rated Mr. Parker a “Medium Risk” for violence and a “High Risk” for recidivism. Dylan Fugett also had one prior offense, a charge of attempted burglary, and he then went on to commit three subsequent drug related offenses before being brought to the court on misdemeanor drug paraphernalia charges. The Compas system rated Mr. Fugett a “Low Risk” for both violence and, somewhat more surprisingly, recidivism. If you hadn't guessed, Mr. Parker is a Black man, and Mr. Fugett is White.

Racialized inequality permeates other areas of law enforcement, too, and so provides fertile ground for automated systems to learn terrible habits. In 2016, Georgetown University's Center for Privacy and Technology (CPT) released the results of its research on the use of facial recognition in police surveillance.⁹ Among many other distressing findings in their 151 page report, the CPT researchers found that communities of colour are more often the subject of police surveillance, and that they are more likely to be inaccurately

⁶ Chen, Le; Ma, Ruijun; Hannák, Anikó; and Wilson; Christo. 2018. “Investigating the Impact of Gender on Rank in Resume Search Engines.” In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (CHI '18). ACM, New York, NY, USA, Paper 651, 14 pages. DOI: <https://doi.org/10.1145/3173574.3174225>; Bertrand, Marianne; Mullainathan, Sendhil. “Are Emily And Greg More Employable Than Lakisha And Jamal? A Field Experiment On Labor Market Discrimination,” *American Economic Review*, 2004, v94(4,Sep), 991-1013. <http://ideas.repec.org/a/aea/aecrev/v94y2004i4p991-1013.html>

⁷ Caliskan, Aylin; Bryson, Joanna J.; Narayanan, Arvind. “Semantics Derived Automatically From Language Corpora Contain Human-Like Biases.” *Science* 14 Apr 2017: 183-186. <http://science.sciencemag.org/content/356/6334/183.full>.

⁸ ProPublica: “Breaking the Black Box” <https://www.propublica.org/article/breaking-the-black-box-how-machines-learn-to-be-racist>; Analysis of Compas Dataset Records from the Broward County, Florida criminal courts <https://github.com/propublica/compas-analysis/>; “How We Analyzed the Compas Recidivism Algorithm.” <https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm/>.

⁹ Garvie, Clare; Bedoya, Alvaro; Frankle, Jonathan. “The Perpetual Line-up: Unregulated Police Face Recognition in America;” Georgetown Law's Center for Privacy & Technology. <https://www.law.georgetown.edu/privacy-technology-center/publications/the-perpetual-line-up/>

identified by automated facial recognition systems:

“...an FBI co-authored study suggests that face recognition may be less accurate on black people. Also, due to disproportionately high arrest rates, *systems that rely on mug shot databases likely include a disproportionate number of African Americans*. Despite these findings, there is no independent testing regime for racially biased error rates. In interviews, two major face recognition companies admitted that they did not run these tests internally, either... *Face recognition may be least accurate for those it is most likely to affect: African Americans.*” (Emphasis added.)

To be as blunt and clear about this as possible: Black people are over-policed, with many young Black men being spuriously said to have “Fit the Description;” because of this, Garvie notes, the mugshots of Black people are entered into police databases at a disproportionate rate. Those databases are then used to train facial recognition surveillance systems on how to search for “criminality.” We have even taught these systems to specifically search *for* particular skin tones.¹⁰ These algorithms, however, cannot distinguish well between the details of Black faces, and so they apply pattern- recognition metrics which result in darker skinned faces being marked at a higher likelihood for criminal behavior. In effect, we have taught algorithmically intelligent systems how to automate the process of telling Black people that they “fit the description.” To understand a bit more about how this happens, we have to understand something of the history of photographic technologies and scientific processes.

2.1 Photographic Bias

Investigative journalists like Mandalit del Barco have studied how, throughout its history, still photography and the cameras used to capture it were tested on and organized for the use of people with lighter complexions.¹¹ As such, when the light and contrast of photographs were balanced, they were done to maximize the contrast and detail for the complexion of lighter-toned people. This meant that photographic images of darker skin would be indistinct, or “muddy.” This isn’t down to some objective fact about how light works and gets translated onto celluloid or photographic plates—or rather it is, but these physical principles could just as easily have been used to make other choices about the way in which skin tones were filmed, such as to preference the visibility of details in dark skin. But the preferencing of White skin in photography laid the foundation for the practice of physiognomy, a pseudoscientific practice of differentiating “races” according to their physical attributes. Physiognomy specifically used the existence of contrast imbalances in photography to declare the racial inferiority of all nonwhite peoples.¹² As del Barco notes, French filmmaker Jean Luc Godard had to go so far as specifically developing new techniques by which to film his primarily Black cast in his film about Mozambique, and various Black photographers and directors such as Spike Lee have done much the same in the late 20th and early 21st centuries. All of this demonstrates that the tools and techniques of photography *can* be used to demonstrate other social frameworks and perspectives—it is simply that they too often have not been configured to do so.

As it stands, the choices about which skin tones to clarify and which to wash out have

¹⁰ Joseph, George and Lipp, Kenneth. “IBM Used NYPD Surveillance Footage to Develop Technology That Lets Police Search by Skin Color.” *The Intercept*. September 6, 2018. <https://theintercept.com/2018/09/06/nypd-surveillance-camera-skin-tone-search/>.

¹¹ del Barco, Mandalit. “How Kodak’s Shirley Cards Set Photography’s Skin-Tone Standard.” November 13, 2014. NPR <https://www.npr.org/2014/11/13/363517842/for-decades-kodak-s-shirley-cards-set-photography-s-skin-tone-standard>.

¹² Seiberth, Sophi; Yoshioka, Jeremy; and Smith, Daniel (2017). “Physiognomy.” *Measuring Prejudice: Race Sciences of the 18th-19th Centuries*. <http://scalar.usc.edu/works/measuring-prejudice/blank>

been so thoroughly built into the technology of photography that it even forms the basis on which digital cameras' processes get designed and built. Additionally, the unexamined assumptions which exist in the minds of design teams reflect their lived experiences, and the kinds of questions they would never have thought to ask. In a series of events over the past decade, several technology companies have had to contend with the fact that their cameras are reproducing racial prejudice. Whether we look at Hewlett-Packard's web-enabled camera not being able to see Black people's skin, Nikon's facial recognition assistance asking smiling people of various Asian phenotypes whether they had blinked,¹³ or Google's image matching algorithm being so poorly trained that it returned requests for pattern matches of Black people's faces with images of gorillas, the choices made in our photo-imaging technologies still reflect a social history of, by, and for primarily white men. But the solution to this problem is not a simple and potentially tokenistic "inclusion" or "diversification of design teams."

2.2 Surveillance

In their 2018 presentation, "Don't Include Us, Thank You," researchers Sarah Aoun and Nasma Ahmed point to Simone Browne's *Dark Matters* and other works to further explore the intersection between race and facial recognition technologies, and the ways in which police surveillance and systems of oppression are already unequally applied, in Western society.¹⁴ If we don't start by addressing the systemic racism of the systems which give rise to these inequalities and the systems in which we deploy these technologies, then the "diversification" of design teams and datasets will exacerbate this inequality, not dismantle it. That is, instead of a wide swathe of Black people "Fitting The Description," there will be a system by which to more easily and *specifically* target, for instance, prison abolition and Black Lives Matter activists, or other people who might be deemed "persons of interest." Hence: "Don't Include Us."

This type of consideration forms the background for much of Safiya Noble's *Algorithms of Oppression*, in which she demonstrates how the use of paid advertisements within the constructed, mediating space of search engine results reinforces and replicates racist histories such as the oversexualization of Black women starting at a young age.¹⁵ Noble traces a clear line from the unconscious cultural biases of the producers of various products—from makeup to pornography—to the way companies like Google will generate revenue by selling ad space at the very top of the listed results of people's searches. And not only does this practice drive a climate of racism, as Noble demonstrates, when coupled with Google's other practices, it can be deadly.

2.3 Google's Search

In 2015, a man named Dylann Roof entered the basement of the Mother Emanuel Church in Charleston, South Carolina, and shot nine people to death. In his own words, Roof said that he was driven to this horrific act by hearing the verdict in the trial of George Zimmerman for the killing of Trayvon Martin—a young Black man who, at the time of his death, was Roof's age. As Noble and others note, Roof decided to look Martin up after continually hearing the other boy's name related in news reports; more crucially, Roof decided "to type in the words 'Black on White crime' into Google, and I have never been the same

¹³ Wittkower, D. E. (2016, 13-14 May 2016). "Principles of anti-discriminatory design." Paper presented at the 2016 IEEE International Symposium on Ethics in Engineering, Science and Technology (ETHICS)

https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1027&context=philosophy_fac_pubs

¹⁴ Aoun, Sarah; Ahmed, Nasma. "Don't Include Us, Thank You." Theorizing the Web 2018.

<https://livestream.com/internetsociety/ttw18/videos/174091941>

¹⁵ Noble, Safiya U. *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York : New York University Press, 2018. Print.

since that day.”¹⁶ We will never know exactly what Roof saw, but if we know something about how Google works, then we can generate a pretty solid supposition.

To generate a reasonable reconstruction of a Google search, we must first remember that, in addition to the paid advertisements described by Noble, Google delivers search results through a three-part process they describe as “Crawling, Indexing, and Serving/Ranking.”¹⁷ First, automated Google systems continually trawl the internet for the most current versions of webpages; then those processes work to cross-reference the content of that page and get a sense of what it is; finally, Google uses factors such as the searcher’s location, language, and type of device to decide the order in which it will serve up the answers it has. None of this is a “neutral” or “objective” process. Every step of the above-listed process depends on and changes via choices made by both the searcher *and* the programmers and coders who designed the search system. Every one of those changes—location, device type, language choice, and the weight those factors are given—impacts what the end user—the searcher—receives. Your location, for instance, will be used to give heavier weight to the links people near you have clicked on, when they’ve done searches similar to yours. And if you leave Google’s autocomplete feature on, this all begins before you finish typing your query, with the algorithm presenting you with the list of options it thinks you’re most likely to want, along with previews of their attendant results pages.

If you use Google, and if you want to change any of this, you need to go to “Settings,” where you’ll see options for your search language, your search history, and what data of yours Google (admits they) hold onto, from your searches. The overarching category for altering how Google operates, however, will be “Search Settings,” and once you click that, you’ll see options like “Private Results,” “Search History,” and “Region Settings.” Again: altering any one of these options, from language to region, will alter what Google shows you and how it decides to do so, as you use it.

So if you’re a young White man in borderline rural/urban South Carolina, with a history of racist threats, and a low level of technological engagement, how likely are you to know that these factors exist at all, let alone how to turn off or mitigate them? More to the point, before this moment, right now, did you? And so it is very likely that Roof’s search showed him something very similar to what would be seen by someone searching in South Carolina, today: you could get as far as typing out “Black on” and the autocomplete feature would suggest to you, in order, “Black on White crime,” “Black on White violence,” “Black on White crime statistics,” and “Black on White racism. Choosing any of these presented options, today, returns a raft of White supremacist webpages with doctored statistics used to push a racist narrative that the greatest danger facing White people, is Black people; though we cannot know for sure, it is, again, a safe bet that Roof’s results, modulated as they would have been by similar searches, results, and clicks in and around his location, provided him with something similarly virulent.¹⁸

3. Intersubjective Intersections

As long as humans are the ones doing the work of translating their experience and

¹⁶ Noble, Safiya U. *Algorithms of Oppression: How Search Engines Reinforce Racism*; Hersher, Rebecca. “What Happened When Dylann Roof Asked Google For Information About Race?” NPR’s The Two-Way. 2017. <https://www.npr.org/sections/thetwo-way/2017/01/10/508363607/what-happened-when-dylann-roof-asked-google-for-information-about-race>.

¹⁷ “How Google Search Works” <https://support.google.com/webmasters/answer/70897?hl=en>.

¹⁸ Robles, Francis; Stewart, Nikita “Dylann Roof’s Past Reveals Trouble at Home and School”. The New York Times. 2015. <https://www.nytimes.com/2015/07/17/us/charleston-shooting-dylann-roof-troubled-past.html>; Hersher, Rebecca. “What Happened When Dylann Roof Asked Google For Information About Race?” NPR’s The Two-Way. 2017. <https://www.npr.org/sections/thetwo-way/2017/01/10/508363607/what-happened-when-dylann-roof-asked-google-for-information-about-race>.

understanding of the world into technologies— and into the languages that other technologies can understand— those humans will need to work in far more diverse groups of people. But this means more than a tokenistic sampling of someone to be the only Black person, the only woman, the only disabled person, the only trans person, the only gay person in the room; it means taking a serious representational sample of the opinions and needs of the stakeholders who will be affected by what you create. This process is necessarily more complex and time consuming than choosing one prominent person, but it is also far more likely to capture the perspectives of those people who understand not only the existence of our framing questions and their implications, but also the epistemologies and life strategies that they represent.

There are a number of people and theories we might use as a combined set of strategies, in order to address the problems of representational diversity. In her 1988 lecture, “Can the Subaltern Speak?” Gayatri Spivak discusses the theory of the “subaltern” or those people who are most often ignored or unheeded in terms of being people who hold knowledge; in her 1991 book *Simians, Cyborgs, And Women*, Donna Haraway expands on this.¹⁹ The Subaltern concept can in turn be used to understand what Deb Chachra, Lorraine Code, and E. Burcu Gürkan all discuss in their work: epistemic valuation. People have mental models for who they consider an “authority” or a valid source for knowledge, and while the construction of this mental model changes from one field of expertise to the next, there are certain areas which don’t even get counted as knowledge, in the first place.²⁰

Perhaps unsurprisingly, Code notes, the areas of knowledge most often discounted are exactly those which pertain to the kind of lived experiences we’ve been discussing: fields, academic disciplines, and trades traditionally dominated by those people whom society categorizes as women, as disabled, as any ethnicity other than White, are often deemed “lesser forms of knowledge.” Not only that, but Chachra says that when members of those identity structures find themselves in fields such as the sciences, they have to work even harder to prove themselves worthy, and to not internalize a disregard for their own worth and knowledge.

Gürkan’s work deconstructs how young women often get socialized into self-sexual objectification, and individuals can become equated to and conflated with their sexual parts. Gürkan references a study titled “That Swimsuit Becomes You,” in which women were asked to take a math test to assess their skill level, then asked to change clothes, donning either swim suits or looser-fitting clothing like large sweaters and jeans. The women were then presented with a room in which sat a large table of food they could eat, and later another table at which they were asked to take a brief math test. Women wearing the swimsuits a) actively avoided the food and b) did *far* worse on the math tests. A second test on a group of women and men showed that this self-objectification held true only for those socialized as women. And all of these findings cohere with studies which show that female coders on the public repository GitHub were consistently ranked substantially higher than men—but only if their gender was hidden.²¹

We can also find this kind of interrogation of “what counts as knowledge, and who gets to be an expert” in the disability and neurodiversity communities, when it comes to questions of how people with disabilities and neurodivergent folx understand themselves and their place in the world. The social model of disability says that it’s not the physiological

¹⁹ Spivak, Gayatri Chakravorty. “Can the Subaltern Speak.” 1988; Haraway, Donna. *Simians, Cyborgs And Women: The Reinvention Of Nature*. NY: Routledge. 1991.

²⁰ Chachra, Deb. “Countering the Self-Fulfilling Prophecy of Gender Schemas.” *Bitch Planet*, Vol. 1, Iss, 4; Code, Lorraine. *What Can She Know? Feminist Theory and the Construction of Knowledge*. NY: Cornell University Press. 1991; Gürkan, E. Burcu. “A Constellation of Knowledge: Popular Culture, Identity, and the Self.” SWPACA 2016.

²¹ Terrell J, Kofink A, Middleton J, Rainear C, Murphy-Hill E, Parnin C, Stallings J. (2017) “Gender differences and bias in open source: pull request acceptance of women versus men.” *PeerJ Computer Science* 3:e1111 <https://doi.org/10.7717/peerj-cs.1111>

difference which disables, but the way that spaces, architectures,²² and simply basic societal expectations limit how a person “should” intersect with the world and what kind of body and mind (or, as Margaret Price puts it, “bodymind”) they “should” have.

For example, there’s Daniel Kish, the man who was born blind, but has often been publicly lauded for engaging the world and doing “amazing” and “inspiring” things like crossing the street and riding a bike on his own.²³ Kish, like many other disabled people, argues that there is nothing at all “inspiring” about a disabled person living their life, and that it’s the social conditioning of blind children that makes the difference in how they engage the world, not their blindness, in and of itself. There’s a phenomenon experienced by many blind people, where they begin to navigate the world by a kind of echolocation, or “Clicking,” and Kish says that this is done spontaneously by many blind children, but that they are socialized out of it, both by being told it’s “not normal,” and by the more subtle process of everyone in the blind child’s life constantly treating them as helpless.

And thankfully, there are an increasing number of studies and collections of first-person reportage about how technology intersects with and facilitates the lives of disabled and other human persons with differing types of bodies. There is Ashley Shew’s work on “Disability, Experience, and Technological Imagination,” Kim Sauder’s 2015 “When Celebrating Accessible Technology is Just Reinforcing Ableism,” Alice Wong’s Disability Visibility Project, and many more.²⁴ Through these works we can come to understand that how we build our societies, physically, is a direct product of how we build our societies, ideologically, and that both of these constructions impact the lives, experiences, and knowledges of the different kinds of people who are subject to them.

But if we take seriously what we discussed above, about intersubjectivity, then we shouldn’t think of all of those as separate lessons. We have to understand that while each of these perspectives can be understood to represent a different lived experience, there are many people in whom one or more of these experiences combine. For instance, since the late 1980’s, theorists, researchers, and practitioners in what is known as User Centered Design have focused on the process of how systems, artifacts, and interfaces are built with the user in mind—taking what’s been built back to the people who will use it, and asking them what works and what doesn’t.²⁵ This is also the basis of Kimberlé Williams Crenshaw’s theory of “Intersectionality”²⁶:

“I argue that Black women are sometimes excluded from feminist theory and antiracist policy discourse because both are predicated on a discrete set of experiences that often does not accurately reflect the interaction of race and gender. These problems of exclusion cannot be solved simply by including Black women within an already established analytical structure. ***Because the intersectional experience is greater than the sum of racism and sexism, any***

²² See Rosenberger, Robert. “The Philosophy of Hostile Architecture: Spiked Ledges, Bench Armrests, Hydrant Locks, Restroom Stall Design, Etc.” 2018.

²³ Rosin, Hanna; Spiegel, Alix. “How To Become Batman.” Invisibilia, from NPR, season 1, episode 3, 2015, <https://www.npr.org/programs/invisibilia/378577902/how-to-become-batman>.

²⁴ Shew, Ashley. “Award Abstract #1750260: Science of Broadening Participation: CAREER: Disability, Experience, and Technological Imagination.” National Science Foundation. https://nsf.gov/awardsearch/showAward?AWD_ID=1750260&HistoricalAwards=false. Accessed June 25, 2019; Sauder, Kim. “When Celebrating Accessible Technology is Just Reinforcing Ableism.” *Crippled Scholar*. July 4, 2015. <https://crippledscholar.com/2015/07/04/when-celebrating-accessible-technology-is-just-reinforcing-ableism/>. Last Accessed June 24, 2019; Wong, Alice. “Disability Visibility Project.” <https://patreon.com/DVP>. Accessed June 25, 2019.

²⁵ “User-Centered Design Basics.” Usability.Gov. <https://www.usability.gov/what-and-why/user-centered-design.html>. Retrieved June 25, 2019.

²⁶ Crenshaw, Kimberlé Williams. “Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics.” <https://philpapers.org/rec/CRETI>

analysis that does not take intersectionality into account cannot sufficiently address the particular manner in which Black women are subordinated.”

(Emphasis added.)

Crenshaw centers Black women, but this isn't to say that *only* Black women can be intersectional subjects. Rather, she uses Black women as an example of how groups of people that have been cast as only one kind of identity (Black, Woman) would be far better understood as the center of an intersectional process. As Patricia Hill Collins and other proponents of what is known as standpoint epistemology have put it, when we understand people in an intersectional way, we can recognize the many vectors for different kinds of knowledge, in the world.

3.1 GIGO (Garbage In, Garbage Out)

Human biases and prejudiced outcomes are exacerbated by coders and designers who use inputs from human systems as data to train algorithmic systems; those systems then effect and further racist disparities in incarceration rates, from childhood onward. People of colour and especially African Americans have been historically over-policed and over-incarcerated, at a rate wildly disproportionate to their percentage of the population, and so algorithms which use this history as training data will reproduce and iterate on this racist history. And in this, as in each of the cases we've discussed, we can find evidence of communities of individuals with shared knowledge who a) raised concerns about the technologies being built, but b) were not heeded. Why weren't they? Again, all of this happens because of the datasets, code, and assumptions—of objectivity, of neutrality, of shared experiential knowledge, of what *kinds of things count as knowledge at all*—of humans. People encode and inscribe their values into every single tool and system they create *and* into how they use said systems. And then, when those systems reproduce those values, those people cry, “it's not me! It's the math! The code! The system.” But the code and the system are made of the choices of people and the perspectives of the world in which they exist, and those people and those perspectives far more often tend towards white, ablebodied, cisgender, heterosexual, and male.

Here's one final, more recent example: In late October of 2018, a man killed 11 Jewish worshippers in Pittsburgh, at least in part because he feared that Jewish people were funding a caravan of asylum-seeking migrants trying to enter the US to eradicate the “White Race.” In early November, investigators at the Intercept discovered that Facebook's targeted advertising algorithm had designed a category for believers of the white supremacist “white genocide” conspiracy theory, and that that category remained an active choice for advertisers, even in the wake of the Synagogue massacre.²⁷ While many chose to focus on the fact that the category exists, at all, more shocking is the mechanism by which it was created. Again: According to Facebook spokespersons, the targeted advertising algorithm *created the category, on its own*. The targeted advertising algorithm is designed, programmed and trained to use pattern recognition to define potential target groups for advertisers so that they may more easily identify and engage the audiences with whom their service or product will do well.

And how was it trained? By exposure to Facebook's network patterns and the behavior of people in them—networks which Facebook has been notoriously reticent to moderate for racist, disableist, sexist, xenophobic, transphobic, homophobic, or otherwise bigoted content. When humans train a system via uncritical pattern-recognition protocols applied to that system's continual exposure to bigoted datasets, humans will get a bigoted system. When humans then teach that bigoted system to weight its outputs for use in a zero-sum system like

²⁷ Biddle, Sam. “Facebook Allowed Advertisers to Target Users Interested in “White Genocide” — Even in Wake of Pittsburgh Massacre.” The Intercept. November 2, 2018. <https://theintercept.com/2018/11/02/facebook-ads-white-supremacy-pittsburgh-shooting/>.

capitalist marketing and advertising, where every engagement is a “good” engagement, the system will then exacerbate that bigotry in an attempt to generate the *most* engagement. Once that’s done, the capitalist advertising-driven system made of the biases and bigotries it learned from humans will sell the amplified iterations of those biases and bigotries *back to those humans*. Then, the assessment of how those humans engage with those iterations (remembering, of course, that any click is a good click) will, again, inform the system’s next modulations. And then the cycle begins again.²⁸

4. Conclusion

Because code is not neutral, which is because what we’re actually doing when we code is describing our world from our particular perspective; so code is rather more of a language, and like with any language, translation is an issue. When we code, we are translating our knowledge (even that unconscious knowledge and those tacit beliefs gained from perspectives and lived experiences) into a language that a technoscientific system can understand. And so whatever assumptions and biases we have in ourselves are very likely to be replicated in that code.²⁹ We built these systems—people, in search and service of power, money, perspectives, preferences, and biases. These tools and systems are *made things*, and no amount of offloading our culpability to the “objectivity” of code or math or science will *elide* that culpability. This is a systemic problem; it concerns how we process data and who counts as the “we” doing the processing—because the implications of “how” arise directly within and through the lived experience and intersubjective knowledge of those various “who.”

Because, to reiterate, different phenomenological and post-phenomenological experiences will produce different pictures of the world, and different systems of knowledge by which to navigate them, and so, in order to get as complete an understanding of the world as possible we need intersubjectivity and intersectionality of knowledge construction. We need to develop programs and cultures whereby we access communities and (or of) individuals who hold different perspectives and who have generated different systems of knowledge based on those perspectives and experiences. This does not give us “objectivity,” as such, but a co-creative and co-arising access of multi-perspective understanding. By bringing training in theories of race, disability, gender, sexuality, phenomenology, intersectionality, and intersubjective knowledge into conversation with insights from user-centered design, religious studies, science and technology studies, and philosophy of technology, we can now talk about exactly what it is that we might have known. That is, when we learn to apply techniques such as bias bracketing and intersectional analysis in the contexts of scientific and technological research, development, and design, we can begin to learn from our past failures in a more robust and systematic way.

Who might have been able to apply their lived experiences to work being done at Google, Nikon, HP, Amazon, Compas, the new construction on your local university’s infrastructure, or countless other technological artifacts, processes, designs, and spaces? Who might have been better situated to produce outcomes—and cultures—which might have better benefited everyone? And what was it that kept us from reaching out to or heeding them, in the first place?

²⁸ Cf. Rosenberg, Yair. “Amazon’s Algorithm Has an Anti-Semitism Problem.” *Tablet*. November 15, 2018. <https://www.tabletmag.com/scroll/275042/amazons-algorithm-has-an-anti-semitism-problem>. NB: The examples in this chapter are only a small selection of now-current harms perpetrated by algorithmic technology at scale, and by the time you read this many more and possibly worse will very likely have occurred.

²⁹ Conversation with Eveleth, Rose, narrator. “Rude Bot Rises.” *Flash Forward*, season 1, episode 10, 2016, <http://www.flashforwardpod.com/2016/04/05/episode-10-rude-bot-rises/>; Finley, Klint “Open Source Will Help Computers Not Be Evil” 2016. *Wired*. <https://www.wired.com/2016/05/what-is-ai-artificial-intelligence/>.

So go back to the beginning, read those questions again—what do you do when a police officer pulls you over; what kinds of things about your body do you struggle with whether and when you should tell a new romantic partner; if you are able to stand, for how long—and then ask yourself what would have to be true about your life in order to have those questions not be questions for you, but rather for them to exist as automatic behaviours and considerations and constantly engaged experiences, throughout your entire life. That is, who would you need to be, how would you need to live, and what communities would you need to come from, in order to better understand the implications of those questions? Now, when you have a clear idea of who those people are, reach out to, consult, hire, and pay attention to these people and believe what they tell you about what they've lived and what they know.

There is no one-size-fits-all answer, here—only a shifting matrix of needs, stakeholders, and power dynamics, of which and whom we can be more (or less) cognizant. To be more cognizant, we need to consult with and heed marginalized people—in the questions we ask at the outset of any project, in the design teams and managerial frameworks that we build to tackle it, in who we hire and give power and authority within our organizations, and in the kinds of knowledge and training we deem important for them to have. To be more cognizant, we have to ask ourselves not only “who isn't in this room,” but “who is *alone* in this room?” To be less cognizant, all we have to do is nothing.

We need to pay special attention those knowledges, minds, and lives which have been oppressed, disregarded, and marginalized—because they will have developed knowledge and survival strategies to which we otherwise would not have access. Because it's not just *important* whose knowledge we value, whose experience gets to be known, and who is allowed and encouraged to translate their lived and experiential knowledge into the technoscientific systems and devices with which we all live—it can be a matter of life and death.

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