MANUFACTURING DIFFERENCE: DATA, SELVES, AND OTHERS

By

Janine S. Slaker

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ABSTRACT

The following work presents an ethnography of this idea – that data, particularly digital data, makes a difference. The approach was in Science and Technology Studies and theories of difference to examine dominant imaginaries of digital data and its contradictory impacts on groups of different social categorizations. To guide my activities, the inquiry is centered upon a question of difference, namely, through interactions with makers, practitioners, and users of self-tracking devices, I sought to identify how social differences were encountered, made sense of, and produced through digital tools. I interacted with self-tracking practices across three levels that captured institutional, community, and individual practices to engage with this question. The findings from this work speak to three processes in which self-tracking tools made a difference, specifically racial differences, productive enabling both the reproduction of normative whiteness and the decentering of it. This work seeks to contribute to eliciting the values and biases of digital practices that can have stratifying social impacts.

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CHAPTER 1: INTRODUCTION

A point of departure. What does it mean to be rendered a technological display? I first met Aria at a Quantified Self meetup. Her zeal for capturing candid moments and her enthusiasm for storytelling had noticeably entranced the room. I soon learned that Aria was a professional storyteller, part of the reason she started to self-track. She had worked decades at a PR firm producing content, but in recent years, she felt her creativity was not as stable as it once was. She grappled with increasingly demanding deadlines in our fast-paced world of real-time information and heightened online engagement. The expectation to produce continuously added to her current strain as she felt trapped in a cycle of relentless tasks and tight schedules. She was currently experimenting with sleep trackers in hopes of leveling the ebb and flow she was experiencing. Aria's quest had recently taken her through a maze of patents until she found an appealing device:

> So I'm reading about it, and its algorithm sounds amazing. It is precise and clinically approved, and FDA-approved for the market. It's even used in hospitals. I'm thinking, Wow, the tech is amazing! These guys *really* know what they're doing. This is like state-of-the-art.
>
> So I purchased it. I put it under my pillow. It's supposed to read my body as I sleep, and I just look at it when I wake up. Then as I'm doing it, and I'm tracking and looking the next morning, I start to think, this isn't telling me shit about my body. It wasn't helping me develop awareness or embodiment. It wasn't anything but the convenience of knowing. You know? It was the convenience of being rendered a technological display. You give a man a compass, and he literally colonizes the world. This? [pointing to device] This was getting me nowhere.

Aria's experience speaks to several motifs that help frame this research's themes. Her turn to self-tracking reflects a broader shift toward digital self-management for health and improvement (Feng et al., 2021; Rising et al., 2020). She was drawn to the device based on its algorithm's precision, clinical approval, and Food and Drug Administration (FDA) clearance. Aria's assessment, based on algorithmic precision, state-of-the-art technology, and clinical and FDA approval, speaks to the biomedicalization of digital devices that give apps, sensors, and wearables authority as medical devices (Clarke, 2014). She gestures to the centrality of bodies as a valuable site of currency in a world increasingly mediated by digital technology that evokes the colonialist imagination (Couldry & Mejias, 2019). A fundamental tension unifies these themes: the promissory discourse of digital technologies as avenues for heightened awareness and empowerment and the outcomes they deliver. This misalignment between the social imagination of our digital tools and the outcomes of their use represents the core focus of the following ethnography.

The following work presents an ethnography of this idea–that data, particularly digital data, makes a difference. My goal was to understand how self-tracking technologies, through their data collection and application, mirror, perpetuate or contest established social norms and power arrangements. To guide my activities, I centered my inquiry upon a question of difference through interactions with makers, practitioners, and users of self-tracking devices. I sought to identify how social differences were encountered, made sense of, and produced through engagement with digital tools.

I organized this chapter into three parts. In the first part, I review how self-tracking tools are being institutionalized and positioned as technologies to decrease social disparities in health. I then complicate the framing of self-tracking as a technology of difference, focusing on how the

tools are positioned to lessen racial health disparities. I then turn to the section of this chapter that reviews the biopolitical impacts of self-tracking tools under consideration of Foucault's use of modern racism. Last, I critique how self-tracking, as a technology of difference, engages with processes of racialization that distribute bodies in various ways.

Self-Tracking, Neoliberalism, and Governing Difference

Self-tracking technologies have become integrated into multiple areas of daily life, offering a variety of devices and applications for monitoring diverse aspects, such as physical health and financial status. Brands like Apple, Fitbit, and Garmin are prominent in this industry, while more specialized products like Jakcom and Motiv smart rings provide alternative tracking options. Mobile and smartphone applications like LoseIt! and MyFitnessPal offer platforms for monitoring weight, exercise, and spending. A Pew Research Center (2013) report found that 69% of U.S. adults were using technology to track at least one health indicator. This report also estimated that 2 billion people worldwide use digital devices to monitor their health, highlighting the widespread nature of this trend.

The growing reliance on technology for personal health monitoring aligns with broader changes in the healthcare industry (Mitchell & Kan, 2019). One example is the Precision Medicine Initiative (PMI), inaugurated by President Obama in 2015. The PMI recognizes that the "one-size-fits-all" approach to medicine provides treatments designed for an "average patient [which] can be very successful for some patients but not for others" (The White House, n.d.).

The PMI reflects prevalent concerns in academic discourse about the role of digital data in social life. These concerns often fall within critiques of technological solutionism that situate data about bodily activities within a broader context of technological innovation, privatization, and biopolitics. Within this milieu, self-tracking technologies are positioned as significant tools

to solve social challenges, many of which fall within the health sector. These technologies are promoted as tools that empower individuals to enhance their daily health and decrease the need for intensive medical intervention.

Overseeing activities of the PMI is the National Institutes of Health (NIH), which facilitates the private and public partnerships needed for its success. Like many neoliberalist projects, the PMI depends on market-driven solutions, and cross-sector collaborations between public-private partners for its success that position the government as a facilitator. In 2018, the NIH launched the *All of Us* Research Program, with a cohort of over 100 organizations and more than 1,000 researchers. This collective is tasked with creating one of the world's most comprehensive biomedical databases seeking to recruit one million people living in the U.S. to donate their information. This database will house vast biological and biometric data from diverse sources. This includes "omics" data, electronic health records, surveys, and biological samples (Chen & Snyder, 2013). The database also emphasizes the ongoing, real-time capture of environmental, behavioral, and lifestyle data from wearable devices like Fitbits (Genomics Working Group, 2017).

For the *All of Us* cohort, self-tracking technologies provide the key to including data that can be a proxy for environmental, behavioral, and lifestyle information. It is unsurprising to see wearables listed as a source of biomedical information. Self-tracking devices like the Fitbit, intended to be worn continuously, offer researchers and practitioners the possibility of continuous and real-time information that may help with diagnostics and monitoring. In the last decade, self-tracking has become mainstream. The lowering cost of sensors and hardware used to make apps and wearables is often referenced to explain the proliferation and application of self-tracking tools in social projects for good. However, as Aria mentioned, the convenience

associated with these technologies should cause us to pause when considering information like step counts or activity levels as valid medical and health information. Health trackers that provide continuous and real-time monitoring, like activity trackers, use standard sensors found in mobile phones. Sensors like accelerometers and gyroscopes, initially designed for functions like auto-rotating phone screens, are repurposed to measure activities such as “steps.” As Sara Watson pointed out in her interview with Eveleth (2014), the “health” data produced from trackers is often not health data but information that a mobile phone can produce. Watson’s observation underscores the importance of critically evaluating the nature of data generated by self-tracking devices. This is especially relevant for programs seeking to promote self-managed care as it informs discussions on data validity, user awareness, and ethics of program design.

What is also concerning is how the use of self-tracking devices, though widespread in the United States, appears to subsist after an average of six months (Gorm & Shklovski, 2019). More concerning is how, consistent throughout the last two decades, there is a lack of evidence to support the efficacy of self-tracking in the context of enhancing patient care unless programs have integrated self-tracking as a subsidiary mechanism of care in conjunction with more routine physician visits (Feng et al., 2021; Jin et al., 2020; Nuss et al., 2021; Otaka et al., 2021; Zakariah et al., 2021). Despite the limitations of self-tracking technologies and the lack of evidence on their efficacy, these tools persist as central actors in the democratization of healthcare. Initiatives that use digital tools to promote democratic access to healthcare have become increasingly widespread. Notably, the World Health Organization (2022) has recently endorsed self-tracking through its self-care initiative, emphasizing its capacity to enhance global universal health coverage and overall well-being. The nof1 concept has become a catch-all for handling the increasing challenges related to rising healthcare costs and the lack of access to it. Self-tracking,

particularly the digital data made and collected by tracking technologies, is even considered a valid "digital phenotype," offering a valid proxy for a range of social, cognitive, and behavioral information (Jayakumar et al., 2020). While there is much enthusiasm for these technologies, there is skepticism, as the rise in popularity has blossomed into a billion-dollar market, estimated to reach $428.82 billion by 2030 (Market Research Intellect, 2023).

While self-tracking can foster a sense of empowerment and serve as a gateway to self-knowledge (Heyen, 2020), these tools have also faced critique for their tendency to oversimplify representations and for their embedding normative assumptions about health, the body, and productivity (Gill et al., 2005; Whitson, 2013). Lupton (1995) has frequently commented on this tension, noting the ambivalence inherent in data from self-tracking tools. Striving to manage one's health improves their "vital capital," which involves enhancing the inherent value found in the abilities and capacities of individuals as living beings (Harvey, 2010, p. 369). This phenomenon contributes to the commodification of health (Lupton, 2014). Thus, while the techniques of healthy citizenship may not involve direct interventions, they align individual goals with state objectives, encouraging people to conform to societal expectations of what a healthy body should be (Lupton, 2013). This results in new forms of subjection, discipline, and control rather than the promised empowerment and autonomous choice (Lupton & Smith, 2018; Sacco-Peterson & Borell, 2004). To this end, the healthy citizen serves as the disciplinary field that lowers the individual's burden on society while also managing the threat of risk (Shostak, 2010). Such considerations, coupled with the lack of evidence supporting the benefits of self-tracking technologies on health, raise questions about how diversity might be constrained and institutionalized by this initiative.

Biocitizen and Bio-Other

Theorists who draw on governmentality emphasize the subtle but effective forms of social control that link individual conduct to political objectives (Lupton, 2017; Lupton & Smith, 2018; Pantzar & Ruckenstein, 2015; Petersen, 2012). In a neoliberal society, the individual is seen as a self-governing entity responsible for their own well-being (Harvey, 2006; Rose 1992), where engagement with self-monitoring tools is understood to strengthen actions and beliefs that align with larger socio-political goals of promoting self-responsibility and individualism (Lupton, 2016). Within this perspective, responsibilization involves promoting the normalization of self-monitoring and improvement practices, such as managing diet and exercise (Bergroth & Helén, 2020). Management of the self is addressed through the normative beliefs that self-tracking technologies circulate and affirm, such as viewing the body as a machine to optimize the Field (Sayyah et al., 2012) that limits what it means to have a healthy body (Ruckenstein & Schüll, 2017). While these technologies can offer a sense of autonomy by providing personalized insights, they can also lead to new forms of subjection as individuals internalize societal norms and expectations, such as the ideal body image or productivity levels (Sharon, 2017a).

While the discourse around self-tracking often emphasizes individualism, it's crucial to examine how this singular focus perpetuates a colorblind perspective regarding the disadvantages, exclusions, abuses, and violence perpetuated and caused by the medical sciences (Williams & Mohammed, 2009). I highlight this aspect because it offers an alternative perspective for discussing the impacts of self-tracking technologies. While current scholarship addresses and critiques the normative dimensions, I aim to provide an alternative approach to exploring the normative implications of these tools.

For instance, consider projects like the Precision Medicine Initiative, which target specific populations and communities to address longstanding health disparities. The utilization of technological solutions to tackle social disparities is a recurring theme, from initiatives like One Laptop per Child to various others (Toyama, 2015). While it's evident that self-tracking has the potential to flatten disparities, it's equally clear that large-scale self-monitoring projects and healthcare reforms are increasingly centered around marginalized populations. In this context, these self-tracking projects and reforms can be viewed as a form of racial project, using the terminology of Omi and Winant (2015). They are intended to redistribute resources along the axis of color that contribute to the formation and maintenance of racial categories and hierarchies (Omi & Winant, 2015). For instance, self-tracking has been applied to various projects, from seeking to scale personalized health to the underserved to using devices to monitor population and community-level data for communities who face environmental and social burdens that exacerbate the level of social determinants they must contend with (Barrett et al., 2013).

Rail and Jette (2015) have discussed that this necessity not only cultivates a healthy and efficient biocitizen through various market strategies but also creates a contrasting, biologically marginalized group or bio-Other. Their argument highlights how the biocitizen and the bio-Other function in a symbiotic yet hierarchical relationship. The biocitizen is often constructed as the epitome of societal ideals—fit, productive, and aligned with the state's objectives. This figure serves as a benchmark for health and productivity, often benefiting from market solutions tailored to enhance these attributes. On the other hand, the bio-Other is constructed as the antithesis of the biocitizen: unfit, unproductive, and often marginalized due to not meeting the state's or market's ideal criteria. The existence of the bio-Other serves to reinforce the virtues and desirability of being a biocitizen. It creates a moral imperative for public health systems to

engage in “rescue missions” to rehabilitate the bio-Other, ostensibly to elevate them to the status of biocitizen (Rail & Jette, 2015, p.328). However, this rescue mission often serves dual purposes. While it ostensibly aims at social betterment, it also provides an opportunity for market expansion. Corporations co-opt these public health initiatives to introduce new products or services, effectively commodifying and rescuing the marginalized and aiding in their rehabilitation. For instance, it is being positioned as a solution to the cost burden of the growing global refugee population (Abdelrahman, 2023). As well as being positioned to address several vulnerable and underserved communities, from women’s health and pregnancy in poor incomes (Guendelman et al., 2017) to mental health in indigenous communities (Maxwell et al., 2021), and research testing the efficacy of self-tracking interventions for the management of post-partum depression (Christiansen et al., 2023).

This arrangement reveals an inherent contradiction: the necessity of the bio-Other’s persistence for the biocitizen to maintain its current social position as an ideal. Serving as a target for market expansion and capital accumulation, the bio-Other places marginalized populations in a precarious position where their continued marginalization is essential for sustaining the existing market arrangement. In essence, the presence of marginalized populations becomes indispensable for the very existence of biocitizenry projects.

Foucault's (2003) work sheds light on how discourses and disciplinary practices shape individuals and groups, offering a relevant perspective for understanding the integration of self-tracking practices within broader societal structures. Particularly striking is how his focus on the performativity and iterative nature of practices in constituting the subject. Building upon Foucault's insights, the discussion now turns to his concept of the biopolitical, the very domain in which the concepts of biocitizenry and governance find their home. This exploration will further

illuminate the intricate relationship between these concepts and shed light on how they intersect with Foucault's notion of modern racism. Understanding these intersections will also help address a central critique of the current field of scholarship: a primary limitation in this field is the homogenized and idealized imaginaries of users that detach scholarly works from the actual, everyday experiences of self-tracking participants (Sharon, 2017).

Biopower and Modern Racism

The construction of the bio-citizen as dependent on the bio-Other sheds light on how neoliberal projects, such as the Precision Medicine Initiative, engage in a form of modern racism. In his lecture series "Society Must Be Defended," delivered at the Collège de France between 1975 and 1976, Michel Foucault introduces the concept of modern racism within the framework of biopolitics and state power. Foucault argues that modern racism is a mechanism through which the state exercises its power over life and death, particularly in the context of managing populations. This form of racism is not merely an ideology or set of prejudices; it is a technology of power that serves to legitimize the state's interventions in life processes (Foucault, 2003).

Modern racism, according to Foucault, serves to justify the exclusion, marginalization, or elimination of certain groups under the guise of protecting the health and well-being of the population at large. It operates through institutions like healthcare, criminal justice, and social welfare, making it more systemic and less easily identifiable than overt forms of racial discrimination. This form of racism is integral to the functioning of the modern state, as it provides the moral and philosophical grounding for the exercise of biopolitical control (Foucault, 2003).

What is significant about Foucault's concept of modern racism is how it helps to expand the scholarly discourse on self-tracking to address the relationship between the normative and the

marginalized. Modern racism, according to Foucault, serves to justify the exclusion, marginalization, or elimination of certain groups under the guise of protecting the health and well-being of the population at large. This division is not necessarily along traditional racial lines but can be based on various criteria such as health, criminality, or social utility This form of racism is integral to the functioning of the modern state, as it provides the moral and philosophical grounding for the exercise of biopolitical control.

Current critiques of self-tracking often hover on the implications of these tools as biopolitical mechanisms of control (Alevizou & Murchison, 2022). While stigmatization is addressed, these technologies' marginalizing impacts are often relegated to the liberal discourse of inclusion. That is, the marginal or othering impacts are framed as evidence for a critique of the deployment of these tools rather than as necessary and required outcomes for the biocitizen to thrive. Moreover, to consider self-tracking as a form of modern racism is also to recognize these tools as technologies of race.

Chun (2009) defines race as technology as a shift in understanding from just what race is (a construct of biology or culture) to how it functions and operates as a tool or system that is designed to “do’ things. To consider race as technology is to extend the understanding of race beyond a mere biological or social category and to recognize its role in mediating relationships that shape definitions of biology and culture. Engineered to sort, categorize, and rank individuals, technology as race serves to produce and reproduce social hierarchies (Chun, 2009; Browne, 2010). This concept sees race not only as an object of representation or knowledge but also as a technique, a technology that encapsulates the larger logic of comparison that allows for likening entities as similar or dissimilar. It can also be understood as a technology that mediates human relations and functions to establish and negotiate definitions of biology and culture.

Furthermore, it is maintained that race as technology can be both a means to establish hierarchical differences and a tool for subversive action.

For instance, several scholars have addressed how self-tracking depends on ocular forms of reasoning. Nafus's (2014) insights into self-tracking, although not directly framed as a discussion on race as a technology, offer a valuable perspective on the aesthetic dimensions of self-tracking practices. Nafus highlights that self-tracking transcends mere data collection; it becomes an aesthetic practice where the management of the body is intricately tied to the presentation and interpretation of data. This aesthetic aspect is not just about creating visually appealing data representations; it also encompasses how bodies are perceived and recognized within self-tracking.

Building on this literature, I challenge current framings of social inequality and race to shift the focus from merely implicating them as consequences of use. Specifically, I explore how self-tracking technologies function as orientation devices based on degrees of alignment, contributing to creating normative subjects alongside deviant subjects. In doing so, race is not merely a risk factor, but also informs how data is captured, experienced, and participates in the configuration of the subject as bodies are oriented in space and time.

The positioning of these tools as the solution to challenging social disparities, considering a lack of evidence of their efficacy, helps me problematize how these tools are being positioned as technologies of difference. Specifically, to recognize self-tracking as a technology of difference is to acknowledge the contradiction inherent in its racial consciousness that allows for the dissonance between liberalism narratives of democracy and equality in the face of persistent racial injustices. Governance of difference is to acknowledge how neoliberalism has relied on

liberal narratives and recognize how these narratives rely on having an excluded or marginalized object.

By examining self-tracking through the lens of race as a technology, it can help to map the racializing techniques embedded in these technologies to broader discourses of risk and deviance. I am mainly focused on how technologies of race influence social arrangements as self-tracking tools are being imagined as providing a new arrangement for social bodies to access health resources. In this regard, the concept of race as a technology, as Chun (2009) posits as a techne—a process or technique that can be mastered and reproduced. Coleman's (2009) analogy of a hammer underscores the notion that race, like a tool, can be detached from any specific body and deployed to address social issues or achieve certain outcomes. This perspective can be significant when examining self-tracking tools, often positioned as instruments to enhance health access. In this regard, the following chapters seek to address how self-tracking tools are positioned as tools that can increase access to health; it would also require recognizing how these tools function as mechanisms that would produce and sustain difference so as to sustain the position of the bio-Other.

Organization of the Dissertation

This dissertation is divided into six chapters. Chapter 2 begins with an exploration of my initial encounters with self-tracking, detailing how these early interactions significantly influenced the configuration of the field site and the design of this ethnographic study. The chapter then transitions to a thorough review of the research design, highlighting the specific sites that facilitated access to this field. Furthermore, it underscores the importance of employing a multi-sited ethnographic approach (Marcus, 1995), enabling me to study differences as an ethnographic object. It also reviews the analytical process applied in this research, along with a

concise summary of the identified primary themes. This chapter is structured to offer an introduction to the relation between the subsequent empirical chapters.

The following chapters are dedicated to empirical chapters that discuss three positions within the field of self-tracking, specifically, the practitioners of these tools, the users of these tools, and the individuals who are DIY self-trackers and designers. In chapter 3, the first empirical chapter focuses on the practitioners who design and deploy self-tracking tools. Specifically, I examine how practitioners form narratives of access that contribute to the broader technoscientific imaginary associated with self-tracking. Shifting focus from the visual representation of race as depicted by self-tracking tools to an exploration of the racial imaginary that underpins the visions of many designers, I examine how narratives of access impart significance to the design space and the practices of practitioners. I conclude with a discussion on how the racial imaginary reinforces various biases and divisions that naturalize the space of design as a white space (Anderson, 2015) of moral virtue. This is contrasted with an imagined racialized Other, portrayed as deficient, to illustrate how the racial imaginary functions as boundary-making devices that act as a place of connection for practitioners as well as offers them a tool of segregation of the users.

Chapter 4 explores how self-tracking technologies contribute to making a difference, focusing on how these devices and apps direct attention to the body. Given that consumer devices often market and rely on automated and continuous data gathering, the chapter examines how the differences they produce are, in a sense, manufactured– that is, differences as mechanically rendered, automatic, and industrial in nature. Specifically, I seek to address how self-tracking devices merge Foucauldian notions of the panopticon and surveillance of the body with race-making technologies based on how bodies are proximate to normative whiteness. By

examining the varying degrees of proximity to normative whiteness, the chapter aims to shed light on the often invisible backdrop against which these technologies operate. This perspective seeks to reveal the subtle ways in which self-tracking technologies can reinforce or challenge existing social norms and racial hierarchies.

Chapter 5, the final empirical chapter, examines two self-tracking tools through the lens of 'design as self-defense.' This perspective explores how individuals utilize the design of self-tracking practices as strategies to defend against the prejudices and marginalization they face. By integrating insights from formative research from design literature and critical discourse on race and social differences, I examine how individuals engage in design as a form of self-defense. This chapter emphasizes the proactive ways social differences are engaged with, negotiated, and experienced through self-tracking practices and tools that seek to avoid collapsing representation and the fixity of stereotypical understandings of difference.

Finally, in chapter 6, I synthesize the arrangement presented in the empirical chapters by discussing the role of digital dysmetria, a term I introduce, which refers to the imbalance or discrepancy in how digital technologies mediate and represent different bodies and identities. This concept helps to explain the productive power of difference. By examining how self-tracking tools differentially impact the bio-citizen (those who align with the normative standards of health and behavior as dictated by these technologies) and the bio-other (those who are marginalized or misrepresented by these standards), this chapter highlights the role of technology in shaping contemporary notions of health, identity, and citizenship.

CHAPTER 2: RESEARCH DESIGN AND METHODS

My research into self-tracking was sparked by a fundamental dissonance that recognized how personal data can be harnessed for societal uplift and oppression. This dissonance pointed to a divided field where personal data serves dual purposes—as an instrument for societal empowerment and simultaneously as a mechanism for control and oppression. I approached this study with the understanding that self-tracking devices are not only conduits for surveillance and governance across various social spheres but also beacons of optimism, self-improvement, and autonomy. The intricate nature of this research subject necessitated a multi-sited ethnographic approach (Harvey, 2006) to capture how individuals' perceptions, interactions, applications, and beliefs are often contradictory and exceed the binary discussions in self-tracking that have faced recent criticism (Sharon, 2017).

While multi-sited ethnography helped me acknowledge the ambivalence inherent in technologies for self-tracking, situational analysis (Clarke, 2005) was used to trace emergent patterns between liberations alongside discrimination. Situational analysis helped me capture the intersections of power and knowledge and their influence on the varying potentials of subject formation to connect the various activities across research sites.

In the following chapter, I provide an overview of the investigative activities that shaped my understanding of this field and the reasoning behind adopting multi-site ethnography and situational analysis. The chapter is organized into three parts. First, I review my entry into this work to dissect the dualistic character of self-tracking that contours the situation of inquiry that this research takes as its main object of study. I summarize features of the paradoxical nature of self-tracking to help explain how I contoured and selected field sites for this research. In the final

portion of the chapter, I discuss the analytical process, which will also introduce the findings that will be addressed in further detail in the coming chapters.

Recognizing a Site of Silence

I was first introduced to self-tracking in late 2014 while conducting preliminary fieldwork for my dissertation, during which I worked closely with a group of designers who were developing a self-tracking app for a worksite wellness program. I started observing this group out of curiosity about the potential for data and quantification to enable empowerment. My connection to the group stemmed from an introduction by a professor who served as an advisor on the project.

Over several months, I engaged with the CEO and the diverse team based in San Francisco through meetings in California, Grand Rapids, Michigan, and via Zoom to include members who were located internationally. In contrast to the typical startup, the team did not consist of technologists; there were no computer scientists among them, nor were any members formally trained in human-computer interaction or design. Instead, their unifying thread was a collective experience of work-related burnout. They aimed to shift the focus from unyielding productivity to a work culture prioritizing humanity, reflection, and well-being. They envisioned leveraging this ethos to initiate a transformative movement that could confront and reshape the work culture that had precipitated their collective burnout.

Their collective experience of adversity brought into sharp focus the dominant cultural ethos in San Francisco that idolized innovation and disruption. Within this environment, their project took root, aiming to counter and offer an alternative to the prevailing narrative. The burnout experienced by team members arose from the intense startup work model that had infiltrated their respective fields, promoting prolonged work hours and data-driven activities that

led to dehumanization, burnout, and exploitation.[1] They often discussed design rationale parallel to the toxic work culture that drove people into long hours, distanced them from their families, and left them in states of depression. In turn, the app they were developing was dynamic and energizing, focused on soft skills and gratitude, and aimed at being a Trojan horse compared to other productivity and ROI-oriented worksite wellness programs.

During our meetings, the CEO would frequently discuss the networking events and conferences they were attending, such as Wellness 2.0 and Quantified Self meetups. I remember one occasion when the CEO fondly recounted meeting someone at a conference, which led to a moonlit hike in the California desert, reading tarot cards, and experimenting with various substances. It seemed that the design of their worksite wellness platform was as much a part of their personal journey of healing from past professional traumas as it was about imparting these healing practices to others.

As I prepared my dissertation proposal, I continued to find sites that spoke to the topic of datafication and empowerment. Naturally, this led me to several Quantified Self meetups. The Quantified Self-community consists of individuals who take an active role in producing data about their own experiences. These "Quantified-Selfers" adopt a personalized approach, often termed n=1 (pronounced, the n of 1), to determine what constitutes meaningful exploration, medical or scientific issues, the tools to use, and what data is significant (Lupton, 2016). The n=1 approach is foundational to the development of the Quantified Self and serves as a celebration of individual uniqueness, which traditional scientific norms often overlook (Ruckenstein & Pantzar, 2017). As Nafus and Sherman (2014) have argued, the data practices of the Quantified Self

[1] For instance the head advisor for the project had left their job as a geographer studying earthquakes and they were being pushed more and more to create predictive models and follow the culture of crunch time or in adopting data-driven methods of evaluation for measuring equity in public schooling.

represent a form of “soft resistance” that provides a counter-narrative to institutionalized science (p. 1793). Swan (2013) and others have praised the group for their empowering practices and use of data to bypass traditional intermediaries to impact their lives directly.

When the Quantified Self-movement was first introduced, it was regarded as a fringe group, and even a fetish culture obsessed with data (Hoskins, 2016; Rettner, 2014)**.** Founded in 2007 by Gary Wolf and Kevin Kelly, the Quantified Self has undergone a significant transformation that reflects its growing influence in various sectors. Initially, the organization presented itself as a "movement," but it later changed its name to Quantified Self Labs. It boasts influential figures like Susannah Fox, previously associated with the U.S. Department of Health and Human Services, and Davis Masten, who has held esteemed roles, including Co-chair of the President's Circle of the National Academies of Sciences, Engineering, and Medicine. Additionally, Masten's previous position as Chairman of Cheskin, a prominent consulting firm recognized for pioneering “Design Research and Multicultural Customer Experiences,” further aligns the group with prevailing techno-culture and capitalist ideals.

Working with public health, policy, and scientific research experts, the community's leadership aims to advance the concept of everyday science, which encourages individuals to use self-tracking technologies for personal discovery (Wolf, 2010). For the Quantified Self, culture and science are interlaced through their practices of technological DIY, hacking, personal discovery, and n=1 studies, which they frame within Article 27 of the Universal Declaration of Human Rights. Article 27 emphasizes the right to freely participate in the cultural and scientific life of the community, which is informally reserved for the freedom of expression for various minoritized cultural celebrations; the QS uses this declaration as a platform to argue participation in datafication practices is a cornerstone activity of modern democracies. As others have argued,

the Quantified Self's marginality is perhaps more of an identity that helps them appear authentic and less like a lifestyle brand (Constantin, 2019) or an organization with a centralized leadership from the likes of eBay and McKinsey with broad interest from sports and finance to health care, productivity, and military surveillance (Abend & Fuchs, 2016).

As I continued my preliminary fieldwork, the homogeneity and social influence of the Quantified Self became increasingly problematic. The presence of "big business" was demanding, and Quantified Self meetups were predominately attended by affluent, white, and male participants (Lee, 2014). The demographic uniformity combined with the group's adoption of activist rhetoric echoes a familiar theme in cyberpunk narratives that depict a white male savoir standing against an oppressive technocracy (Rehling, 2009).

Concurrently, there was a broader misalignment in the public discourse about the tech industry in San Francisco, which often failed to reconcile its image of innovation with the less-discussed negative impacts on society and culture. In 2014, San Francisco was the leading city for technology and information sector employment, accounting for 13% of the city's total employment and generating 22% of the city's total revenue (Bureau of Labor Statistics, 2013). This period marked the zenith of Web 2.0, characterized by a significant fusion of technology and content, which was hailed as participatory (Jenkins, 2008) and critiqued as a "social factory" involving free labor (Terranova, 2004). Creating and managing content was essential to the success of San Francisco-based companies such as Twitter, Yelp, Trulia, and Pinterest, which were key players in this digital boom (Mandel, 2014, p. 6). Amidst these narratives, reports suggested that the tech industry was exacerbating the economic divide between the rich and the poor (Stehlin, 2016). Incidents like the "Google Bus Controversy," where private shuttles used public bus stops, became emblematic of this tension (Wong, 2019). The tech industry was also

criticized for rapidly gentrifying San Francisco under the guise of being counter cultural. Critics labeled tech workers as lacking humanity and too absorbed in their phones to engage with the immediate physical world around them (Corbyn, 2014).

Around this time, I also became aware of the Chicago Police Department's installation of the Strategic Subject List (SSL). The SSL score actively shapes social decisions and behaviors in profound ways. The software program comprised data about residents of Chicago. The dataset houses individual arrests, gang affiliations, social network affiliations, and crimes committed. This data is then used to generate a score regarding the likelihood that an individual will shoot another person or be shot themselves. Law enforcement officers use this score to assess the potential threat level in their interactions with individuals that can influence the degree of surveillance and increase arrests and sentencing such that the score can reify systemic racism within the city (Law, 2004).

Even more problematic was the growing rates of algorithmic bias and "data harms" that grew alongside the subfield of computer science that focused on Fairness, Accountability, and Transparency in Machine Learning (FAT-ML). Despite racial and economic homogeneity, this group professed concern for social issues and was committed to mathematically refining algorithms to reduce outcomes of social discrimination due to bias within their design (Dwork, 2011). However, a pattern was emerging, one that would contour the fieldsites for this research. The pattern I observed suggested that data harms were disproportionately impacting marginalized groups—specifically, those defined by race, gender, and sexual orientation. The demographic uniformity within both the Quantified Self groups and FAT-ML presented a racial and gendered divide from those who were affected by data harms. This divide brought to the forefront a critical question of representation: Shouldn't those impacted by data injustices be

involved in the discussions and development of solutions for fairness or the involved in projects concerning empowerment?

The dichotomy between those advocating for fairness and empowerment through technology and those who suffer from its discriminatory practices starkly illustrates a persistent social divide. On one side, there are marginalized groups who bear the brunt of bias, discrimination, and harm—issues often dismissed as "minority problems." On the other, there is the predominance of the privileged who engage with themes of empowerment, resistance, and liberation, seemingly detached from the lived realities of the oppressed.

The dilemma I encountered was the stark contrast in how data, specifically self-generated data, could be employed for vastly different ends: one, a project aimed at transforming worksite culture to enhance shared humanity, and the other, a law enforcement tool that risked perpetuating systemic oppression. Both were rooted in the same conversation about data's role in society, yet they represented opposite spectrums of empowerment and control. This paradox became the central inquiry of my dissertation, questioning the dual nature of data as a tool for both liberation and subjugation.

What arose were the questions that broadly frame this research, which emerged around the limits of empowerment within an "Age of Big Data." The conflict that emerged is how forms of data-driven empowerment appear predominately accessible to those already in positions of privilege. Moreover, was concerned with how oppression manifested as a productive force that enabled this form of empowerment to occur and remain isolated to a privileged few.

A Site of Silence

Amidst this landscape, a new kind of silence emerged, characterized by the absence of critical voices and perspectives in the discourse on data and empowerment. This silence

represents the unacknowledged "gorillas" that Adele Clarke refers to in her work on situational analysis (Clarke, 2005, p. 86)—the significant yet unspoken elements that loom large in our collective consciousness. As Clarke articulates, sites of silence are the "present but unarticulated…[those] thousand-pound gorillas [that] we think are sitting around in our situations of concern that nobody has bothered to mention yet" (Clarke, 2005, p. 86). Clarke further exemplifies how these unspoken elements, these "sites of silence," can be as influential as the voiced discourses in shaping our understanding and actions within a given context. They embody the tacit or disregarded elements that, notwithstanding their absence in explicit discourse, exert a pivotal influence on the interplay of power, the construction of knowledge, and the shaping of subjectivities that can emerge.

Foucault (1972) posits that discourses are not mere reflections or representations of social realities but are practices that construct and constrain the subjects and objects they discuss. The dichotomy thus becomes a site of discursive struggle, where the meaning of data and related subjectivities are a matter of discursive formations. Furthermore, they argued that discourse contains what truths can be said about the phenomenon. Still, he does so while remarking on how constraints are also productive. They confer authority on specific individuals or groups to articulate and shape knowledge while marginalizing or silencing alternative voices and perspectives. Therefore, the discursive moment is not merely a reflection of power but a battleground where power is enacted and the potential for social transformation is realized and constrained.

Thus, the dichotomy between the rhetoric of data as a tool for empowerment and the reality of data as a mechanism of discrimination is not just a matter of conflicting experiences. The site of silence observed was not just a reflection of social inequalities but also presented an

entry for understanding how social inequalities were produced as a producer of them, where the struggle over the meaning of data is also a struggle over who has the power to define reality and whose reality matters. This discursive battle sets the stage for what can be imagined, what can be achieved, and who can participate in shaping a data-driven society (Jasanoff, 2005). At this point, it became necessary to fully employ a research approach that not only afforded the centering of a site of silence but also provided a framework to chart the various sites surrounding its absence.

To this end, Clarke's (2005) situational analysis became a critical approach to inform the activities of the dissertation. Situational analysis is a methodological approach in social science research that focuses on understanding the complexity of situations by examining various elements and their interactions (Clarke, 2005). It extends beyond traditional grounded theory methods by considering various factors influencing a situation. A situational analysis aligns well with the theoretical perspectives of subject formation as constituted by the practices and discourse of self-tracking. Self-tracking offers a conduit between macro-level structures and individual practices. Situational analysis offers a significant meso-level analysis that is particularly relevant to the study of self-tracking Clarke (2005). Situational analysis can attend to this criticism as it exists at the intersection of the local realities of individuals who use these devices and practices and the broader macro-level narratives and structures that frame its benefits and enable self-tracking.

The Multi-Sited Field of Self-Tracking

Situational analysis was implemented using a multi-sited ethnographic approach (Marcus, 1995), which entails researching various locations to understand the diverse contexts and dimensions of the phenomena under study. This method was selected for its capacity to

illuminate how self-tracking emerges through competing and contradictory discourses that simultaneously affirm and challenge the societal norms within which it operates. It allowed me to explore how power is exercised through the discursive formations of self-tracking by examining its shifts across different social groups and practices. This approach proved indispensable in examining the intricate relationship between individual data and societal inequalities. A multi-sited ethnography allows for examining the local context within global systems (Marcus, 1995). It offers a valuable means of addressing the challenge of situating digital data within a broader framework.

Identifying Sites of Entry

In the following I describe the three broad fieldsites that constitute this research. Each is informed by the features of self-tracking described, focusing on selecting field sites that capture the different communities involved in self-tracking. These sites are chosen to provide a holistic view of self-tracking, encompassing its potential for empowerment and oppression. The choice of field sites aimed to capture the diverse experiences and perspectives within the self-tracking community, ensuring that the research encompasses not only the technological aspects but also the socio-cultural and ethical dimensions of self-tracking. This approach is essential for holistically understanding how self-tracking technologies are developed, deployed, and experienced across different contexts and communities.

Quantified Self Community

I aimed to involve members of the Quantified Self community in my research due to their distinctive involvement with data and historical significance in the discourse surrounding self-tracking for public health. The public-facing nature of the Quantified Self clarified how narratives about empowerment and the everyday benefits of these practices traveled. Members of

this community are often active participants in local meetings, many of which are organized through platforms like meetup.com. Additionally, key members contribute to the Quantified Self website, regularly updating it with information about the community's vision, goals, and activities.

Healthcare Information and Management Systems Society

I recruited groups from the Healthcare Information and Management Systems Society (HIMSS), a globally influential organization dedicated to transforming the health ecosystem through information and technology. As a mission-driven nonprofit, HIMSS stands out for its comprehensive expertise in health innovation, policy, workforce development, research, and digital health transformation. It advises a wide range of stakeholders in the global health ecosystem on best practices, leveraging its community-centric approach to deliver insights, education, and events to a diverse audience, including healthcare providers, payers, governments, startups, life sciences, and other health services organizations. I concentrated on segments of HIMSS that were actively engaged in the United States. This focus allowed me to observe and analyze the dynamics and impacts of health information and management systems within a specific national context.

My involvement with HIMSS was made possible through an arrangement with the organization, which allowed me to have access to observe and actively participate in various projects. These projects encompassed different regions and sectors across the United States, including a major healthcare institution on the East Coast, a personal genomics company on the West Coast, a data privacy firm in the Central U.S., a team of biomedical researchers at a prominent West Coast institution, and a consortium of academics collaborating with patient advocacy groups, also based on the West Coast. This diverse array of sites afforded me a

comprehensive and multifaceted perspective on the role and impact of HIMSS in healthcare information and management.

Consumer Self-Trackers

Lastly, I sought to include consumer self-trackers as a field site in a multi-sited ethnography is pivotal. Often overlooked in academic discourse, this group provides a unique lens through which the interplay of technology, personal identity, and social difference can be observed and understood. Consumer self-trackers, typically engaged in wearable devices and mobile applications, embody the everyday practices and experiences at the heart of self-tracking culture. While individual self-trackers are dispersed, this ethnography provides access to how individuals negotiate their identities and social positions through the lens of self-tracked data. This field site also helped reveal how institutional narratives were experienced in everyday practices, offering insights into how users perceive, interpret, and act upon the data they collect. It also helped me to understand the broader implications of self-tracking that shed light on how data was interacted with and negotiated regarding self-representation, health, and social stratification in the digital age.

Theoretical Sampling and Recruitment

Individuals were recruited for interviews at self-tracking events, such as meetups, conferences, workshops, and flyers. Individuals and groups who consciously interact with data about themselves and other people consciously interact with or construct data about themselves or others. Theoretical sampling was used to select observational sites and recruit participants for interviews. This sampling technique prioritizes theoretical categories versus social representation in guiding the researcher on selection criteria (Glaser & Strauss, 1967, p. 47). The concurrent data analysis theoretically informs the decisions about who or what to consider next. Memoing

and situational analysis helped maintain sensitivity to how meaning, identity, discourse, epistles, and representations were presented and constructed. In turn, it supported the problematization of units of comparison, which afforded a deep comparison between commonalities and differences that helped ensure the validity of selection.

Participants found communities under many names, from consumer self-trackers to quantified self and open software movements, DIY and hacker groups, public health practitioners, and data activist groups. Within these groups are people who held roles as public health officials, engineers, startup CEOs, social workers, graduate students, data scientists, biostatisticians, geneticists, census workers, artists, servers, academics, computer scientists, geneticists, educators, lawyers, and homemakers. As the analysis persisted, the theoretical criteria influencing participant and site selection also shifted, such as the shift from designers and makers of self-tracking products to a broader user base of consumer trackers. However, participants maintained the initial commonality as all engaged with self-tracking practices.

Participant Confidentiality and Anonymity

To be considerate of the complexity and power imbedded in identifying someone the research asked participants how they preferred to be identified. In some cases, participants preferred identification via the tools, institutions, or goals that they had with self-tracking practices. For example, describing themselves as "*data memoirist*" or "*part of a large research institution*". While at times participants did want to be identified by traditional categories of race and gender, it would be qualified by a split perspective. For example, "*I self-identify as a Black/African American.*" Another participant in a follow-up conversation, when asked, stated that her race did not add to her story; instead, her experience stemmed from "*a woman that bleeds*." In due respect of each participant's experiences, I continued with these descriptions in

this reporting and forgo traditional demographic categorizations. Participants were also asked if they preferred pseudonyms, with some wanting to be identified with their everyday-use name. When this occurred, participants were typically engaged in social change initiatives. Others were provided pseudonyms, which they or I created. In the writing, I make no distinction between the two preferences.

To further protect participant privacy, I created composites addressing participants or activities associated with a recognizable institution, company, or social advocacy firm. Compositing is a technique where the researcher compiles interview data into a composite persona that presents as a single narrative (Willis, 2019). Creating composites helped maintain the privacy of participants who required greater anonymity and confidentiality, such as working for well-known companies and practitioners within recognizable hospital systems. The technique is also well suited for research in Internet studies as it complicates the ability to trace information about individuals that is typically easily searchable online (Markham, 2012). Lastly, compiling interviews allowed me to prioritize participants' privacy without compromising the broader goal of disseminating research findings to the public.

Data Types and Collection

Observational Data

Field notes were written following each observation. Observation data included descriptive and analytical notes of the observation site(s) and activities and artifacts, such as pamphlets or technologies. Data collected and generated through observation took the form of textual documents, digital images, paper records, and screen capture images. Observational data also included the self-tracking platforms, apps, tools, and devices that were being designed or used by participants. This included proprietary platforms as well as consumer-available self-

tracking wearables and apps. The inclusions of the technologies being developed and used were done to have a more comprehensive understanding of the technological engagements and design decisions made that relate to the values and goals discussed by participants.

Interview Data

In-depth, open-ended interviews were conducted with participants ranging from 40 minutes to two hours. Follow-up interviews were also conducted with participants who wanted to update me on their projects and experiences with self-tracking and lasted an average of 90 minutes. Interviews were conversational in that I sought to cultivate interactions between myself and the participants to acknowledge the co-constitutive nature of the interview process (Law, 2004).

The interviews were conducted to elicit meaningful narratives and insights regarding individuals' experiences with self-tracking. One of the challenges encountered in this endeavor was striking a delicate balance between crafting questions capable of uncovering unforeseen insights while keeping the discussion centered on the research subject (Charmaz, 2006). To strike such a balance, I designed the protocol so that each interview began with the same broad, "grand tour" question of, "*How did you find your way to [X]."* Across interviews, the "X" was revised to fit the group terms, activities, or events where the participant and I were introduced. For example, I would ask participants, "How did you find your way to the quantified self?" if we were introduced at a quantified self-meetup. The "X" also shifted as theoretical sampling was refined and concluded with a range of positions within the situation of self-tracking represented (e.g., "data activism," "personal genomics," "data-driven criminology").

From the initial question, a story would be shared that offered several events, reference points, and concepts to explore. Following the initial story, which one of the participants called

"my origin story," I employed various follow-up and probing strategies to encourage articulating the empirical details of their activities and the sensations, feelings, interpretations, and social implications associated with their experiences with self-tracking. For example, I would use the tactic of "circling back" to earlier statements made in the interview, restate my interpretation of statements to "check for accuracy," ask the participant for examples or explanations of salient topics, and respectfully express interest in wanting to understand more about their experiences, thoughts, and feelings about a topic (Charmaz, 2006, p. 26). An open-ended approach to questioning encouraged participants to identify significant and meaningful elements, facilitating the further elaboration of descriptions and narratives pertaining to the concepts of significance, meaning, and their interconnections with previously discussed aspects of the situation.

Memos

Memos are a procedural strategy that captures the reflexive process of constructing interpretations throughout the research process (Birks et al., 2008) that document the progression and rationale of decisions made (Glaser, 1978). Writing memos is an activating practice for researchers (Charmaz, 2006) and indicates a generative process rather than descriptive in how field notes are. Memos provide the researcher a space to explore their associations, interpretations, concerns, concepts, and categories throughout the process of theory development.

I began writing memos at the first stages of the research and continued until this writing. Memos helped bring "continuity of contemplation" to the research and provided a source for comparing data and theoretical shifts over time (Birks et al., 2008, p. 79). Unlike field notes, which are descriptive and bounded by the observation details, writing memos is an activating practice (Charmaz, 2006) and provides many functions for the research process. Most specific to constructivist grounded theory includes the researcher's position (Mills, et al., 2006). Memos

were most helpful in facilitating the development of concepts, categories, and definitions influential on theoretical sampling and construction.

Coding, Concepts, and Categories

The analytical process of situational analysis was iterative and reflexive, involving three distinct stages: open, focused, and theoretical coding. The initial coding phase aimed to identify themes and patterns using descriptive labels and codes**.** Following, themes were developed and theoretically synthesized to explain relationships between patterns identified in the data. While the coding process is aligned with grounded theory as developed by Glaser and Strauss (1967) it diverges in the integration of memo-writing along with constant comparison to aid in reflexive engagement with data. Constructivist approaches also encourage the integration of extant theory during the analysis.

The coding process of grounded theory is called open coding, an iterative series of analytical procedures that occur simultaneously in data collection (Glaser & Strauss, 1967). There are three "phases" of coding within the constructivist paradigm, which include coding (codes and concept development), focused coding (or categorical development), and theoretical coding (constructing the core category) (Charmaz, 2006). This presents an iterative cycle of coding to focused coding followed by theoretical coding, which is a procedure I engaged in throughout the research study. The iterative nature of the analysis also helped me maintain theoretical sensitivity throughout the research and adjust sampling or fieldsite exposure as the analysis became more refined (Chun et al., 2019). The analysis concluded when a point of saturation was reach for all steps in the procedure (Scott, 2009).

To add in the coding and theoretical analysis of the data, I integrated Clarke's mapping exercises designed for situational analysis. Clarke (2005) also offers various mapping tools to

guide the researcher in analyzing the level of the situation. As an analytical strategy, situational mapping offered a simplified means to determine varying positions and degrees of influence within the situation and illuminate actants that are marginal or excluded from articulations of institutional goals (Clarke, 2005). There are four types of maps: messy, ordered, social worlds/ arenas, and positional maps that act as "devices for handling multiplicity, heterogeneity, and messiness in ways that can travel" (p. 30). Each map is the outcome of a process of relational analysis and presents the foundation for epistemic frames discussed in this research, as well as its exclusions. The role of each map type is explained below in the review of the analytical activities.

Social world maps in situational analysis provide a structured yet flexible way to visually organize and interpret the complexities of social interactions and relationships, offering valuable insights into how various elements within a social world connect and influence each other. While social world maps visually represent the relationships and interactions within a social world, positional maps are designed to explore and depict the range of positions or stances taken on specific issues within a field or area of study.

Coding and Concept Development

The first level of analysis aims to generate descriptive codes. Many of the codes constructed in this research were in vivo, reflecting statements, terms, and objects mentioned by the participant verbatim. Once saturation reached the code level, attention was turned to identifying more abstract concepts than codes and constructed by comparing similarities and differences (Charmaz, 2014; Glaser, 1978). For example, participants would speak about their self-tracking data regarding their visual connotations, such as describing the data as cute,

colorful, and pretty. These codes (e.g., *I see cute data*, *I see colorful charts*, and *look at this pretty data*) were organized under the concept of *data aesthetics*.

Messy Mapping

Messy maps also helped track the development of saturation. Messy maps provided a tool to recognize the new and unfamiliar concepts and codes that deviated from previous assumptions of the situation and encouraged reflexivity and constant comparison when analyzed alongside memos. Holistically, the messy map recorded how self-tracking was recognized over the research timeline, documenting the rationale for sampling decisions and theoretical development (Charmaz, 2006, p. 48). Additionally, messy maps provided a tool to recognize the new and unfamiliar concepts/codes that deviated from previous assumptions of the situation. As such, messy maps were a particularly helpful tool for engaging in reflexivity and constant comparison, as maps could be analyzed in comparison with memos.

Focused Coding and Category Development

Focused coding began following saturation at the level of the concept. The goal of focused coding is to develop the theoretical robustness of concepts to identify higher-level categories (Charmaz, 2014). Categories are constructed based on shared qualities across concepts, including qualities of difference (Saldaña, 2009). I also constructed various ordered maps to facilitate concept development. Ordered maps organize the elements, conditions, and constructs presented in the messy maps and help to exemplify the degrees of influence and power present in the situation (Clarke, 2005). For instance, actants in the ordered map were determined based on Latour's (2007) expansive criteria, encompassing technological and material items, events that facilitate social gatherings, and constructs used for social and moral judgments. Quantification is considered a non-human actant because it symbolizes a specific

technology and circulates within society, influencing assessments of credibility and legitimacy (Porter, 1995).

Similarly, Alphabet's technology, "Deepmind," is a non-human actant, representing a platform and invoking various non-human constructs related to big data. This includes the idea that data-driven approaches allow for a deep understanding of the mind, aligning with the myth of technological superiority (boyd & Crawford, 2012). Consequently, many non-human actants embody multifaceted material, moral, and social dimensions.

Ordered Mapping

For this level of analysis, I also integrated the construction of ordered maps to organize the elements, conditions, and constructs presented in the "messy" maps and help exemplify the degrees of influence and power in the situation (Clarke, 2005). The maps used for situational analysis are also intentionally flexible to afford to adapt methods to address the empirical and theoretical needs of the situation (Clarke, 2005). To incorporate the varying functions of discourse within the situation, I expanded the ordered map to include further elements of Foucault's theorizing of discursive power. For the current research, Foucauldian (Foucault, 1972) concepts of surfaces of emergence, continuity, and division were integrated into the situational analysis. Surfaces of emergence regard how discursive objects come into view; for example, the workplace is a standard surface for self-tracking to appear via various wellness programs, productivity and project management, and biometric monitoring of employee movement. Emphasizing Foucauldian discourse offered a pathway to expand on the function of discourse present within the situation. For example, the actant, "patient empowerment," bridges concepts like patient agency, equality, freedom of information, cost containment, biometric monitoring, and meaningful use. Likewise, the function of divisional actants influenced the

position of subjects within a hierarchy. For example, “healthy” was often expressed to distinguish and distance one’s position from “unhealthy.” The divisional statements helped to indicate the relationship between the bio-citizen and bio-other.

Theoretical Coding and Identification of the Core Category

The theoretical coding began once the categories reached a level of saturation. Theoretical coding marks the final level of analysis in grounded theory approaches. This stage aims to identify connections, links, and explanations between categories (Charmaz, 2006). The focused coding pointed to the need to address the functional quality of exclusion theoretically. What is meant by functional quality of exclusion is subjects were positioned “outside” dominant spheres of influence within the situation. Still, proxies of subjects (e.g., made from data trails, user scenarios, algorithmic configurations, etc.) were circulating within the dominant spheres. While grounded theory is grounded in the data, integrating extant theory is encouraged when there is relevance and fit (Glaser,1965; Charmaz, 2014; Clarke, 2005).

The orientational map was unhelpful in analyzing how power and agency are circulated, negotiated, and stunted within the situation, all of which facilitated the construction of the core category. The core category describes how codes, concepts, and categories are theoretically connected to one another and are derived in consideration of results from previous coding phases. The process began with consideration of the orientation devices present within the situation, focusing on the directional qualities that present to various actors when engaging with self-tracking devices and practices. The goal was not only to address what directions were present but also affiliated processes and outcomes that spoke to how social difference is understood, constructed, or contested within the situation of self-tracking.

Orientational (vs. Positional) Mapping

To understand the orientations distributed within the situation, I combined Clarke's (2005) social worlds/arena map with the positional map and adapted it to reflect elements of queer phenomenology (Ahmed, 2006). The orientational map was then used to position influential, excluded, and marginalized social worlds. I aimed to capture dominance circulating within the situation without conceptually partitioning the marginalized or excluded from the situation. Doing so provided a more grounded view of how elements in the situation are connected to one another and the outcome of those connections. The splitting effect was persistent and influenced the identification of the core category for this research, digital dysmetria, which is summarized below.

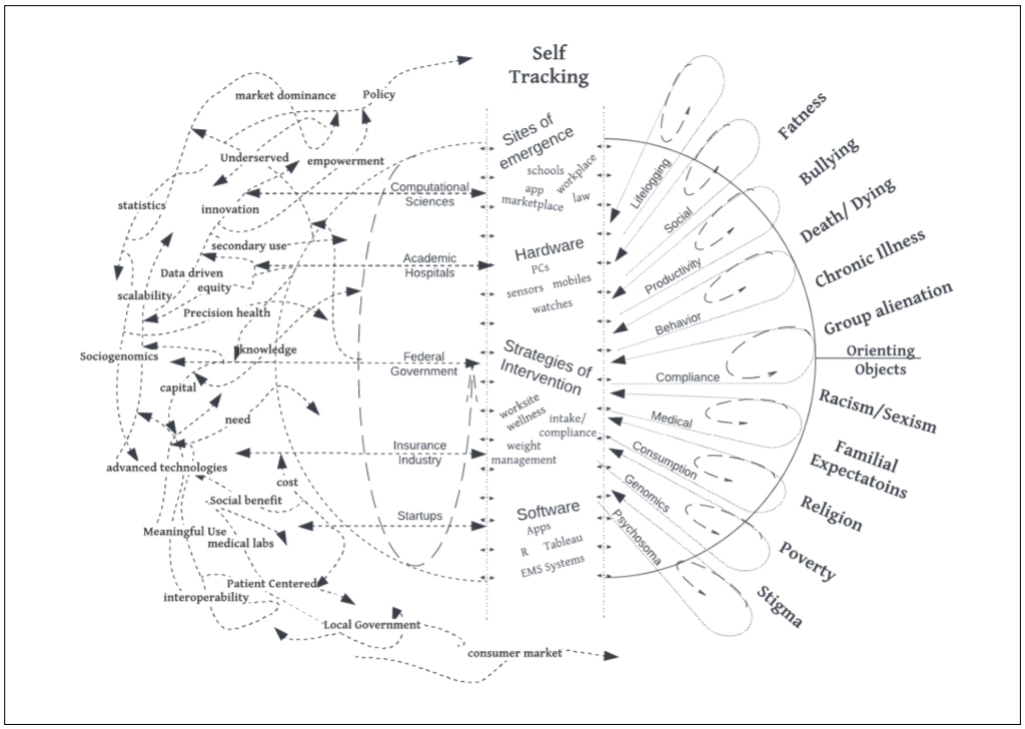
Core Category of Digital Dysmetria

Specifically, I aimed to display both dominant and marginalized worlds "in view" and focused my analysis on the level of influence afforded to each within a situation. In the present study, Sara Ahmed's (2006) theorizing on race as a matter of orientation emerged as a relevant framework for understanding the function of exclusions circulating within self-tracking. Specifically, relying on Ahmed's (2006) queer phenomenology, the orientational map illuminated the arrangements within the situation that speak to how subjects are positioned in front of varying potentials for actions. Within the domain of self-tracking, the appearance of data shifts as it travels across social worlds. This differs from the data object "becoming something new," such as with secondary use. Instead, appearance refers to how the salient characteristics of data changed. For instance, activity data like "steps" could appear as "steps" as well as "gender-based bias," depending on the position of view. Ahmed (2006) contends that "function [is] an orientation device, which both shows the 'direction' of phenomenology and take[s] it in a certain

direction" (p. 26). As such, orientation speaks not only to how a person is oriented within a situation but also to what objects and lines of sense-making are afforded to them within their orientational view. In turn, being oriented and having orientation points to different directions, or primers, to make sense of their tracking experiences. There was a persistent splitting observed such that designers and practitioners of self-tracking technologies created tools that would extend their influence well beyond the physical borders of their bodies, in contrast to users who had a very restricted set of possibilities that contained their activities upon reflection of their body.

Figure 1

Orientational Map of Social Worlds



Note. The figure demonstrates the social world of designers on the left and the social world of self-tracking users on the right. The arrows in the map symbolize directions. On the left side, there are numerous directional possibilities such that groups can extend their influence into self-tracking situations, and their constructs, elements, and technologies can circulate within the field, interacting, merging, replicating, and so forth. On the right side, the directional possibilities are more limited, with orientation devices (e.g., racism) directing thoughts and actions inward toward the individual rather than outward into a broader field.

To this end, the orientational map presented in Figure 1 demonstrates how self-tracking generates a splitting or divisional effect and how it helps organize the core category emergent in this research. The arrangement of this splitting effect organizes the characteristics and processes that describe the core category of digital dysmetria. The term "dysmetria" was selected as it describes a condition characterized by spatial distortions affecting how one perceives and interacts with objects in their environment. For example, a person experiencing dysmetria may reach for an object but fail to grasp it accurately. I use this term metaphorically to describe the spatial arrangement I attempt to address in the following chapters. Importantly, Figure 1 does not present a binary view of self-tracking. While practitioners were generally less constricted than device users, the interaction between them, including limited interaction, helped extend practitioners' influence and constrain users' influence. Some groups could subtly extend their actions into the broader field (e.g., life loggers), but their impact is marginal. Occasionally, more contained groups, such as those tracking chronic disease management (e.g., diabetes), intersect with another group to expand their presence in the self-tracking field.

As such, digital dysmetria was central to how social difference was recognized as relational within the situation of self-tracking. It helps explain a process of subject formation in which three categories of interconnected processes are *racial imaginary of access*, *manufacturing difference through an unsettled subject*, and *design as self-defense*. These themes, held together by their dysmetric similarity, are discussed in the following chapters as themes of access, difference, and defense.

CHAPTER 3: THE RACIAL IMAGINARY OF ACCESS

In this chapter, I discuss the utility of narratives of access for practitioners who are designing and implementing self-tracking tools. I use practitioners to indicate the people involved in making and designing self-tracking tools come from heterogeneous fields like psychology and education. In this chapter, I focused on self-tracking tools for biomedical or health applications. Yet, the practitioners involved still offer a range of backgrounds, from biostatistics to public health, ethics, and law. I focus conversations on narratives of access as they offer stability and bring coherency to an ever-changing and expanding field. In the face of disagreements and ambiguity about what self-tracking is and what it can do, actors from UX research to zoology agree that a feature of these tools is that they afford some dimension of access.

Narratives of access offer the entry for the analysis reviewed in this chapter, which examines the utility of narratives of access for practitioners designing self-tracking tools for diffuse adoption in the health and biomedical fields. These narratives afford practitioners various techniques for arguing meaning into their design, gathering resources and capital to help their development, and presenting as persuasive tools to get buy-in from those they want to use their tools. However, narratives of access also involve practitioners in imagining different kinds of people and a practice that involves imagining different kinds of social relationships. As practitioners argue that their tools provide access, they must also isolate groups or types of people who do not have this access yet, which triggers the need to contend to why they do not have access and how the tools can benefit them if they do. This activity of imagining people in need and the related social relationships that constituted the social value of access is where the analysis for this chapter resides.

In the following, I discuss how narratives of access, as a primarily creative and imaginative act, afford practitioners various techniques for envisioning people and their relationships to one another and, broadly, techniques for attaching value to various social arrangements. While narratives of access help practitioners bring relevance to their products in a rather diffuse field of actors, they also trap them into a discourse that relies on dichotomous logic. Access implies various dichotomies from inclusion (exclusion), privilege (disadvantage), and autonomy (dependency). These dualities implied in narratives of access help to structure the following review, which centers on how access becomes a tool to rationalize exclusion and reason with social differences.

The chapter is organized as follows. I first situate the analysis within the technological design, self-tracking, and the health sector. I present the analysis, which is organized into three emergent themes. The first theme, *racial imaginaries of access*, reviews the presence of racialized stereotypes laden in narratives of access that become significant instruments for practitioners as they provide a tool for moral and ethical self-fashion. The second theme, *compassionate exclusion*, considers using the racial imaginary as a reasoning device for various decisions. The final concept, *boundaries of belonging*, explores how practitioners enact the border-making affordance of these narratives both in rhetoric and through physical interactions. I conclude the chapter with a discussion of narratives of access as a technique of compassionate exclusion to address the marginalizing practices it enables that rationalize the exclusion of Others from the location of self-tracking design.

The themes addressed in the following analysis are derived from interviews and observational data with 32 practitioners spanning five self-tracking projects, all within the United States. Practitioners represented a range of fields, such as biomedicine and statistics, genomics,

public health, medicine, and computer science. They held various roles, from UX designers and web developers to scientists, academics, entrepreneurs, ethicists, and biostatisticians. Practitioners were involved in various activities when designing and prototyping tools ranging from design methods (e.g., prototype testing and heuristic evaluation) to behavioral studies, participating in academic conferences, and writing journal manuscripts. I include these activities as part of the design reasoning addressed in the following analysis, as the cross-field collaborations that undergird these projects present a design practice in which members come to the table with various methods and expertise.

The self-tracking projects were also substantial in scale, designed for significant distribution (e.g., across a health system), and often involved multiple institutions or cross-sector collaborations. To simplify the presentation of findings, I offer descriptions of the self-tracking technologies practitioners are helping design as a way of "locating" them rather than discussing a specific site. I use pseudonyms to maintain their privacy and confidentiality, and when possible, I focus on the function of the self-tracking tool rather than using a name to identify it. Doing so helps me avoid associating practitioners with one another, which would compromise their privacy and the confidentiality of their projects.

Narratives of Access

Narratives of access are a routine feature of Silicon Valley startups in which conferences like TechCrunch Disrupt offer prime seats for observing its formation. The TechCrunch Disrupt events occur in various "tech hubs" around the globe, but the largest and most iconic is held in San Francisco, CA. Disrupt distinguishes itself from other tech conferences by emphasizing its goal of connecting new founders with investors (Kolodny, 2010). Since its inception in 2010, Disrupt has facilitated over $29 billion dollars USD worth of investments. While the conference

only lasts three days, it can wield significant investments for a company. For instance, in 2010, Fitbit, then still a small, relatively unknown company, secured $1 billion USD by the weekend's closing.

Disrupt was also among the earliest tech conferences to offer a stage to biostatistical firms like the Gladstone Institute and personal informatics companies like 23andMe. The conference regularly hosts a range of public officials for keynotes and special topics panels, from city Mayors to high-profile figures like the Secretary of Defense and the Chief Technology Officer from the Executive Office of the White House. In essence, while Disrupt is regarded as an industry conference, it is an event that brings various actors together to frame the agenda of technological growth and application areas for the following years.

In a neoliberalist economy, the significance of public officials attending the conference cannot be stressed enough. Initiatives like the Precisions Medicine Initiative (White House, 2015) or the 2009 HITECH Act rely on a governance model in which federal actors must get buy-in from industry to provide the innovative tools and capital for their development that can bring these social dreams into fruition. In essence, the appearance of public officials marks a call to action in which their keynote speeches or panels are “pitching” government agendas, signaling to industry the potential (and the government’s need) for these actors to help them develop solutions for their various projects. TechCrunch Disrupt is more than a technology convention. Instead, it acts as a place of convergence where government officials signal investors and entrepreneurs an area of market growth that can guide technological innovations and priorities.

The reliance of the federal government on the technology sector to help in their initiatives of improving social services, such as access to healthcare, helps us reconsider the significance of TechCrunch Disrupt. The Government's reliance on the tech industry to help in the innovations it

needs to fulfill its various initiatives helps to underscore the authority given to technologists who hear these calls to action and are told they are the key to fulfilling these democratic visions. I contextualize this as the authority and attitude of technological solutionism and entrepreneurial saviorism are dominant characteristics in the pitch stories circulating among new startups that also trickle into the expectations and beliefs of the practitioners in this analysis. This authority to author solutions to social challenges undergirds the visions of technological projects I encountered throughout this ethnography. However, as I will discuss below, endowing technologists with this role of public servitude and saviors and giving them the authority to author solutions creates a foundation of innovation that inherently begins from a place of asymmetrical power relations that places technologists in higher status than those they imagine helping. The asymmetry can be illustrated in the pitch stories that founders provide, which will help frame the general problem the following analysis attempts to examine.

TechCrunch Disrupt is a market for the government to advocate for growth in various areas that would benefit the public. Disrupt is also an elitist event. Tickets are in the thousands of dollars. While Disrupt recently broadened its access to online patrons, the physical event remains rather gated, with attendances ready to invest huge capital. Luckily, thanks to a friend who won tickets in a company raffle, I could attend the mother event in San Francisco in 2016. My attention was not on the 100s of expo tables of new startups that bring the largest general audience. Instead, it was the Startup Battlefield, a competition at the end of the conference where six finalists pitch their products for a $50,000 grand prize. The low amount of the grand prize helps illustrate the actual value of competing on the Battlefield in gaining exposure. Companies participating in the competition can walk away with millions of dollars of investment funds regardless of whether they win the grand prize.

The Battlefield works on a presentation model in which startups competing in the contest have six or so minutes to make their product pitch. Following, they field questions from judges and are slowly eliminated. This happens in a spectacular setup where founders come onto a large stage with judges sitting in a row off to their side. In TED Talk-like fashion, founders come to the stage, facing a largely invisible audience. Hidden. They present their pitches upon a backdrop of their slide deck. Among the finalists was Carbon Health, a startup specializing in health data tracking (Escher, 2016). As previously mentioned, Disrupt catalyzes technological innovation for the coming years. I was interested in attending as I wanted to see how the industry imagined using health tracking data.

The lights have dimmed. The stage is bright. And the CEO of Carbon Health, Erin Bali, has come into view. He wore a black shirt and jeans, a "hip" uniform for Silicon Valley types. The t-shirt had a modestly sized word written upon it that read, "carbon" in bold white lowercase letters. With only a few minutes of time, Bali began his pitch. His mother had been diagnosed with a rare disease. In finding a treatment, she traveled to various specialists. But each trip was daunted by the need to carry her paper medical records and weighed down by the need to retell her story to each physician she encountered. One clinic after the other. File in hand. Retelling her story with each encounter.

What Bali just described was the hook, or "pain point" that presents the need his product is about to bring a solution to. Bali starts to contextualize the pain point for us, emphasizing the struggle of carrying these paper records from one place to another. And the struggle of telling doctors the same story time and again. In Bali's narrative, this struggle is symbolic of a struggle with accessing health in which the paper, that file carried by his mother, became the locus of barriers to accessing healthcare. But carbon health can solve this problem.

Bali, now introducing the problem, was referred to as a broad problem of "barriers to healthcare" in which carbon health was now positioned as the solution to "democratizing healthcare." But before he can tell the audience how carbon health will lead the way to this new system of democratic care, he needs to reframe the problem altogether, which he does by framing the schematic of the hospital:

> Let's take a look at what a hospital is at its core. There are doctors who give the actual care. They are the heroes of the system. The hospital itself is mostly an administrative layer that handles things like registration, billing, and shared access to medical records.
>
> And it turns out you can replace most of these things with technology. (Bali, Sept., 2016)

Bali's reframing of the hospital came as a surprise. It was a leap for me, to say the least. He had offered a compelling story of need, but how did we go from a poor mother going from clinic to clinic to a "burn down the house" attitude of imagining a democratic healthcare system that would obliterate hospital buildings?

He continued that Carbon Health would offer an entirely new system of patient care, in which Carbon Health would function as "a ubiquitous technology platform that connects us with our doctors," much "like a very large hospital that does not own any buildings," where providers would be "united by the platform itself" (Bali, Sept. 2016). My attention began to fade, periodically returning to focus on pitch words like "It will broaden access" and "right at your fingertips." Still, considering the convenience he was proposing, I could not stop but think of the human suffering that would come if we were to demolish hospital buildings.

This "issue" of technologists proposing a technologically driven solution to a social problem they do not understand is a routine criticism of startup culture. What I would like to pay attention to, however, is the utility that narratives of access offered Bali, as these narratives were

significant to his ability to reframe the issue into one that resolves upon a technical solution. Through a series of rhetorical maneuvers, access was positioned as a tool to recast a social issue – the barriers to healthcare – as a purely technical challenge that could ostensibly be resolved with a mobile app. I would like to highlight how "access," engendered with layers of cultural associations and values of equality, fairness, opportunities, and life chances, is strategically used to endow his platform with meaning. Likewise, Bali's use of the word "barrier" is equally charged with the associations of disparities, unfair suffering, inequality, and injustice. Loaded with cultural significance, these terms do much of the heavy lifting to bring social meaning to his project.

Failures and Contradictions

While the vision Bali proposed in 2016 failed to materialize, these narratives of access persisted. Narratives of access engendered with democratic social values of equality, fairness, and justice are used to justify the persistence of carbon health even in the face of its inaction to democratize healthcare. Following 2016, Bali attempted to remove the hospital building for the next several years. Carbon Health offered "on-demand" healthcare appointments via a mobile app.

In the first years of its existence, carbon health worked on a per diem model. The platform had the familiar feel of apps like Uber or TaskRabbit, with slogans like "sign up and work for us today" and "control your schedule and your time," breaking up the content on the page (Carbon Health, 2017). The healthcare providers were positioned much like the drivers for delivery services were paid per order. While Bali had proposed accurate access as a direct conduit to the "doctors [who] are the real heroes," the care system of carbon health was unsuccessful at recruiting them. Instead, Carbon Health had amassed hundreds of on-call nurses,

the labor source for his ubiquitous care model. At that time, the company offered no job security or benefits. In essence, carbon health was taking advantage of a population of workers who are historically underpaid, of lower socio-economic status, and primarily people of color, who, ironically, bear the brunt of the impacts of barriers to healthcare. This app thrived on precarity, giving nurses per diems, paying medical transcribers per file, and forgoing long-term employment options and benefits (Prassl, 2018).

Carbon Health also created new entries for compromising patient rights. To use the mobile app, they were required to consent to the terms of service, which agreement came with relinquishing ownership of their records. By consenting to the terms of service, users also consented to Carbon Health's limited liabilities, which included acknowledging that Carbon Health was not responsible for a) inaccurate information provided to the client, b) data breaches or ensuring the security of their platform, c) the deletion or omissions of client records; and d) generally "mistakes of any kind" (Carbon Health, 2017).

While the model for carbon health has since shifted to include urgent care centers, the structure of on-demand care and the precarity of on-demand services are still well integrated into its business model. To say that this platform is driving to a future of democratized is a difficult argument to make. However, the company continues to frame services as a model of "advanced technology with expert care," claiming it is "physician founded" and "remov[es] traditional boundaries to make high-quality, transparent, and personal care accessible…no matter who you are" (Carbon Health, 2021).

The Racializing Language of Access

Carbon Health is emblematic of the encounters I had throughout this ethnography, where the codes of access, barriers, inequality, and justice were put to work by practitioners.

Practitioners also tended to use codes like distinct elements that could be attached or paired with other codes depending on the context or the topic being discussed. Narratives of access were not always cohesive in that they appeared as a story, such as Bali's presentation, or as a structured narrative. Instead, I would often receive a condensed version of "the pitch" that, with further discussion, surfaced its various elements and affordances for reasoning social relations and design.

For instance, Betty is a researcher for a large private hospital in an urban center on the East Coast of the United States. This hospital is one of the most heavily funded by the NIH and is a leader in spearheading personalized and genomic-based medicine. It is also rated as one of the most "innovative" in applying data science methods to healthcare. The project that Betty is helping facilitate is working towards scaling precision medicine to the public. Precision medicine is an approach that aims to account for the variability of individual genes and each person's environmental and lifestyle choices (Chang & Colonna, 2018). When introducing the project to me, Betty provided the following description:

> We basically were of the understanding that while big, giant clinical studies, like RCT's, while they're really useful, and they are considered the gold standard, we've taken a personalized health approach, and recognized that even if an RCT says XYZ drug works for 50 or 60% of the population, obviously it doesn't mean it's going to work for everybody. So, we want to be able to provide people with the opportunity to figure out what works for them specifically. It goes along with my institute's broad goal of focusing on precision health. The idea is to make this sort of thing more accessible to a larger population.

The above represents the “condensed” versions of pitches that I received in which the following discussion helped identify the elements, people, and utility of the narrative. For instance, in the above, Betty provides a narrative that speaks from the position of “we,” indicating that she is talking on behalf of the institution she’s employed. She also returns to the institution at the end, where she relates the motivation to the hospital's mission and then further provides the context of the mission by adding that “the idea is to make this sort of thing more accessible to a larger population.”

Following the condensed pitch, I would ask questions like, “That sounds interesting. Would you tell me more about this?” From various prompts, the conversation would generally provide more details. For instance, Betty started to discuss the types of people in more detail:

> [It’s] being able to provide every different population with the same access to care. You know? Not everybody has the same access to healthcare, and that kind of trickles and results in not everybody having the same access to health, in general. So, that's kind of what I mean by access, but there are a lot of different things that go into it, whether it's affordability, or quality, or anything like that.

While Betty provides a few more details on the access that she is imagining, as illustrated in her quote, the language used could be vague and colorblind in which terms like “every different population” imply all creeds, there is no group or groups discussed when characterizing who she is thinking or speaking about. What does occur is the use of various words, or terms, that help parse the referent, which is what I mean by “codes” as rhetoric came to provide a coded image that worked using various colorblind terms in different combinations.

Lastly, colorblind language was often used by practitioners, in which I interpreted their descriptions as racially coded. I did so for several reasons. The discourse of health, especially the

discourses of health risks and disparities to which access is often attached, are racially coded and expressed in colorblind rhetoric (Davis et al., 2018). Avoiding direct racial language characterizes colorblind rhetoric, the rejection of racial signification in social issues, and the implication that race is not significant as we have achieved racial equality (Bonilla-Silva et al., 2006). Narratives of access are a colorblind narrative and "fill in" for racial signification via racially coded language. Colorblind language is well documented in health and medicine (Kreiger & Bassett, 1993; Malat et al., 2010) and argued as one of the barriers to addressing social disparities in healthcare (Bailey et al., 2017). Racially coded language is also found to circulate in the general discourse of health and medicine (Lee et al., 2022). For instance, in the above quotation from Betty, word(s) such as "different populations" that were paired with "access to care" were. Interpreted as racially coded.

Further, the reference to social determinants, such as "quality," also pointed me to understanding messages as racially coded. This was due to quality of care being an identified disparity among racialized minorities in which they receive varying care than white patients (e.g., shorter visits, dismissal, etc.). While I attempt to identify colorblind terminology in the following, common terms used include difference, diversity, variation, special populations, vulnerable populations, burden, needs, underprivileged, and disadvantaged.

The Racial Imaginary of Access

Since narratives of access were not contained, as discussed above, I parse the presentation of findings to address different features of the narrative and its use for designers. Each section presents a characteristic of the narrative, followed by a discussion on how designers and practitioners used it. In the first section, I address how practitioners, through the colorblind language of access, construct a fictional racial Other in need. To discuss the utility of the racial

imaginary, I illustrate how practitioners use the imagined person in need to help them define who they are, such as their qualities and relationship to the person(s) imagined. In the second section of the analysis, compassionate exclusion, I discuss how practitioners extend and constrain privilege by employing the fictional racial Other as a reasoning device for various design choices. In the last section of the analysis, racial micro-expressions, I discuss how practitioners extend the racial imaginary through physical gestures in settings with racialized Others such that it reinforces the exclusionary practices reasoned in spaces of design. In conclusion, I discuss narratives of access as racialized border-making devices that contribute to the creation and maintenance of boundaries between racialized Others and the predominantly white spaces of design and innovation. By critically examining these narratives and their manifestations in discourse and practice, I describe how racialization shapes access and exclusion within this field and the subtle mechanisms by which racial boundaries are drawn and maintained.

Imagining Racialized Others in Need

Like other forms of digital design, the work of self-tracking design necessitates understanding the technologies' intended users. This requires engaging in the practice of imagining people, their situations, and their needs. Designers have several methods for approaching this task. While practitioners in this analysis were not always from formal design training, they would adapt to these methods using the techniques and tools they had. In this context, narratives of access and need contribute to creating visual artifacts, as they necessitate the imaginative act of conceptualizing people. This is commonly done by developing user personas and scenarios considering various demographic and psychographic factors. More common ways of referring to this imaginative act are through developing user personas and scenarios. Mapped onto a topology of cases – from base case to edge case, a boundary case,

worst-case– users are imagined and organized into various possibilities. I provide two examples of practitioners engaging in this practice in the following.

Persona Poverty

In user-experience design, a persona is a fictional character representing a user who might use their product or service. These profiles include details such as the name of the person, their age, occupation, and background, but also their technological proficiency, frustrations they have (that would relate to the product being designed), behavioral traits, and, bizarrely, these typically include a picture and a quote that captures their core need (Matthews et al., 2012). While professional designers create multiple personas, many practitioners would refer to a unified entity that captured various needs for an ambiguous group that they implied or recognized as disadvantaged.

For instance, Cameron is an independent software developer who, as he states, "as a Black man," is often the "outsider" among other technologists, describing how he was often "the only one in the room" or how he is "denied entry" to the venture space. He often finds he is recruited for projects where they need, as he says, "An African representative." Cameron is a Black man who often remarked on how he was typically the "only one in the room." He was working on a micro-financing application for use in Nairobi. He had been recruited for the project because of his, as he said, "background." For several decades, micro-financing has been linked to health as a mediator for improving well-being (Leatherman & Dunford, 2010). He had been asked to help via a friend of a friend, explaining:

> My grandmother is from Liberia. I am not African. But they believe it." For Cameron, these are just routine negotiations he must make to participate in the community, which he remarked "had denied me otherwise.

While he had a tone of annoyance with his partners, he had taken the project because he was personally interested in the micro-financing project. As he shared, “I grew up poor. I’m a product of inter-generational poverty.” As we were talking about his project, I asked if they had any contacts in the locations where they wanted to launch the app, as I was curious how they were designing for a population that was so far from where they were. But they did not, which seemed a sour spot for Cameron, who appeared to recognize the implication of the relationship that was forming, remarking:

> They believe they are empowering, but they’re not looking at the impact. So when I think about how we are going to go to this nation, and say, hey, tell me your story, I’m going to give you this app, I am going to help you, it’s like no. They will say no. They will say, if you want to be a part of our marketplace you need to listen to our needs. You know?

While Cameron is an advocate for understanding users' needs and mentioned how he had tried to get the group to go and speak to people and see if “they even need this.” On the other hand, his partners wanted to do personas to save money.

Cameron’s partners were researchers from a local university. They were working with a larger team designing this app which they planned to test as part of a grant they had received. He starts to recall one of their first meetings:

> I remember sitting in on a design meeting. They [his partners], well-intentioned as they might have been, were sketching out user personas based on what I could only describe as a collection of stereotypes about Africa. They talked about creating a simplified interface, assuming that users would be unfamiliar with digital banking, and discussed ways to 'educate' users about savings – as if the concept was foreign to them. [Partner A]

> was particularly enthusiastic about adding a feature that would send reminders to users to save money, as if this was some novel concept that hadn't occurred to them.

This passage reflects Cameron's perspective on a disconnect between the intentions of empowerment from his partners and the actual impact their approach may have on the target users of their micro-financing application. Cameron suggests that the partners' approach is superficial and doesn't consider the real needs and narratives of the people in Nairobi. He criticizes the notion of simply presenting an app to the community with the expectation that they will be grateful or accept it without question. Instead, he emphasizes that a genuine understanding and respect for the local community's needs and voices are essential. He implies that the community will reject solutions that do not align with their needs or are paternalistic.

Cameron's critique extends to the patronizing attitudes he encounters, as he draws from personal experience to highlight the condescension often inherited in such development initiatives:

> Like, when I have money in my account, I know my brain operates differently. I don't need anybody to tell me that. I understand what a savings account is, and I get really mad when people try to belittle me and tell me about a savings account and how you should save money. I know all of these things; I grew up with inter-generational poverty. If they're ignorant to, you know— that I'm smart, it's on them. Like I have a brain, but they don't think of that.

Educating users about savings and adding features like reminders to save money reflects a deficit model, assuming a lack of knowledge or sophistication among the target users (Dourish & Mainwaring, 2012). As applied in this context, the deficit model implies that the technology users lack specific knowledge or abilities, which the technology aims to correct or supplement.

The tokenizing of the practitioners is a recognized critique of human-computer interaction and addresses how assumptions about helping can dehumanize them (Toyama, 2015). This perspective often leads to solutions that are more about imposing the designers' ideas of what users need rather than empowering users with tools that enhance their existing capabilities. It also positions the technology as an active agent juxtaposed against passive people.

Scenario Compensating for Deficits

Practitioners would also employ scenario-based design techniques to contextualize further the people they imagined in need. For instance, Carlin, a research coordinator at a large hospital on the West Coast of the U.S., walked me through a mobile app prototype that would let patients complete nof1 trials with their physicians. The nof1 studies are iconic of how precision medicine is imagined as scaling to the public. These trials have a sample of one and rely on incorporating data from the patient's previous trial. The aggregate is a cross-comparison of outcomes from that patient's different treatments. Carlin had opened the prototype on her browser and walked me through the two studies they had available for testing. The team was going to test the efficacy of their, as she said, "some kind of Bayesian statistic" in the following weeks. Since the team was just concerned about the model, they had filled in the treatments with two "dummy" trials. The experiment offered was a straightforward A/B test that tested the difference in cognition if you drank coffee versus coffee and the amino acid L-theanine, which may enhance the effects of coffee.

As we scrolled the pages, Carlin shared that her motivation for being on this project stemmed from an influential debate in graduate school. Her background is in Public Health with a specialization in ethics and law, which sparked the following exchange:

> We learned a lot about how different populations have been treated over time, and how people can use coercion and persuasion to affect health research, and things like that. So, yeah, I think that my interest in accessibility grew throughout grad school, due to everything I learned.

When asking Carlin more about her interest in access, she responded:

> I don't know. I think it's just a general interest. It bothers me that different groups of people are unable to receive the same level of care, or receive the same level of health, due to circumstances that they can't necessarily help. Whether it be where they were born, or the economic status that they grew up in, or anything.

That bother from people not getting the same level of care because they were from different groups had influenced her advocacy for, as she described, "the underserved" and for using methods that would "over-sampling of those from privilege."

Carlin's awareness of historical and ongoing discrimination in healthcare was present throughout our discussion, and she started to discuss how the knowledge about her history had informed her of the benefits these nof1 studies could offer people. One aspect that she was very concerned with was the issue of self-report, stating: "The problem with self-report is it's important not just to rely on feeling because a lot of times your feelings could be wrong or affected by some external factor" in which the app being developed "provided the role of a medical test, in that it will provide you with a more concrete or unquantified way of giving your treatment results to your clinician."

Carlin was beginning to point to distrust in the information shared by people she understood as being historically disadvantaged from care practices. As she continued to discuss her concerns, she started to pull on her knowledge of social determinants and barriers to care.

She created various scenarios in which their educational level were a barrier to their care. For instance:

> I think it's important not just to rely on feeling because a lot of times, you're feelings could be wrong or affected by some external factor. [I]f you can develop a standard way of measuring an activity, you'd be able to kind of figure out and problem solve. It's essentially another way of learning how to problem solve. For example, say they're tracking their running, and they notice that they do really poorly on day's where it's raining out. They would be able to understand or figure out, oh, it's not that I'm just really bad on those days, or it's not that there's something internally wrong, it's just that it's raining and it affects my running.

Carlin's statement sheds light on a viewpoint regarding patient-reported information, especially from those identified as belonging to Othered categories. This perspective raises questions about the reliability of self-reported data, which may not always conform to traditional standards of organization and rigor. According to this viewpoint, their self-tracking app would offer support that mends the deficits she perceives them to have. This is illustrated in the juxtaposition between the suggested subjective patient experiences with that app's objective and rigorous data collection methods. The contrasted positions that Carlin imagines can imply a patient is not trustworthy unless they can comply with the norms and standards of medical practice Mason (2011). However, in this case there is also an uncertainty of their ability to do so, in which the app is considered a bridge that compensates for this inability.

In practitioners' narratives, the construction of the Other manifests through imagined groups characterized by intellectual deficits and poverty. In the following, I also discuss how practitioners imagine their race.

Estrangement of White-Male Privilege

During discussions with practitioners, there was a noticeable awareness of white dominance within the technology, science, and medicine sectors. This consciousness was attached to the figurative figure of the "white male," an attachment that was spoken about by both white men and women. For example, Brian, a designer and advocate for DIY genomics, emphasized how her graduate studies and research projects thereafter "was very, very biased. Very white. And very male as well." Brian was not alone in attaching bias, white, and male together. Others would take note of how design practices had been "biased" and "privileged" with values and norms that "reflected a select few." However, what was peculiar was the use of "white men" as a tool that helped neutralize and then naturalize these spaces of science and technology as white such that "white men" were spoken of in a figurative sense. As an object, a vessel in which to contain bias and privilege. This figure has also been historicized. It was spoken of as existing in the past. Occurring in tiny rhetorical moves such as referring to white males as something that "was," remarking how it was "back then," or framing their space as something that "used to be limited," indicating this was no longer the reality.

At times, practitioners would wave their hands in front of their faces like they were swatting a fly or start to shake their heads and look down with a heavy sigh. These gestures helped frame the figure as a bad behavior since corrected or an embarrassing memory that will continue to fade. These were strategic moves that worked to reproduce the white space of the design. By historicizing the white male figure, whiteness, privilege, and bias were moved to the past. Once removed, it afforded a conceptualization of their spaces of practice as different. In turn, whiteness was naturalized and made invisible once again.

The figure's historicization would benefit the practitioners as they continued to think through their tools and the Others they imagined. It also severed to naturalize their spaces and normalize the homogeneity. That is when the figure was gone, practitioners were more liberally attached to values they understood associated with their place of practice. For instance, Jamie, a genomics researcher who is also an advocate for citizen science initiatives, has worked as a geneticist for decades and was offering me a comparison between how it looked in the past, which she recognized as male-dominated and had explained the reason for the dominance with characteristics such as the research being "high risk" and it genomics as inherently "technologically oriented," implying high risk and technology are gendered characteristics. However, she also placed white men in the past; however, in doing so, the characteristics of the field, as high-risk and technologically oriented, remained. The splitting effect seemed to benefit the practitioners' understanding of the values of their practice as it was cleaned of bias, but the good characteristics remain.

What is significant is the performative quality that the white male figure took in these conversations. Practitioners recognized "white men" as historically characterizing the space of technology and science. Similarly, they associated racism with white–male privilege. Consequently, the historicizing of white males bled over to the historicizing of racial bias in spaces of practice. This phenomenon of recognizing racism as historical has been remarked upon in several psychological studies on the discourse of race in the United States (Mekawi et al., 2020; Yi et al., 2023). White Americans associate racism with the law such that violence such as lynching and segregation, which are now illegal, mark that racism is also a thing of the past. This view differs from that of Black Americans, who view racism as an ongoing process of violence and exclusion. In the context of this research, the conception of racism was not entirely

historicized if it no longer existed. Instead, the white male was used to partition certain aspects of racial bias from their spaces of work and practice.

This perspective offered practitioners a certain level of flexibility. On the one hand, it enabled them to acknowledge ongoing social injustices, highlighted by the rise of the Black Lives Matter movement. On the other hand, it allowed them to distance themselves from their personal responsibility for both past and present injustices. In this context, the “white male” figure served as a symbolic container for the racial homogeneity often associated with science and technology. This association persisted even if the "white male" remained dominant in these spaces.

Notably, the figure of the white male underscored the performative function of racial consciousness within these spaces of design and practice. It allows racism and prejudice to be treated as external factors, separate from the current manifestations of whiteness in these settings. By historicizing white–male privilege, practitioners could reimagine their current spaces as imbued with attributes such as masculinity, intelligence, and technological expertise—attributes linked to the space and practices rather than to any specific privileged bodies. Thus, the historicization of white–male privilege and its connection to racial bias serve a dual function. It enables the performance of racial consciousness in the present while also repositioning the problem of whiteness as a relic of the past. This allows the whiteness of the present to remain unproblematic, effectively sidestepping the need for critical self-examination.

Compassionate Exclusion

The second theme I would like to focus on is called, compassionate exclusion, which concerns how practitioners rationalized the social exclusion from the space of their work and design practices based on the reasoning of stigma and stereotypes as unwavering deficits of

individuals and groups. The first aspect of compassionate exclusion that I address regards how practitioners spoke about social disparities as if they were a possession of the other, such as referring to "their social determinants" and "their disadvantages." These minor, semantic marriages casually pathologize social and structural injustices as an individual problem. In this regard, white space was recognized as configured upon ranking color (Anderson, 2015). However, there was a different kind of racial privilege circulating such that whiteness was the one to receive race. In contrast, all others were absent of racial recognition that displaced the impact of race on disadvantage. In turn, statements discursively bound individuals to certain positions as if they were their natural traits of a group (Benjamin, 2017).

Extending Privilege

The Other as having a deficit that the tool or app could supplement or correct, was frequently expressed and used to reason different kinds of engagement with their tools. Similarly, the belief that Others did not have credible knowledge was also present when discussing engagement. These characteristics became essential tools for the designers and practitioners to understand their position and role in those they imagined.

The perception of the Other as vulnerable and uninformed naturalized practitioners' privilege, which was then conceptualized as something they should extend to those lacking it. Extending privilege would occur through their facilitation or the emancipatory potentials engendered in the apps and devices they created. Diane is a product manager of a software development company that designs digital health technologies and has spearheaded several community initiatives for patients who experience chronic illness. Diane firmly believes in the power of "patient-led data," which allows individuals to take greater control over their health

information and, by extension, their health outcomes. Diane articulates the company's aspirations as follows:

> So one thing that [Platform] would hope is to get better and better at improving things to help populations themselves take control. So in the sense of patient led data we see that happening [in chronic illness communities]. I mean, data in general is very, I think part of what we hope is that we develop more tools and insights for people to understand their data.

The language used, "improving things to help populations themselves take control," suggests an optimistic view that these technologies can extend privileges to those who are less privileged by granting them access to "tools and insights" for understanding their data. This viewpoint also assumes that the technologies are inherently emancipatory. The notion that technology can "extend privilege" also reflects a particular ownership of the emancipatory process. By assuming the role of facilitator, practitioners further naturalize the exclusion of the Other from their place of practice.

Privilege could also be extended through data practices relating to a miscegenetic fantasy. Data was considered a racial inheritance that could be extended to the less privileged via data aggregation. For example, Emma is a research ethicist on a multi-institutional project experimenting on an app that would help validate nof1 experimental studies, which the team hopes could be integrated into clinical practices to lessen the burden on physician follow-up visits. While a coalition of academic hospitals is leading the project, the company they have hired, with which Emma is a liaison, is based in Silicon Valley. The hope was that having ethicists on the team who were directly involved in discussions with product designers would

help create a tool free of bias. However, Emma found it more challenging than she had thought, spending much of her time "steering the engineers in the right direction."

In hopes of sustaining their attention, Emma created an ideographic demonstrating the importance of a diverse dataset. As she explained, "Our project's data is super white, right? Like the data that we have available to us. So I tell them, maybe we can do something like mix into it. Like take your data," making a gesture toward me to signal my non-whiteness, "and mix it into our data here." To help remind them of the goal, Emma made a graphic of a "salad bowl" with different profile pictures, like what you would see in a grade school yearbook. The pictures tumbled out of two cereal boxes, one with primarily white faces and the other with people of color. As Emma remarked, "You know, you have all these images of those brown people, Black people, Muslim people, and we can put it into this data, you know? Like, "Oh, I can *see* the different types. I can *see* [speaker emphasis] diversity."

The visualization of diversifying data that Emma illustrated was often echoed by several practitioners when explaining how they could participate in creating a more just world with the data that they had accumulated from the self-tracking apps they had designed or were making. For example, Jonathan, a biostatistician who described himself as an "anti-capitalist activist of DIY-genomics," was the principal investigator for a research institute focused on personalized medicine. The institute had various initiatives related to genomics in which participants from various studies consented to use their genomics data for "the greater public good." Jonathan saw potential in the openness afforded in the sharing of genomic data, especially as it related to police brutality against Black bodies. His vision rested on the public's concern about using DNA from consumer genomic companies, such as 23andMe, in law enforcement. While Jonathan

understood the concern, he believed that there was an important aspect missing from this debate, as he explained:

> Law enforcement *already has* [speaker emphasis] genetic databases. It *has* genetic databases that are collecting biased data about certain demographics. And those are the demographics that are underrepresented in these sort of upper-class versions of genetic databases, like 23andMe. The number of people who have done 23andMe and had their DNA recorded from a criminal investigation is probably not a large overlapping set. So, saying that law enforcement can't use those databases focuses the attention of law enforcement in the use of genetic data on the existing law enforcement databases. And on existing disadvantaged demographics. It's a very nimby attitude, and one could say that allowing law enforcement access to these other databases is a balance to an existing state which focuses their scrutiny on demographics that are least equipped to defend themselves.

The imagined inheritance of data as having an upper or lower class and those classes being relevant to "disadvantaged demographics" emphasizes the depths of the biomedical imaginary of data. As Epstein (2007) remarked, "Digital tools are believed to have a social/genomic link to whiteness that can be sent to different places, propagate with the residents at that location, to develop more advanced (and equal) societies." (p. 67). The biomedicalization of technology configures a racial imaginary in which the tools are believed to be physical extensions of white bodies, engendering these technologies with a peculiar genomic connection. In this example, the biomedical imaginary presents a coded racial imaginary that hovers on the rhetoric of upper and lower classes, disadvantaged demographics as criminals, and data in which the mixing of differences becomes a way to inherent white privilege.

Others could enter the space only as a representation of the white imagination; the others were given the function of needing white saviorhood, which was an acceptable position of inclusion because it didn't threaten their status. The positioning of race as "over there" presents an imagined geography in which to extend the dominant gaze; in turn, subjects are presented as objects to consume. The mechanism to activate expansion is reliant on the construction of a racial imaginary that includes depictions of Others who are positioned outside the site of influence (e.g., out there), who have deficits in regards to intelligence (e.g., not understanding risks), and who need white help, especially in the form of white constructed knowledge tools (e.g., create the tools so they can solve their own problems).

Constraining Privilege

Simultaneously, the imaginary helps absolve accountability. The founder of a personal data-sharing platform serves as a prime case to explore this dynamic. The founder built a platform based on Wikipedia's model of governance, a model in which individuals could come to the platform and submit their data into data commons, which was then extended to include user data analysis tools approved by the community. While this model was better than a top-down model of governance, the founder "wanted to be aware of its limits," acknowledging:

> There's a theoretical lens of common space production in economics, a new way of generating digital knowledge through the internet. Wikipedia is a prime example, self-organized and self-selected topics. Enabling this in citizen science is vital. Top-down models are controlled by those at the top, but bottom-up governance theoretically includes any voice, yet often results in bias. It depends on time, resources, awareness, knowledge, and the feeling of being allowed to speak. Recognizing peer production limitations, it still appears more democratic than top-down systems.

The above quotation is a mixture of competing acknowledgments inherent to rationalized exclusion. There is an acknowledgment that open and equal opportunity are dependent on self-selection, which can create a biased and privileged system as those who are self-selected are often individuals who have awareness of the project, have the time to invest in the project, and feel they can assert themselves in these spaces, that they belong (Menking & Erickson, 2015). However, after acknowledging such limitations and privileges, a dismissal takes the form of a quick rhetorical statement: "With that recognized, it at least seems more democratic than a top-down system." This rhetorical maneuver places boundaries on the conversation of limitations and privilege. It reorients it to a favorable closure of—well, it is better than what we have now, an option that is the lesser of two evils. Because it is better than what we have now, it allows for a justification of privilege that appears as a "conceptual innovation" that operationalizes illiteracy to one of inherent group deficit.

Equal access was frequently discussed by practitioners qualified in framing, such as "a channel where hypothetically any voice could enter" and "there's no reason this can't be applied to diverse groups." The equal access mindset limited discussions about who was and was not in their space as a matter of personal choice. This "Field of Dreams" approach to equal opportunity strengthened the border of white space. Gordon (2008) remarked how privilege is recognizable when one thing can be generalized to the entire population. It also frames participation as the sole matter of personal choice. Still, it also deflects accountability as it is not about a potentially biased design, as the platform is a place where "anyone can enter." Thus, the conversation is reconfigured with a limited point of view—the concern becomes speculating on the reasoning for a personal choice, reinforcing the white space**.** All the while, practitioners could maintain a sense

of moral superiority as they could return to choosing. White space was white because only white people made the choice to be there (Mueller, 2017).

Practitioners also acknowledged the various design limitations that could influence whether choice was a reality for users. For example, a designer creating a self-tracking tool for low-income community clinics in a large urban city understood that creating a tool only available on the iPhone was potentially limiting. Similarly, designers of open-source tools for small nof1 analysis of health data, tools they were testing for adoption in a large hospital setting, were aware that beta testing via Slack channels and GitHub was limited to certain people.

Several practitioners remarked on their awareness of how their designs potentially limit access. However, they quickly resolved the contradiction via statements such as “it’s just a familiar way of working for us, but hypothetically it’s open to everyone” and “yeah there’s a heavy learning curve, but anyone could learn this if they wanted, but hey, we’re nerds”.

Passivity in statements such as “[platform] gives everybody an equal opportunity to try this way if they wanted to” offers a way to reroute the conversation into a white frame of reference. Specifically, it is a rhetorical maneuver that cuts off the impact of privilege and shifts focus to a hypothetical idealism. The double-play of choice reinforces what Mueller (2007) terms “white epistemic maneuvering” (p. 225), which is a conceptual innovation deployed to maintain the status quo. In this regard, the racialization of choice is acknowledged and then quickly taken away via discursive gymnastics that returns choice to evidence of equality. Now back in the mindset of equality, practitioners were able to neutralize choice and deracialize the situation. Thus, anyone in the white space of practitioners was there by choice, and it just happens that they are white.

Compassionate Exclusion

The concept of data as inherently “white” suggests that data can be “white” by nature and then 'given' to Others. This notion highlights how whiteness, in this context, is conceptualized: it becomes a quality detached from any physical form and can be transmitted through networked devices. This leads to the idea that data, when interacting with this “white” data, undergoes a process of racialization, illustrating how the construct of whiteness can permeate and circulate within data.

Drawing a parallel, the racial imaginary can similarly be understood as an entity distinct from any physical form. Scholars in race studies, such as Wendy Chun, Sara Ahmed, Beth Coleman, and Edward Said, have explored various ways race can be conceptualized as a technology. This conceptualization views race as a tool that extends one's presence into space and enables interaction with the world. In this sense, the racial imaginary functions as a technology because it is not tied to any specific body. It is collectively constructed, accessible for individual and social use, and an extension of oneself.

As a form of technology, the racial imaginary can be deliberately designed and incorporated into self-tracking tools created by practitioners. This integration allows for the racial imaginary to be mechanized and operationalized within these tools, reflecting how deeply embedded racial constructs are in the design and function of technology.

Boundaries of Belonging

In the final section of the analysis, I focused on the use of spatial metaphors within the discourse of practitioners, specifically in/out and up/down. This discussion examines how these metaphors are echoed in the physical gestures of these individuals, especially in social settings that include racialized Others. The purpose is to show that the language of space employed by

these practitioners reflects and reinforces racial hierarchies. Such language plays a role in sustaining the exclusion of people of color from predominantly white spaces.

Access as a Way of Looking

The first spatial metaphor I consider is, "power is up" and "submission is down" (Dancygier, B. & Sweetser, E., 2014; Lakoff & Johnson, 2003; Littlemore, 2019). The metaphor of power is up/ submission is down as evidenced in expressions such as the "burden of understanding" or "push into demographics" in comparison to "high-risk science" and "upper-class data," for instance. Building on the spatial metaphor that "power is up" and "submission is down," I turn to the following observation that describes how this metaphor can materialize in physical behaviors between practitioners of racialized Others. My goal is to make the connection between the spatial metaphor, which is associated with understanding certain kinds of bodies, and how that metaphor becomes "impressed" in a physical space where I observe practitioners interacting. The point is to underscore how the racial imaginary circulates in narratives of access is not merely an ideological or conceptually bounded issue but also a performative act that materializes and influences how social bodies are arranged and related to one another.

The performative aspect of the racial imaginary became evident during a self-tracking meetup. This was an informal gathering of self-trackers who always seemed to be Silicon Valley types with a smaller group, so we sat in a circle, moving our chairs to face each other. The discussion topic was focused on a single attendee who had recently presented a prototype of a self-tracking tool that would help ease the burden of integrational trauma. The presenter, who had grown up in poverty, aimed to identify what they termed "micro-triggers" that influence their current emotional experiences, such as those they encounter when negotiating with clients.

Over the course of the presentation, practitioners started to move their bodies, angling them in more direct lines toward the presenter. By the time the presenter had finished, the practitioners sat with torsos at 90-degree angles with their necks extended toward the speaker. While some had a hand on their chin or cheek in awe, and others had their hands tightly crossed as if they had a stomachache, they all leaned in with such vigor they risked falling from their seats. When it came time for the Q&A, and before any hands or questions could be asked, a voice was heard requesting "a moment of silence to really appreciate what just happened." Following this pause, a practitioner, who introduced themselves as working for a personal genomics company, extended their arm with an open palm towards the presenter and said, "I, look at this, you, and am so saddened. [pause] I really want to help. Just look at you. You are spectacular! Strong! I can help." The practitioner then broadens his gesture so that his arm is traveling, open palm, addressing the outer circle of seats as if it were a crowd and continues: "What can *we* [speaker emphasis] do to help?"

This interaction illustrates the racialized performativity within the framework of the racial imaginary. Practitioners visibly and physically altered their posture during the presentation, leaning in toward the speaker in a manner that effectively racialized the space. While we were all physically located in the same room, the shift in bodies created a visual and physical border, and a second space emerged at its interior and housed a single, isolated resident. Extending the practitioner's body toward the inner circle made this second space smaller and smaller. The second space was also met with a need to look away, a moment of silence that afforded a spatial break, a moment of relief in which practitioners could look at the ground and see a space free on this newly contained body. The presenter was then reduced to a spectacular image, an object of fascination and scrutiny, in which the presented was further isolated from the

group via the practitioners' discursive fissure between "this, you" and "we." However, the fissure is productive, allowing practitioners to position themselves in a space of authority and benevolence.

Margo Hendricks' (2006) concept of performative gestures is particularly relevant here. These are coded and embodied actions or behaviors that have been racially constructed or associated. The practitioners' physical and discursive gestures maintain existing racial hierarchies while masking this maintenance under the guise of care, concern, and a desire to "help." To this end, the interaction reveals a dynamic quality to the racial imaginary that underscores its adaptability and ability to be collectively performed, enhancing a visual milieu that racial disparities are embodied in those regarded as racialized Others.

Invisible Lines of Division

The sentiment that is having access also indicates where practitioners understand the other in about themselves. For most, those who needed access were understood as existing somewhere external to their personal spaces of work and practice. Reliance on the "inside/outside" metaphor was prevalent when explaining the location of the imagined excluded (Quinn & Bachnik, 2019). For instance, practitioners remarked that "we've always had a top priority to contact them" or referred to it as a fringe concept, "It's been an idea we'd like to explore and talk to." The othered space was also considered a place with a membrane, like a soft border that contained but was not impenetrable. The space was described as "an exciting space we want to push into" and "we just want to lean in at the right moment". Race as external to a destination demonstrates a metaphorical distance that signifies how race is believed outside practitioners' everyday experience (Rankin, 2020).

For example, Sara, a UX researcher, was working on a new venture designing a data locker. Like the concept of the Google Wallet, a data locker was a virtual space that offered users a single location to track their financial information, such as credit card information and spending habits. The data locker also housed social data, as Sara and her team wanted the platform to be a community-building tool. They envisioned a hybrid of Foursquare that allowed users to “check in” to various places and notify their friends of their location. Beyond locational data, the user could also log interests like hobbies, favorite activities, and anything else they may want to share with other people, companies, or platforms they used. Sara described the platform as “like a suitcase that you pack when you travel.” The thought was to not only expand the social aspects so that friends could see where you are, but also provide a way for users to make new friends such as being notified that someone with similar interests was at the exact location as a coffee shop. The topic of travel is important to how the designers imagined the kind of persona/aura of their platform. Centering a romantic vision of travel, they wanted users to be able to pack different suitcases depending on where they were going today.

Sara had been researching “in the wild,” she said, for the last several weeks, rolling her eyes. In the wild is a common term for testing prototypes outside the design space. While Sara was not testing a prototype, she gathered information about different use cases and their potential design limitations. Edge cases are industry jargon for user profiles or scenarios that fall outside the typical or mainstream use of the product. User experience designers like Sara focus on edge cases as a practice of inclusion. That is, it is a way to ensure that the product in development is user-friendly. Understanding edge cases was a solemn task for Sara, who had spent several months configuring different scenarios, from an adulterous husband in need of hiding their location to the LGBTQ population or those with more "fluid identities.” Her current edge case

involved young adults without legal documentation, which Sara referred to as "undocumented." One of Sara's friends, an activist, had recently invited her to attend a meeting on immigration policy and community leaders “that would have undocumented people at it,” she explained. Following, Sara and I met for a conversation about her experience:

> Over the weekend we went to a community meeting; a community leadership meeting. I knew it was going to be a room full of people, but what I was really excited about was that half were undocumented. [Quick pause, laughing] The only white male there was the developer, but that’s always the case! I mean they [the organizers] didn’t tell us who they were. But [the developer] was the only white guy and then it was like me and two other women like me.

Sara goes on to explain that having grown up in a small city surrounded by rural farmland; she understood “undocumented” as a racially coded word for brown migrant laborers. When she attended the meeting, she could not locate the “undocumented” based on their appearance, which she had assumed she could do quickly. However, even though she could not identify status based on visual cues, the association of “undocumented” with skin color persisted, leading her to develop a new method of identifying individuals by subtracting the white participants she recognized in the room. An approach that reinforced her perception of “undocumented” as darker-than-whiteness. At this point, Sara appeared relieved, as if an equilibrium had reappeared. She continues her reflection on the meeting:

> I wouldn’t say that I’m an activist. And, as I said, we can’t fool ourselves. … But it also feels radical to say things like “dismantle,” in the startup space. But in the activist space? It's like eye-rolls, *everywhere* [speaker emphasis]. But do I have an *activist mindset* [speaker emphasis]? Yes. And I have to remind myself of that.

When Sara finds it "radical to say things like 'dismantle' in the startup space," she is indicating that certain terms or ideas, as well as spaces, are racially coded. To have it be unusual to say "dismantle" is to gesture to a radical resistance, but framing it as a novel occurrence in the startup space implies that it is not usual practice. That the utterance of the term is itself subversive. Similarly, "activist," like "undocumented," is racially coded. Sara's emphasis on "eye-rolls" indicates that she associates activism with something to be seen, which she does not possess but would like to.

Bell Hook's concept of "eating the other" is helpful. Hook's (1992) concept of "eating the other" examines how the Otherness of various cultures, particularly those of racial and ethnic minorities, are fetishized and consumed by predominately white culture. This consumption practice is not only literal such as in the conception of "ethnic foods," but extends to cultural symbols, practices, and aesthetics. As she remarks:

> The commodification of Otherness has been so successful because it is offered as a new delight, more intense, more satisfying than normal ways of doing and feeling. Within commodity culture, ethnicity becomes spice, seasoning that can liven up the dull dish that is mainstream white culture. (Hooks, 1992, p. 367)

When Sara discusses the pleasure of saying "dismantle" or expressing the playfulness of figuring out who is in a room and the enjoyment of claiming an activist mind considering having an activist body, it speaks to the commodification of Others. The Other is rendered an exotic, intriguing, and desirable object, a package for consumption by a majority that detaches it from its' full and layered reality. Playing an activist in a startup is different, radical, and fun. It lends Sara a certain credibility in her meeting space. Sara absorbs what she sees as an exciting quality without engaging in their history, pain, or reality.

To this end, the racial imaginary served to instrumentalize marginalized or oppressed groups as signifiers. These signifiers are then used to construct one's identity or moral persona. This is particularly relevant in self-tracking technologies, where constructing the Other can purify the dominant social body, reinforcing existing power dynamics and hierarchies. As a construction of the imagination, the other was also projected as an ideal self, a projection of hopes and dreams and self-realization of the white self. But this does not mean that the racial body is complete. Instead, the undocumented are picked apart so that one aspect of their lives becomes their entire personhood. With their full personhood put aside, Sara can select what aspect of the Other is most helpful for her.

The Racial Imaginary and Technologies of the Self

In this chapter, I discuss a broadly conceived racial imaginary largely built on racialized stereotypes of cognitive deficits and vulnerability. These stereotypes function as tools for marking boundaries, categorizing, and differentiating individuals, and delineating what society considers standard from what it deems “deviant” and “abnormal” (Dyer, 1997; Maas et al., 2018). As Ho and O'Donohoe (2014) argue, stereotypes situate subjects within a specific social order, engaging individuals in “relational identity projects” (p. 860). The relational aspects of stereotypes position practitioners in a situation of "impression management," where strategies of stigmatizing Others enhance the practitioners' sense of worth and virtue.

Self-tracking designers and practitioners are in the business of imagining people in places, including themselves. Practitioners would introduce themselves by describing the function of their applications and devices, which was done by distinguishing who they were, who they imagined or knew their users to be, and who they were not. The identity work occurring in

interviews was persistent. It reflected the utility of the racial imaginary as helping them feel distant from the people they envision using their product.

What can be seen in the stability of the metaphor across intuitional sites and communities that I spoke with is how the metaphors engendered in the racial imaginary are produced and reproduced through social practices and discourse. The metaphors circulating in narratives about access and needs are significant for two main reasons: first, they offer a schematic for understanding racial exclusion in science and technology; second, the insights gained from metaphorical reasoning influence design practices and affect practitioners' social interactions. That is, metaphors were both cognitive devices and catalysts for various actions.

For instance, when discussing the boundary-making affordance of the racial imaginary, I discussed the presence of designing platforms as “open” and “equal access” in which “hypothetically anyone can join.” While the term “equal access” is not inherently metaphorical as it is used literally to describe conditions where all individuals or groups have the same opportunities to use resources or services. However, when the designer describes their online platform as offering “equal access,” they are invoking a term with both technical and symbolic meaning.

While the pairing of equal access and platform can refer to technical accessibility, such as designing a platform that is compliant with the standards of the American Disabilities Act, the functional use of the term does not apply as the platform was not designed under universal accessibility nor was does it address known barriers to accessible. To this end, using equal access to describe the platform is done metaphorically or symbolically, implying a commitment to broader social and ethical principles such as inclusivity, fairness, and equity. However, since the platform was not designed to address or minimize barriers that may prevent certain groups from

entirely using it, it becomes a metaphorical expression that glosses over the complexities and inequalities that can affect users' ability to use the platform effectively. While the platform might be "open to all" in aspiration, in practice, it might not be accessible or usable by everyone due to various barriers—be they economic, technical, or socio-cultural. In this regard, describing a platform as "equal access" under these circumstances is problematic as it gives the false impression that the platform is universally accessible and that the designers have actively engaged with issues of social and digital inequalities.

Practices of the self are also performative, as practitioners cite and reiterate the values deciphered from these metaphors in their various activities of practice and interaction. That is, it is not that the practitioners are performing some pre-existing identity of whiteness or scientific practices but are constituting their identity through various repeated actions (Butler, 2011). The performative quality of the racial imaginary brings to light Foucault's argument that technologies of self.

Foucault (1985) explains technologies of the self as a kind of aesthetic practice, the performance of attitudes that entails a particular stylization of behavior. In this regard, Foucault (1985) argues that technologies of the self are not a prescriptive code or norm. Instead, the stylization of attitudes indicates "an art of the everyday relationship" with others (p. 93). In the context of this work, the racial imaginary indicates the art of the everyday relationship between the practitioner and those imagined as most in need. As Rae (2022) has argued, the stylization of attitudes that Foucault discusses can be considered a performative orientation indicating adherence to a particular attitude. The attitude of practitioners can be explained as a "non-performative," as Ahmed (2012) has used to describe practices that do not bring into effect the outcome that it articulates (p. 117). Ahmed (2012) argues that the very act of failing to bring

about what is stated is, in fact, the performative act itself, concluding, “naming can be a way of not bringing something into effect” (p. 117). Ahmed further argues that the non-performativity is the action that is intended.

Considering this, the racial imaginary is intended to continue as an imaginary for the practitioners that affords a particular ethical endorsement towards inclusion and diversity. It also stabilizes the imagined Other, which helps maintain its availability for other uses, such as sustaining the need for technological projects concerned with providing access. To this end, the racial imaginary, while it can be used to sustain further and expand various projects of the practitioners, it also creates a boundary between practitioners and those they imagine in need.

In this regard, the racial imaginary provides a tool to “locate” the distinction between white practitioners and racialized others as relationally constituted. Ahmed has argued that whiteness forms through its orientation towards and away from others. Whiteness is where things cohere and emerges as a principal point of reference. When we consider whiteness as the central reference, the orientations (or directions) it takes towards others become reflected in how its identity emerges from these relationships. The relational aspect of orientation is the topic I address in the following chapter.

CHAPTER 4: MANUFACTURING DIFFERENCE

Self-tracking devices, such as wearables and fitness apps, are often marketed as tools for optimizing the body and empowering individuals. Scholars have critiqued this narrative discussing these devices as instruments of normalization, drawing upon Foucauldian notions of biopower and governance (Foucault, 1978; Lupton, 2016). These technologies function as internal surveillance mechanisms, instilling a normative gaze that prompts individuals to self-regulate in alignment with societal standards (Lupton, 2013). These devices implicitly establish normative benchmarks by offering metrics that resonate with dominant cultural values—such as body weight, physical activity, or productivity indicators (Nafus & Sherman, 2014; Swan, 2012).

This process of self-regulation is situated within a neoliberal paradigm, wherein the onus for health, well-being, and even ethical conduct is increasingly devolved onto the individual (Lupton, 2014). Consequently, self-tracking technologies generate data and cultivate a specific form of subjectivity that is disciplined, self-monitoring, and normalized within existing sociocultural frameworks (Ajana, 2017).

The subsequent analysis is based on interviews conducted with users of consumer self-tracking devices. This chapter explores the experiences of participants, encompassing individuals engaged in self-tracking through popular consumer devices such as Fitbit and Garmin, smartwatches, and smartphone-native or freely downloadable apps like RunKeeper or Strava, as well as various calorie counters and meal preparation applications. Using a snowballing approach, 34 participants were recruited through meetups, flyers, and referrals from other self-trackers. Participants usage ranged from three months to approximately two decades, while their ages spanned from early 20s to late 70s. In instances where participants adhered to strict routines, I sought permission to observe their activities over the course of a day. This subset

included five individuals, allowing me to shadow activities such as their Sunday meal preparation, morning swimming routines, privacy-conscious practices, and the regimen of a marathon runner. The ongoing data collection and real-time output play a vital role in how self-tracking technologies discipline the body by pressuring users towards conforming to normative behaviors, as others have remarked on the implications of self-tracking.

Finally, in the discussion, I propose the unsettled subject concept to discuss how design enacts the logic of social inclusion and exclusion that sustain users' engagement with self-tracking devices. The "unsettled subject" describes how users continuously navigate racialized boundaries set by these technologies that users then seek to correct. The focus here is not to argue that these devices create white subjects but rather to illuminate how they subtly reinforce systems that privilege whiteness. This contributes to existing scholarship that critically examines the racializing elements embedded in these technologies (Benjamin, 2019; Cave & Dihal, 2020; Dixon-Román, 2016).

Data, Disorientations, and Objects in View

Default Settings. Julie, intrigued by genealogy and aspiring to study precision public health, had just received their 23andMe report. At-home genetic kits first caught her eye because of the promise of precisely charting an individual's ancestry. Unlike wearable devices that track physical activity or sleep patterns, 23andMe provides insights into one's genetic makeup, offering information on ancestry, health predispositions, and even traits like taste preferences. Julie had "splurged" by purchasing every genetic report 23andMe offered. "It's so cool!" she said, "It even tells me who a good mate would be!" We both started to laugh.

Since its launch in 2007, 23andMe has grown from offering a single ancestry report to over 100 personalized reports in areas like health predisposition and carrier status. This data is

argued to enable participants to self-regulate based on their biological identity, turning genomic information into a personalized guide for health and lifestyle choices (Lee, 2014; Swan, 2013). This capability gains significance when considering that the company has accumulated approximately 14 million consumer DNA results, making it one of the world's largest repositories of genetic information (Seife, 2013).[2]

The report Julie received from 23andMe included a description of over 30 traits, such as eye color and baldness, lactose intolerance, and ability to metabolize alcohol. The inclusion of various "genetic associates" that address aspects of life not usually pathologized highlights the moral discourse of health risks embedded in self-tracking technologies. For instance, her report extended to topics of ice cream preference, fear of public speaking, and the infamous finger-length ratio, all of which were presented in an interactive infographic. This expansive framing of health risks underscores the emergence of what critical discourses term deviant bodies —those that diverge from socially accepted or medically established norms (Lupton, 1995). Julie's report, which emphasizes aspects like healthy eating and sleep, participates in this moral discourse, thereby contributing to the broader conversation on what constitutes a “health risk.”

Throughout the infographic are links for various terms and phrases. Among the many pages of text, one term captured Julie's attention. She clicked on the link to define it:

> Genetic weight. Your genes influence not just your weight but also the impact of different healthy habits. The average weight for a woman your age who is 5’4” tall is 157 pounds, based on 23andMe participants of European descent. The ancestry we used for

[2] According to the International *Society of Genetic Genealogy*, the largest genetic database in the world is Ancestry.com with the DNA of 23 million people. Ancestry.com has offered genealogical and personal ancestry services since their launch in 2013. The focus on family history and kinships has given Ancestry.com a completive advantage over 23andMe who initially marketed their genetic testing kits under the framing genetic determinants of health and have only recently broadened their services to include genealogical and personal ancestry.

> your result is based on the information you provided in your settings. European is used as the default for people of mixed ancestry and for those of ancestries for which we do not yet have enough research participants. (23andMe, 2018)

She let out a derisive laugh, “Well, they didn’t get any of that right, did they?” Julie has “mixed ancestry,” as her parents are Columbian and Taiwanese. While she is 5’4”, she has weighed a consistent 115 pounds almost all her life. “Mixed ancestry” and non-Europeans broadly are problematic populations for 23andMe. Since its launch, the company has struggled to attract diverse customers. Currently, their database is 80% white and upper-class (Zhang, 2018).[3] They can calculate their results by recoding Julie as European, which enables them to generate reports such as the one Julie received.

Under the definition of “genetic weight” is a link to “update your ethnicity setting.” Julie clicks on it: “Select the option that best represents how you identify your own ancestry or ethnicity - similar to what you would enter on a census.” Julie laughs again, “There’s no hope, is there?” What Julie is referring to is both the complication and reduction of race within this description. Julie perceives the term "European" as racially coded, understanding that her health metrics are based on predominantly white populations. This becomes particularly paradoxical when such reports refer to documents like the U.S. Census, which is often d as an example of the social construction of race and has changed its racial categories multiple times.[4] Despite the

[3] Under the “populations collaborations” initiative, 23andMe has intensified global partnerships such as offering free kits to scientists studying historically understudied populations in Asia and Africa.

[4] The U.S. Census has continually adapted its approach to capturing data on ethnicity. Currently, the census includes a question asking if a person is from Hispanic, Latino, or Spanish origin. Prior, questions about ethnicity were often subsumed under broader questions about race or national origin, and the options available were less specific. In the 1970 Census, for example, there was a question that asked about the respondent's "origin or descent" with options like Italian, German, or American. The 1960 Census included questions about "Color or Race" and asked about the birthplace of the respondent's parents. Earlier censuses were even less specific, often focusing solely on race or national origin, without a separate category for ethnicity.

acknowledgment of race as a social construct, the genetic reports continue to frame information on a biological level, reinforcing associations of whiteness.

Mutual Production of The Biocitizen and Bio-Other

Julie's experience serves as a microcosm of the more significant issues at play, making visible the racialized, ethical, and biopolitical dimensions often obscured in the discourse on self-tracking technologies. In an era where data-driven approaches to health are increasingly normalized, Julie's interaction with 23andMe illuminates the racialized assumptions and ethical complexities that underlie these technologies. While 23andMe's transparency about their predominantly European database might appear ethical, it simultaneously exposes a form of digital redlining (Benjamin, 2019). The company's form of racial profiling, which lacks sociohistorical and geospatial context, perpetuates both historical stereotypes and biological inaccuracies (Jackson, 2014). These actions have far-reaching implications as the company actively sells genetic profiles to various pharmaceutical companies conducting precision research on various diseases such as Parkinson's disease.[5]

Algorithmic bias in digital health technologies, such as wearables that use green light for heart rate monitoring, is a pressing issue. Green light is favored in these sensors because it is readily absorbed by blood, facilitating the detection of pulse rate. However, the technology's

[5] For instance, 23andMe, which owns one of the world's largest genomic databases, sells this data to pharmaceutical companies like GlaxoSmithKline and Procter & Gamble. GlaxoSmithKline is particularly interested in this data to develop new drugs for Parkinson's disease. A recent study found that 10% of Parkinson's cases are linked to a mutation in the LRRK2 gene. The LRRK2 gene mutation is found in approximately 15-20% of Parkinson's cases in the Ashkenazi Jewish community and around 40% in North African Arab Berbers. However, it appears in just about 5% of the broader population. Utilizing 23andMe's genomic data allows the company to identify individuals susceptible to this condition, potentially affecting the exclusion criteria for clinical trials. However, 23andMe has been scrutinized for it's lack sociohistorical and geospatial context that assume artificial boundaries of geographic regions from colonial mapping practices that have led to mischaracterizations of genetic profiles and conclusions about genomic knowledge more broadly (Jackson, 2021). In this context, 23andMe engages in a form of racial profiling that not only perpetuates historical stereotypes but also promotes biological inaccuracies. These actions can have long-term consequences, particularly in identifying susceptibilities to diseases.

efficacy diminishes with darker skin tones due to higher melanin levels, which absorb more green light and result in less accurate readings (Shcherbina et al., 2017). Despite these known limitations, media coverage and tech initiatives often focus on the scaling of predictive capabilities in wearables. Companies like Apple and Fitbit are continuously working on projects that aim to expand the range of medical conditions these devices can detect, from stressors to infectious diseases (Chen & Snyder, 2013).

The marginalization of Julie's ancestral lineage is not just a technological or data-centered issue; it is a biopolitical concern that implicates how power is exercised over bodies and populations through technologies of health and identity (Rose, 2007). These technologies not only measure but also actively influence behavior, effectively molding individuals to conform to the established standards of health and efficiency, which is a key aspect of biocitizenship (Lupton, 2013; Rose & Novas, 2008; Ruckenstein, 2014). The biocitizen is an idealized figure, embodying societal norms of fitness and productivity and often benefiting from market solutions designed to enhance these traits (Ajana, 2020).

Rail and Jette (2015) have argued that the image of the bio-Other is created in opposition to the biocitizen. The bio-Other is portrayed as being unfit and unproductive and often intersecting with racialized and marginalized populations. The biocitizen and Other exist in a symbiotic yet hierarchical relationship, where the bio-Other serves to reinforce the virtues of the biocitizen. The relational dynamic described by Rail and Jette speaks to an overlooked aspect of Foucault's concept of biopower. Foucault (2003) argues that racism is a primal mechanism of biopower that legitimizes the state's interventions on both the individual and population levels. Racism works to delineate the moral and social character of individuals and communities into hierarchies that are then used to justify exclusion, discrimination, and even eradication for the

benefit of the biocitizen. That is, the bio-Other is not just different but inferior; thus, their marginalization or elimination is seen as beneficial for the population's health (Foucault, 2003).

The concept of the biocitizen, derived from Foucault's notion of biopower, represents an optimized form of subjectivity. This idealized figure embodies societal norms of fitness and productivity and frequently benefits from market solutions tailored to augment these attributes. Rail and Jette (2015) have reminded us that self-tracking technologies produce two contrasting figures: the biocitizen and the bio-Other. The bio-other speaks to the centrality of racialization within Foucault's theory of biopower, a component that has gone unaddressed in self-tracking scholarship. According to Omi and Winant (2015), race is a fundamental organizing principle that shapes how humanity is understood and categorized. Through laws and cultural norms, various "color lines" are formed, which demarcate what is considered "good/life/fully-human" from what is considered "bad/death/not-quite-human," thereby creating a hierarchy of human value (Weheliye, 2014, p. 27).

Considering Julie's experience, the relationship between the biocitizen and the bio-other becomes even more problematic when the discourse of optimal health is based on data from predominantly white populations. In this context, it's not just that whiteness is normalized as the default standard for evaluating health opportunities; racialized deviance also serves to reinforce white supremacy. Returning to Foucault is helpful at this point. Foucault addresses two functions of racism. The first "to fragment, to create caesuras within the biological continuum addressed by biopower" (Foucault, 2003, p. 225). The second function is biological, what he determines as a positive relationship for white supremacy such that:

> Racism makes it possible to establish a relationship between my life and the death of the other that is not military or warlike relationship of confrontation, but a biological-type.

> Relationship: the inferior species die out, the more abnormal individuals are eliminated, the fewer degenerates there will be in the species as a whole, and the more I—as a species rather than individual – can live, the stronger I will be, the more vigorous I will be. I will be able to proliferate. (Foucault, 2003, p. 255)

For Foucault (2003), it is not that one's life directly translates to the other's life. Rather, like the idea of the biocitizen, eliminating will make "life, in general, healthier: healthier and purer" (p. 255). The biological-type relationship that Foucault speaks of maps well onto how self-trackers are positioned as mechanisms for public health intervention. However, whether by bias or design, or centuries of racism, the general life in the United States is dominated by white life. In this regard, while Julie's ancestral lineage was marginalized, it was to strengthen the general body. The strength can be charted in how Julie's racial otherness helped reify the dominant ethnic character of the company's database as white. Minimizing the significance of Julie's ancestral background maximized its utility in service, stabilizing the European default. In this case, strength translates to including Julie's data in the aggregate of European data, making the stability of 23andMe's white-centric framework more substantial.

In this regard, we see the formation of the biocitizen and bio-Other as Julie's data, now included in the more extensive database, helps to strengthen the ideal and presence through her marginalization. While the marginalization Julie experienced has been examined in academic discussions about self-tracking and the impacts of representational collapsing and the binary reductions of quantification (Crawford et al., 2015), there is a critical aspect of the conceptualization of the bio-Other that is left unattended. Existing literature on the politics of quantification and the marginalizing effect of self-tracking largely conceptualizes both the biocitizen and the bio-other based on pre-existing categories of social difference. This approach

tends to reify categories based on race, gender, and ability as existing before social manifestation. In other words, marginalization is often portrayed as affecting entire groups assumed to be stable and homogeneous (Lupton, 1995; Lupton, 2014).

However, from Julie's perspective, her ancestral lineage is not so categorically stable, nor is her experience of marginalization. While Julie was racialized as white, as her genetic makeup was compared to white standards, she also understood the label of "white" as a mischaracterization. She found other aspects of the report to resonate with her lived experience. She selectively accepted or rejected metrics, such as weight and eating habits, based on their perceived congruency with her knowledge about herself, history, and culture. In other words, Julie was simultaneously racialized as Other and as white, positions that fluctuated depending on her acceptance of various metrics. Julie's experience with 23andMe challenges the conventional understanding of the biocitizen and the bio-Other as mutually exclusive categories. Her selective acceptance or rejection of various metrics illustrates how these categories can coexist within a single individual. This nuanced interaction between the biocitizen and the bio-other adds a layer of complexity to self-tracking technologies, suggesting that they play a role in optimizing the symbiotic relationship between these two figures.

Self-Tracking and Normative Whiteness

As contemporary life becomes increasingly mediated by technological endeavors, the "color lines" that Weheliye (2014) posits are not only found in laws and cultural codes but extend to the sociotechnical systems in which self-tracking technologies are embedded (p. 27). Self-tracking practices are mechanisms that produce and reinforce normative standards of health based on predominantly white populations. However, scholarship on the marginalizing implications of self-tracking technologies often overlooks this aspect. It focuses on the politics of

stigma and exclusion of certain groups, which overlooks the individualizing and continuous data collection that self-tracking devices market. It also avoids discussion of the logic of racialization embedded in these designs. Ahmed's (2005) work on how whiteness can be conceptualized as how one is oriented within their environment and towards or away from others can help us further integrate intersectional frameworks into conceptualizing how marginalized subjects are produced through self-tracking.

In her pioneering work, Ahmed (2005) examines how racism is operationalized by how objects act as orientation devices that both show us directions to place our attention and give us a sense of belonging in the current environment in which we are positioned. She posits that whiteness serves as an invisible, unmarked standard against which other racial and ethnic identities are defined and measured (Ahmed, 2007). Ahmed employs the notion of directionality in a non-metaphorical sense to illustrate how social norms, behaviors, and expectations manifest as racialized lines across various societal domains, including physical spaces, social interactions, and institutional practices, or what she refers to as the sociality of lines (Ahmed, 2005, p. 119). The sociality of lines speaks to the spatial, performative, and embodied organization of social life that relies on race's capacity to create borders, reinforcing structures, systems, and markers of difference that favor whiteness (Ahmed, 2005).

Within this discussion, I should note that whiteness is not an identity but a matter of orientation; it is a spatial and relational concept that shapes experiences and perceptions. Whiteness is not a thing; rather, it appears through how we cohere around it. How we cohere around it depends on varying degrees of proximity and distance. To this end, Ahmed (2005) proposes that whiteness can be considered a straight line, as straight lines are a form of privilege that clears a path for certain bodies and makes their journey less obstructed than those who are

not aligned. In this regard, it is the straightening of bodies to align with dominant norms and standards through which structures, systems, and norms can reinforce whiteness as the absent center (Ahmed, 2007). To this end, the sociality of lines is a normative framework to understand how self-trackers recognize, make sense of, and deny differences that emerge alongside their use of self-tracking devices.

In the context of self-tracking, viewing these devices and practices as facilitating strategic alignments that enhance the individual's "utility" within the existing system is essential. Simultaneously, they reinforce the system itself by contributing to its overall cohesion. By strategic, I am referring to self-tracking technologies and practices to play the dual role of orientating. That is, if self-tracking devices are playing the dual role of acting as an "orientational device," to use Ahmed's terminology, that directs us at what to pay attention to (e.g., goals, daily limits, linear time), and they do so in often automatic and continuous ways. Simultaneous to this function is its ability to act as a "straightening device." It guides, coaches, or instructs and points us toward normative goals and standards, and apps and devices capture evidence of the body facing these directions. This evidence reinforces its authority to direct and reifies whiteness through this record and accumulation of evidence of its cohesion.

Whiteness becomes a habit through repeated actions and behaviors that follow certain social and racial lines (Ahmed, 2007). These lines are domesticated or made to feel "natural" through their constant repetition, making them a form of disciplinary power-producing docile bodies. In this sense, Ahmed's habit of whiteness becomes a form of Foucauldian docile-utility where the docile body helps maintain a racialized social order. Under this perspective, the docile bodies that Foucault (1977) describes can be seen as following social lines as theorized by Ahmed (2005). Furthermore, suppose whiteness functions as a "straightening device" sustaining

its hegemony through orchestrated acts of alignment, as Ahmed has argued. In that case, docile-utility can be conceptualized as linear engineering. It can also be conceptualized as a racialized docility, where bodies are trained not just to be helpful in a general sense but to be useful in the maintenance of a white-dominated social structure. However, it is not that bodies merely have a direction or follow set paths. The repeated actions and movements in specific directions shape the bodies themselves over time. In other words, bodies are directed through their actions and take on a form that reflects this ongoing directionality (Ahmed, 2007).

Understanding whiteness as a distribution means recognizing how privilege is differentially distributed. Ahmed (2006) argues distribution can be traced by considering how bodies are oriented in space. Being oriented speaks to both place and direction; it concerns how someone takes up space and the possibilities of extending their actions through it. Ahmed argues that whiteness as a culturally hegemonic orientation affords greater ease of movement within spaces when bodies are aligned to it or come to fit upon it. She describes this fit as a matter of coherence, a cohesion that strengthens it as a dominant orientation and strengthens its invisibility of the dominance of whiteness. This fit concerns how bodies come to cohere upon whiteness, strengthening its domination. This alignment speaks to the negotiation of differences required, where the least distortion offers a greater sense of congruency with the line and lived experience (Frankenberg,1993). Therefore, when we think of self-tracking, when differences are made, it is in the function of reproducing normative whiteness. In turn, differences made would be to operate through alignment with the straight line of whiteness or distanced to a deviation.

The following analysis demonstrates how these devices and practices offer a strategic alignment that enhances an individual's “utility” within the existing system while reinforcing that system's cohesion. In this perspective, docile-utility is not just a matter of spatial or relational

positioning; it also serves as both the product and the creator of the "straight line" that reifies normative whiteness (Ahmed, 2005, pp. 78-79). In essence, the utility of individuals in this system is determined by how closely or distantly they align with the dominant orientation.

Producing an Unsettled Subject

The following vignettes help to consider the relational, spatial, and institutional context in which people make sense of their data. By integrating Foucault's conceptualization of docility and utility with Ahmed's "sociality of lines," the following analysis seeks to expand how self-tracking users make sense of their interactions with their devices and the feedback they receive from them. Each vignette highlights varying levels of alignment and distinction, shedding light on how self-tracking devices guide the body's orientation in specific ways. Specifically, I first review how proximity and distance interact with marginality by continuously regenerating a hypervisible subject, a process that I refer to as *regenerative marginality*. The second vignette addresses how regenerative marginality becomes a habit, something to strive for and reconcile through engagement with the self-tracking device, which I refer to as the *habituating duality* of self-tracking. The last vignette discusses how regenerative marginality as a habit of a dual subject position can influence the interpellation of difference that can impact how one understands their role socially, which I refer to as a *gentrification of psychic space*.

The Interplay of Proximity and Distance

Maria is from an Eastern European country and is completing her graduate studies in the United States. Her story takes place in the liminal space between her "home body" and her "U.S. body," a terrain that is further complicated by her status as a "foreigner." During her third academic year, Maria began to track her calorie intake, weight, and exercise routines. Maria had never been concerned with her appearance of her weight, commenting that her family is not one

to judge how people look. Alternatively, her motivation emerged from a noticeable change in her weight and a subsequent feeling of discomfort and disconnect from her body when it was "at home." As Maria explains:

> My goal is to maintain the weight that I normally have because, so I'm not from the United States, and I spend my summers in my home country, but for some reason, it's easier to maintain my normal weight there. And every time I go back for the summer in my home country, I lose weight, but it's not on purpose, and I feel better. It's the weight I'm comfortable in.

She knew that it was common for international students to gain weight when they moved to the United States, a topic reviewed during her orientation to her graduate program. "Our orientation was a whole weeklong with a very tight schedule, and it was for international students, but also scholars and faculty" she recalled, "They [the University] reviewed several things, like weight gain, during a presentation on the management of your daily routines, but also expectations of social interactions, and even where to shop, what to cook, and where to eat."

Initially, Maria commented on weight gain little attention. She liked to cook for herself and sought foods that were like the diet she had at home. Regardless, she found her weight increasing throughout the year. Sharing her confusion, she remarked:

> I don't know what it is, but in the United States I start to, well not gain weight rapidly, but I feel it's slowly happening. Like it is, and I eat the same foods, but it just starts to happen. It just feels like it's not my normal, like my home, in my home country, but that [body] is, like I said, what I am most comfortable in.

Accustomed to maintaining a consistent weight back home, Maria was perplexed by her weight gain in the U.S. even though she was eating similar foods, pondering, "It's not the same as in the

same brand, but it's the same food, like a carrot is a carrot. But, like I said, it's not the same body." This weight gain began subtly compounding her emotional distance from her home country.

Proximity and Deviance

Her discomfort about her weight gain deepened when she visited her family this past summer, and their well-meaning yet noticeable comments about her changed body only magnified her sense of displacement, as she shared: "There were a couple of relatives who commented, or I don't know, they joked that I was 'becoming too American.' But it's never been a topic in our family before. It was hurtful." That summer, Maria decided she would start to track what she ate when she returned to the U.S. in the Fall, which she did. Drawing from her routine of notetaking during classes, Maria began recording what she was eating in one of her notebooks. However, this unintentionally increased her visibility among her American friends. She described it as "inconvenient in social situations," elaborating that "it was distracting" using a large notebook was not ideal. Despite her efforts to track discreetly, she faced curiosity and comments from others about her actions, "they would ask me why I needed to do that or say things like, you already eat the healthiest foods," leading her to feel like she was, "being disrespectful of the food here like I was judging," and that made people uncomfortable. This spotlight exacerbated her feelings of being an outsider and emphasized her foreign status as a student in the U.S.

Maria purchased an iPhone to address this issue and blend in more. She recognized that using a phone to track her intake was the norm in the U.S., as "everyone around me uses it," and figured it would draw less attention than her notebook. But her purchasing of the iPhone was not only about weight management but came under the larger decision of wanting "to be a more

modern person." When asked what she meant by modern, she explained it about its social visibility and sharing:

> Because people are into electronics here. So the [iPhone] is more appropriate, it's like an appropriate self and more appropriate for the situation. And I want to feel more like a modern person. Like I said, because a phone, I think a modern person has their phone with them in nearly every situation.

Despite finding this practice somewhat rude, she acknowledged that constant phone usage was pervasive in American culture. With her iPhone, she found herself fitting in better with her peers. Not only was the phone used every day, but owning an iPhone also conferred a sense of modernity that helped her feel more integrated. However, she was still having difficulty adjusting to the device and often missed the ability to write in her notebook. The calorie app on her phone provided real-time updates when she entered new foods, making her acutely aware of when she was approaching or exceeding her daily limit. This increased awareness was distracting and affected her social interactions. "I'm at a friend's party, and suddenly, I realize I've exceeded the limit. I become sad, and I don't want to talk to people anymore," she reveals, "I try not to panic, or, I mean, I succeed in that, but being sad or feeling guilty, depressed, those things, which you're not supposed to feel."

Regenerative Marginality

Ahmed posits that whiteness is not the origin but the effect of what coheres, operating as a spatial and temporal orientation that affects how bodies move and inhabit spaces. Maria's experience exemplifies the complex interplay of these institutional lines, which intersect with other power lines such as class and gender. Her capacity to navigate these lines is compromised by navigating these lines, making her hypervisible when she fails to "line up" with the dominant

orientation of whiteness. Her switch to an iPhone for self-tracking can be interpreted as an attempt to align with this orientation, serving as a "straightening device" that allows her to blend into the background (Ahmed, 2005, pp. 78-79).

The orientation program Maria attended in graduate school served a dual purpose. On the surface, it aimed to acclimate international students like Maria to life in the U.S. It subtly guided them to align with a normative expectation rooted in the dominant culture. As discussed by Ruth Frankenberg, the cultural practice of whiteness goes unnoticed by whites and comes to convey what is American or normal (Frankenberg, 2005). By informing Maria that weight gain is common in the U.S., the orientation underscored the centrality of a whiteness-oriented norm within American society (Ahmed, 2007, pp.159-160). In this regard, the visibility that Maria needed to manage was not isolated to her weight gain issue. That is, weight gain was not the marker of deviance for the normative gaze, even though it registered as usual for Maria. Instead, the deviance that needed management was her visibility as a foreigner whose activities could render a critique of the quality of food in the United States. To this end, purchasing and adopting digital self-tracking engaged her in managing her visibility. It is to engage in weight management in the correct white way, which is mediation's focus. It aligns her with institutions prioritizing individual interventions versus discussing broader systemic patterns.

This alignment, however, is not without its complexities. While the iPhone reduces her social visibility, it amplifies her self-scrutiny, introducing a new layer of self-regulation. Her body remains a site of social stress, exacerbated by real-time updates from her self-tracking app. The app's adaptability to Maria's unique circumstances makes the disciplinary act of self-tracking not just generalized but individualized, capable of adapting to her situation. However, it imposed a moral cartography that illustrates "the subtleties and macro-aggressions of historical and

ahistorical domination" (Paperson, 2010, p. 5). This nuanced form of discipline allows the technology to be flexible and prescriptive, accommodating individual differences while reinforcing broader societal expectations.

The oppositional duality between proximity and deviance that Maria is negotiating can be considered an operation of regenerative marginality that speaks to how the body is made a site of biopolitical production. Returning to Foucault, discipline depends on the ability to bring forth the force of the power relation (Foucault, 1977). Related to Maria, her body is positioned as a site of contestation where normativity and deviance are not discreet states but are presented in a continuity of collisions that converge to reinforce existing structures of white normativity. Her attempts to conform through self-tracking serve as a form of labor to produce a body that aligns with these normative standards, but this is a proximal body. It is not that Maria has internalized an individualistic moral responsibility to manage her weight. Instead, the institutional arrangement mimicked in her social engagements directs her to self-tracking activities. However, her labor does not render her cultural background irrelevant. Still, it strengthens her dissonance between her body in the U.S. and her home country through its real-time updates and accessibility as a device meant to be "carried" "at all times," perpetuating her proximity to the regulatory structure. Her struggle to conform is indicative of a regenerative marginality. This process describes how a position of marginality is made anew by interaction with the app that simultaneously strengthens the norms that define marginality. The following vignette further addresses this continuous duality between normative and deviant positions.

Goal Setting and Habitualizing Duality

Mark, a 66 retired accountant and veteran, had been using a Garmin watch to track his steps for about a year and a half, exclaiming: "It's phenomenal. Beautiful. I love it. Somehow, I

survived without one for sixty-plus years of my life. You'd be hard-pressed for somebody to take it away from me." Mark wasn't always enthusiastic about self-tracking. He watched his wife "fumble" with her Fitbit for several years. She charged the battery almost daily, struggled to get the silicon casing back on her device if she had to change it, and dealt with it slipping or falling off her wrist if it brushed against something the wrong way: "Excuse my language," he said, "But it looked like a pain in the ass."

The shift in perception of self-tracking corresponds with Mark's decline in mobility. Since retiring, Mark has faced a series of health issues, including arthritis, knee instability, and nerve damage in his ankles –contributing to his occasional instability while walking. He stopped running at age 60. At age 64, his ankles began to shake, and he found it difficult to walk or stand for longer than an hour. The pain in his ankles led to his first back surgery, which aimed to decrease the compression in his spine. Everything appeared normal for Mark for a while, but then: "I got busted. I was struggling to walk, struggling to do much of anything." By busted, Mark is referring to herniating several discs in his spine that prompted a second back surgery:

> I've got three discs now with a cage around them that are holding them together, and I have a rod going down part of my back that's screwed into the bone. It's gruesome. I saw the x-rays, and I mean, it's as gruesome as it sounds. It's that gruesome. They've fused my spine.

Recovery for Mark was an ongoing process. His insurance approved physical therapy for the first two months, but after that, he was on his own, remarking, "It was my problem to bear." His physician kept telling him, "You gotta move. You gotta move. If I didn't then I would end up in a wheelchair. But at that point, I could barely do anything. It was a dreadful image." As dreadful as it was, Mark kept trying. He made it a goal to go to the YMCA to walk on the treadmill every

day, but these visits always left him in pain. His joints would hurt. His knee would give out. His ankles were still wobbly. He recalls, “It was demoralizing. But it was my problem to bear.”

Mark attributed his vitality at 60 to his lifelong dedication to running, a practice he grew to love when he entered the military at age 18. He often fondly recalled the sense of empowerment it brought him, saying, "I could run thirty minutes a day. I just felt like a different person” and “It made me feel good like I could do anything after.” A buzzing or pinging of his Garmin watch often brought him back to the present. “It’s just two taps, you see. Tab Tab.” On one occasion, he was brought back to the present at the sound of a faint buzzing; tapping the screen quickly, he chuffed: “I always get these notifications. This one here it's asking me if I want to set a goal for the day to get my heart rate up, but the two goals are just running or cycling.”

Mark valued his Garmin but wrestled visibly with its fitness suggestions, which reminded him of his physical limitations. They prompted thoughts of his younger, more able-bodied self:

> You know, every time I see somebody running, I have to admit, I get so envious. Did you know we all have a natural gait, a natural stride? When you're running at that pace, that's when you're most comfortable, and you just go, to speed up, you go faster, you can go slower if you want. I just miss it. I miss it every day.

In Mark’s case, his focus often oscillated between his current progress and status of step counts and memories of his younger, able-bodied self. One could remark that the device, with various activity metrics, notifications, and notifications and nudges, made thinking about Mark’s younger body a habitual activity. A dialectical imagination became a principal character, serving as a mechanism for rationalizing and problem-solving in the context of changing mobility and an

aging body. It became a central characteristic to understanding how his new swimming routine and subsequent recording of steps renders his body mobile.

The complex relationship that Mark describes with his step counts helps to illustrate how Mark's perception of mobility helps to constrain how he considers his mobility, shaping his daily routines and self-image. The app's emphasis on specific metrics functions as a straightening device, compelling Mark to align himself with quantifiable achievements. This alignment with normativity can be seen as a form of orientation towards whiteness, wherein users like Mark align themselves with the prevailing values that prioritize standardized achievements that privilege ableism and bodily capability as defining factors of mobility.

Mapping Steps onto an Analytica Space

When Mark sees his step counts, he also sees his mobility. Steps are not a neutral reference metric for him, as activities commonly associated with steps, such as walking or running, are outside his capabilities. However, as emblematic of his mobility, Mark is compelled to negotiate their authority by further limiting what is considered valid or invalid activity, often organized based on his abilities. Considering step counts as “my mobility,” then beckons Mark to negotiate the legitimacy and illegitimacy of activities within his capabilities. That is to say that steps are not a neutral metric of reference as activities commonly associated with steps, such as walking or running, are outside his capabilities. But as emblematic of his mobility, Mark is forced to negotiate their authority by further limiting what is considered valid or invalid activity, which is often organized on degrees of his capabilities that circulate between the dual presence of his current body and his past able-bodied self.

A lack of step counts was used to rationalize non-participation in routine activities. The Garmin's inability to accurately record steps during certain activities, such as driving the tractor

or mowing the lawn, helped Mark delegitimize them. Dismissive remarks like, “you would have to attach your watch to your ankle for the device to count steps if I pushed a grocery cart, no thank you,” reveal how the technological limitation of the device is displaced onto activities, separating them into categories worth striving for and those not worth the effort.

At times, the limitations of the device were merged with a gendering of activities such that it helped to strengthen Mark’s indifference to tasks that he was once responsible for, such as illustrated in his account of his wife mowing the lawn:

> [I]f she wants to get steps recorded she has to attach her Fitbit to her left arm and then swing it while she’s pushing the mower with her other hand. She looks ridiculous. I’ve told her the whole neighborhood must be watching. It’s silly, but I would never do that.

In turn, by limiting the recognition of mobility to what could be registered as a step count, it reproduced normative conceptions of an able and youthful body.

The dismissal of past activities was not always as straight forward as configuring an activity silly and inconvenient. There were situations where he experienced himself as hypervisible as he adjusted to a developing awareness of his body's capabilities in once-familiar spaces. At times required him to negotiate his self-worth by securing his alignment with quantification. In these moments, he experienced his body as hypervisible. To ease the discomfort, he would look to his past for skills or experiences that would assert his alignment with quantification and reassert the order of masculine superiority. In one such instance, when discussing his routine of swimming in the morning, he remarked on his surprise that there were so many strong women swimmers who could swim much faster and for longer than he could, remarking: “It doesn’t feel good to see that you only have a 1,000 steps recorded and you’re

spent and they are still going strong." Statements indicating Mark as feeling discomfort were resolved by reflections on his past that emphasized his younger, able body.

Mark would comment on his affinity to quantification such as "I have always been strong with numbers" to "it is just a God-given talent." Statements affirming his alignment with quantification were used to reorder the state of things via diminutive analogies equating the mathematical with masculinity. For example, his God-given abilities were contrasted with his daughter's lack of mathematical skill, noting that she was "bad at math" but "great artistically," further asserting that he was horrible at anything related to art. In turn, the presentation of contrasts such as this gave Mark a rhetorical vessel to gain distance from certain activities, further aligning him with legitimating signs of his masculinity and intelligence. In this regard, the thing that was measured–Mark's mobility–was not measured in isolation but accompanied by a whole string of other associations. Comparison served as a subtle yet powerful form of control as Mark adjusted his behaviors to maintain alignment with the norms they were associated with. As Porter (1995) remarks, this is the gentlest form of power.

The constant negotiation between what is achievable and what is lost creates cycles of negotiation that permeate Mark's daily life. While serving as a tool for self-improvement, the Garmin device also becomes a symbol of loss and constraint. It maps his physical world into a landscape of challenges and reminders, reflecting the complex interplay between his current state of immobility, his memories of a more able-bodied self, and societal norms around ability and masculinity. The device's constant presence and the hypervisibility of his step counts serve to amplify this tension, making it a central aspect of his lived experience.

Mark knew that certain activities, such as mowing the lawn, playing football, or running, were no longer within his reach. Still, these activities frequently surfaced when he discussed his

activity goals and routines. This constant reference to his past abilities, juxtaposed with his current limitations, cultivated a heightened awareness of his body in society. By dwelling on this comparison, Mark allowed it to become the primary authority on his mobility, fueling the repeated circulation of normative ideas about the body captured in the increasing or decreasing step count. This dichotomy between his present state and his memories of a younger, more able self-created a hypervisible body, subjecting Mark to increased scrutiny and stigma related to mobility and aging. To navigate this visibility, Mark sought to align himself with normative practices legitimizing his current body as-is.

Habituating Duality

Features such as goal setting, feedback, and rewards are framed as tools for users to gain awareness and foster progressive behavior change. However, these features continuously triggered a dichotomy between the two bodies for Mark. The relation between the two bodies produced an unsettled subject anchored in a present reality of physical constraints and haunted by the ghost of a former, more able-bodied self. In this regard, Mark's interaction with his self-tracking device rendered a habituating duality in which common features like step counts, notifications, and goal setting partitioned Mark into two opposing identities. The duality Mark experiences places him in between ability and limitation, and the longer for his younger, more able-bodied self and his alignment with numbers as a "God-given talent" are all part of a larger societal tendency to prioritize youth, physical prowess, and specific conceptions of masculinity The constant checking of his device maintains the hypervisibility of his body, and the further he is from the benchmark of 10,000 steps, the more vividly his younger, able-bodied self is brought forth as a frame of reference. To this end, mundane locations were turned into sites of negotiation between his current immobility and his struggle for alignment with a more able past.

Mark's oscillating focus between his current progress and status of step counts and memories of his younger, able-bodied self also rendered him more visible of his body in spaces that he had never given attention to. To this end, the tension rendered by habituating dualities was not confined to Mark's internal experience but overflowed into the physical spaces he traversed. Step counts were mapped onto the physical spaces Mark navigated. He knew it was 50 steps from his car to the gym door where he swims. He knew that he could accumulate 100 steps if he stopped to get gas and picked up a snack from the convenience store. However, that is not to diminish the significance of quantification as a tool to aid in Mark's negotiation of marginalization. These precise measurements were not just trivial details but essential markers for Mark, helping him mediate the hypervisibility of his body's constraints. Step counts are "measures of achievement" that gain their power when people accept them as reasonable indicators of achievement or worth (Porter, 1995, p. 44). These measures act as legitimizing actions because they offer standards for self-assessment. Porter (1995) also remarks that "the measures succeed by giving direction to the very activities that are being measured" (p. 45). In this regard, we can consider numbers to be "the gentlest and yet most pervasive forms of power in modern democracies" as "individuals are made governable" by being directed towards these legitimated actions (Porter, 1995, p. 45). However, in Mark's case, the ability to align with measures of achievement was a challenging task. While he desired to engage in the activities the measures directed him towards–from the most literal of steps to the notifications and encouragements to take a run–they were not a current possibility. Subsequently, Mark is positioned outside the line of the normative direction.

Mark validated certain activities by quantifying his environment in steps, giving him a newfound sense of control, and understanding. This validation was intrinsically linked to his

knowledge that the device would document these activities, creating a concrete record of his progress. In doing so, he transformed his surroundings into an abacus for calculating his mobility. This step-based mapping was part of a broader strategy to align his activities with normative expectations. Mark could reconfigure his environment by breaking it into measurable units, creating alternative paths that allowed him to maintain a normative direction. While this approach enabled Mark to validate certain activities, it also necessitated the devaluation of others—particularly those he couldn't engage in or that the device struggled to record.

This duality creates a dilemma for Mark in which acknowledging reminders and notifications as activities he can no longer engage in would entail confronting a diminished sense of self-worth, exacerbating his anxieties about aging and mortality. Consequently, there's an urgency for Mark to realign his identity with culturally valued metrics. His past running prowess and accounting skills are bridges, bringing his current state closer to normative expectations. He also employs a gender-based binary, associating certain activities with masculinity and others with femininity, thereby delegitimizing activities that the device might otherwise consider worth measuring. In this context, the Garmin device becomes not just a tool for tracking physical activities or progress but a mechanism of alignment that assists Mark with maintaining a sense of continuity between his perceived limited body and his identity as a strong, capable man. In this regard, the Garmin served as a reminder of his limitations while also providing a connection to a past-self that was more aligned with societal ideals.

Far from being solely about physical health, Mark's actions represent a psychic negotiation with his past self. He is compelled to recreate his past's emotional and physical environment, striving to reconcile his former physical capabilities with his current limitations that resemble a dialectic image. This repetition compulsion serves as a multifaceted framework

for understanding not just Mark's individual experience but also the broader complexities of aging, physical limitations, and the psychological mechanisms that drive individuals to revisit and attempt to resolve such life challenges. Through this lens, we can see how Mark's interaction with the Garmin device becomes a complex interplay of past and present, a negotiation between physical capability and societal expectations, all underpinned by deep-seated psychological needs for coherence and self-worth.

Mark's and Maria's experiences with tracking devices illustrate how the body becomes productive by creating a subject within the force of a power relation. This subject is dichotomous, and Mark’s experience was addressed to illustrate how the dichotomous subject can be perpetuated, even mechanized, by common features within self-tracking devices. Through the repetition of producing a dichotomous subject, it maintains the normative direction, emphasized in hopes of complicating the argument regarding self-tracking technologies and normativity.

Self-Improvement and the Interpellation of Difference

Joyce is an equity officer for a non-profit organization that collaborates with a local public school district. In this role, she visits various middle and high schools to assess teaching methods, student interactions, and staff dynamics. Her goal is to recommend strategies for fostering more equitable educational environments. Recently, her organization initiated a pilot test for an equity app. Initially designed for a major city hospital but adapted for educational settings, the app uses self-tracking to cultivate skills for identifying and addressing discrimination in the classroom. Joyce's work is particularly crucial given the city's history of segregation and disparities in education, health, and economic opportunities. The district she

works with has a diverse student body but exhibits significant disparities in educational outcomes, particularly among Black and Hispanic students compared to their white counterparts.

When Joyce and I discussed her experiences with self-tracking, she had just concluded a meeting with her colleagues and the app's developers. Unlike conventional self-tracking apps like Fitbit or Garmin, the app Joyce was piloting prioritized qualitative data. Through daily reflections and a journal-like structure, the app is intended to act as a personal and communal journal that captures the thoughts and experiences about equity (positive or negative) that, in this case, Joyce and her colleague encounter. The app employs gamification, a common feature of self-tracking technologies, often used to enhance engagement (Stiglbauer et al., 2019). In this case, gamification transforms training into enjoyable activities (Bandura, 1997; Caprara et al., 2008). Joyce and her colleagues receive daily quests to complete, such as gaining awareness of an equity mindset in which the quest could be having an equity-focused Conversation. Each mission is accompanied by two subtasks: a qualitative reflection on her experience of the mission and a short numerical survey asking her to rate her perception of various abilities, such as confidence and preparedness.

Joyce volunteered to pilot the app to facilitate more discussions about equity within her school's administrative leadership. She observes subtle yet cumulative discriminatory actions in classrooms, such as the same student being repeatedly expelled or teachers favoring certain students. Joyce sees these issues as challenges that require time and planning to address effectively. From Joyce's point of view, there is no way to collectively mark these as happening as the teacher continues with the lesson, the class bell rings, the next one begins, and so on. The lack of opportunity to discuss equity is one of the motivating problems that the app being tested is trying to address. It is done by prioritizing activities that develop their awareness of equity.

Tasks are provided daily and follow an incremental theory of learning; each mission is open for one to two days, during which Joyce and her colleagues cycle through the mission, reflection, discussion, and self-assessment. Joyce does not always have the time to complete all the tasks within the specific timeframe, at which point the “quests” close. For Joyce, the “closed” nature of the conversations was her most significant criticism of the app, but there were several small others. For example, there was a 400-character limit to the length of reflections put in place as the reflection portion was designed with the assumption that colleagues would share their posts with others, remarking, “The character limit made you stay on the surface, which glosses over anything challenging or more convicting.”

The issue that Joyce had, and one she believed many of her colleagues shared, was the difficulty in explaining in words a racist enactment. The depth of these experiences and knowledge about inequity in the schools was lost with the designer's decision to prioritize quick "snapshots" over lengthier conversations. Regardless, the “snapshot” type conversations were reinforced by prompts that asked for reflections via imagery. Further complicating the matter was a gradient filter automatically placed over uploaded images to the app. This filter could be adjusted from transparent red to green on a sliding scale. Using images and color to supplement entries was also a decision of the graphic designer, Joyce explained, who believed that “people feel through colors.”

Civility Training

The app's use of imagery and color and color choice ignores the context in which these images would be captured. Joyce finds it "wildly inappropriate" to take pictures of her Black students being kicked out of the classroom. This design feature, therefore, not only trivializes the gravity of these incidents but also risks objectifying the students involved. Feeling through colors

for Joyce was a matter she could relate to, but it was far more complicated than the holiday gradient that app afforded. On one of these occasions, Joyce was confronted with a decision regarding how to make a record of an inequity:

> I wrote something like, ‘That fucking bitch.' Honestly, I couldn't believe she did it again. I wanted to say, 'Look who you’re sending out of the room! Look!' Like, what do you do when one student is pulled up to the front of the room and their table is labeled, 'Africa'? Like you can’t always address it because the timing has to be right. You can’t just say, “Hey! Mrs. Smith! Can I talk to you about that kid you have at the front of your room?

When asking Joyce what she did with the post, she explained, “I deleted it. I ended up posting a picture of like ocean waves, like stormy waves and slid that color scale all the way to red.” What occurs is that even though the picture function presented challenges, Joyce found benefit in the app’s ability to maintain her focus on these actions: “It’s not, well what I do appreciate is it [the app] holds that focus, holds that memory, in the back of your mind, at all times, because you've got to be held accountable to it.” At this moment, a fracture becomes visible. We observe a significant divide between the social and psychological aspects of racism, with institutional practices serving as the force that deepens its separation. A practice that isolates race from its social context, framing it instead as an issue of individual responsibility. As Joyce noted, taking pictures of children in the classroom would be highly inappropriate. Such an action would objectify the children's experiences and undermine the teacher's authority, causing disruption in inhumane and unacceptable ways. This shift can also be interpreted as adopting practices that conform to a more “straightened” notion of living—one that is oriented toward white cultural ideals of individual success and perseverance. Adopting self-tracking devices and practices can be understood as a form of internalized orientation toward whiteness. This internalization can

lead to a distancing from familial experiences that don't align with the dominant cultural ideals promoted by these practices, potentially erasing the value and significance of those experiences.

The equity app aligns with institutional norms by confining the concept to mental imagery, thereby legitimizing a racist act only when it is framed as a memory; a thought contained to one's psyche. In doing so, the app reinforces institutional norms prioritizing civility, authority, and appropriateness. It suggests that discussions of race are acceptable only when framed as matters of personal development and accountability, thereby excluding racism from collective or institutional discourse.

The further displacement of racism to a psychic act is seen in Joyce's comments on what accountability is about:

> So, what was interesting to me is that I found, or learned through this, that I don't get into equity conversations mainly because I'm sort of a crazy hot-head in person. I wind up frustrated with the kinds of things that I'm hearing to the point that I can't clean it up, like I become so upset with the egregious thing I'm hearing that it's hard for me to help that person process through how sometimes, or I to restart, because whatever it is I think they're saying it's because I'm so personally offended. That's not everybody's issue.

Joyce's comment above can be interpreted as a form of cultural racism that (McCulloch, 1991) defines as a nuanced form of racism that targets not the individual's physical traits but rather the stylistic characteristics of a culture of people. In Joyce's experience, there is an internalization of the logic of cultural racism. She explains her identity as something that should be separated from the institutional context in which her work practice resides. The comment "that's not their issue" is indicative of the sophistication of cultural racism to marginalize the experiences of minoritized groups in service of upholding the culture of dominant groups as superior.

Various features of the equity app reinforce the notion that racism is a problem that Joyce must personally contend with. Still, it also extends to other features of the equity app. The app's design features, which mimic dominant platforms like Twitter, prioritize brevity and quick engagement. Such as the color-coded imagery, or color evasion rather, is deflected back onto Joyce, who becomes the only one who holds the key to its decryption. The app's design prioritizes quick interactions and fails to provide the space needed for these complex discussions, reinforcing that racial matters are private, individual issues rather than systemic problems.

While the app's design features are ill-equipped to capture or address the complexities of racism in the classroom, Joyce can separate this from what she understands as the benefit of the app. Joyce feels that the app holds her accountable as she noticed it to help with "keeping equity in the back of your mind at all times." At this signal, there is an even deeper partition that occurs, one that influences her conclusion that her experiences with racism are individual baggage, something she needs to manage privately:

> I'm vulnerable, which is talking about some of it, talking about where I'm from, from the perspective of the Black woman that I am, so being able to have it more on the forefront helped me do better with other people when I encountered their patterns of inequity. Like I was warmed up. A little less sensitivity may be a little better, just a little better, if you need to be someone else's guy at that moment because when you come up against that, that person needs you to be "their guy," and you don't always want to do that, sometimes you're just frustrated, and you're like I'm in a, "You do your own damn work" kind of mood. Like, "Take a look at who you're kicking out, is there any pattern?" But that's not the work, so you gotta let that go.

Joyce's experience above helps frame the equity app as elevating some form of white European culture over others. That leads to a scenario where racism exists without explicitly invoking the concept of "a cultural-differential racism" (Balibar, 2008, p. 1635). As seen in the app, racism can exist only in the minds of its users, but as Joyce's problem is solved, it comes out as pictures of angry ocean waves superimposed with a red hue. And a caption that reads, "I can do better."

The app subtly guides Joyce's actions to uphold the existing status quo. This guidance is shaped by her desire to maintain a sense of civility within the school setting and during conversations about equity with the district's predominantly white teaching staff. I am exploring a phenomenon termed "whiteness through niceness," which is a form of politeness that hinders the pursuit of racial equity in educational settings where public civility is highly valued (Drake & Rodriguez, 2022). This form of white supremacy operates through mechanisms like color evasiveness and shaping interactions based on the emotional dimensions of whiteness (Annamma et al., 2017; Bonilla-Silva, 2014). It acts as a technology of affective that displaces social matters of racism into the private space of the psyche (Eng, 2010).

Gentrification of Psychic Space

In the guise of promoting racial equity, the app encourages Joyce to focus on personal awareness and self-improvement. It subtly shifts the locus of responsibility for addressing systemic racism from the collective to the individual. By doing so, the app effectively depoliticizes the issue, turning it into a matter of personal growth and self-management. The app's design features, such as character limits and snapshot-style posts, further contribute to this by limiting the scope and depth of conversations around race, thereby reducing them to manageable tasks or missions. The app's insistence on "keeping equity in the back of your mind" further reinforces this by making the struggle against racial inequality a background concern,

something to be managed alongside other daily tasks rather than a pressing systemic issue requiring collective action. This serves to desensitize Joyce from the complex and often painful experience of both witnessing and being the subject of racist actions. As Joyce remarks, “I should be able to control myself better. It's just a matter of trying to deal with it. That's grace. That's poise.”

The equity app detaches our understanding of race from its social, political, and institutional context (Bonilla-Silva, 1999; Omi, & Winant, 2015). Instead of presenting race as a process of internalization, it suggests that race emerges solely from the individual's own perception. Joyce's reaction is not characterized as “hot-headedness” in response to a racist act, one that emotionally resonates with the observed violence and gregariousness. Instead, her reaction is portrayed as something inherent within her—emerging from her identity, vulnerability, history, and experiences, which are not considered factors to contend with. This affective containment is not just an unintended consequence of the app's design; it is a mechanism that actively channels Joyce's energies and focuses on individualized activities promoted by the app.

This process of desensitization and individualization functions to keep Joyce—and others like her—close to systems of domination. It accomplishes this through the affective management of Joyce's experiences, separating her engagement from broader systemic issues. Ahmed has posited that domestication serves as a form of social regulation aimed at making the “foreign” familiar or assimilating what is considered other into the dominant culture or system (Ahmed, 2000). In the context of the equity app Joyce uses, the concept of "domestication" extends the normative as a realm that encapsulates the everyday life of racism. Holland (2012) has noted that

racism, often discussed in terms of discrimination, prejudice, and social structures, also involves a complex interplay of desires, attractions, and repulsions related to race.

In Joyce's case, the app's approach to civility, which presents racial matters as simplified snapshots, uses colors reminiscent of elementary school games, and limits contextual descriptions to mere titles as one might find in a museum, serves to illustrate how the lived experience of racism is confined within the normative social psyche. This confinement is then deflected back onto Joyce, making it appear as if addressing it is her sole responsibility.

The simultaneous production of normative and marginalized subjectivities through the app's design serves to keep Joyce proximal to systems of domination, particularly by affirming the notion that race is a private matter. But the management of Joyce's affect goes beyond civility politics in white spaces, as it becomes something she must reckon with as inside herself. Making Joyce more accountable however, was recognized by her as the equity app helping her to Joyce describes as "rearranging her psychic space." The rearranging her psychic space entails "always in the back of your mind" and affective containment.

In Joyce's context, she participated in a dynamic interplay between the tacit boundaries of acceptable emotions often encapsulated by professionalism (Gulati-Partee & Potapchuk, 2014, p. 27), and her identity as a Black woman, which renders the responsibility to call out injustice. It was not so much her decision to not upload images that would depict segregation in the classroom as there would be legal consequences for capturing images of students in general. Instead, the dilemma resides in the App, reinforcing an individualistic view of equity work in which tools for addressing inequity are reduced to matters of individual resilience.

At this point, the professionalism of the workplace kicks in and reinforces a boundary that distances her ability to engage in discussions about racism in the classroom. Furthermore,

the app's emphasis on tracking shifts in gratitude perceptions and other wellness metrics appears to veil the intricate complexities inherent in systemic inequities, inadvertently nurturing a colorblind approach to equity. In turn, the app, designed to enhance emotional well-being, inadvertently reinforces these boundaries by nudging users towards adhering to a predetermined spectrum of emotions and responses, further constraining opportunities for discussion.

In Joyce's case, this partitioning serves as a civilizing mechanism that repositions stereotypes of “angry black women” into a more socially acceptable framework, thereby reinforcing the existing social order. The partitioning of subjects separates them into various groups or categories. The separation also underscores the self-referential nature of self-tracking. Self-referential refers to two aspects of how data is observed. First, data takes a central role, becoming the primary focus. Second, the data also creates the impression that it is isolated and solely refers to the individual. The relegation of race to the private contours of the psyche presents a gentrification of psychic space. Just as gentrification transforms physical neighborhoods by making them more palatable to middle- and upper-class sensibilities, psychic gentrification operates in the mental and emotional realms to make them more amenable to dominant cultural norms, often white-centric.

In the digital context of the wellness app, this psychic gentrification occurs through the app's features and design elements, which subtly guide users toward a specific set of emotional and mental states. These states are not neutral; they are shaped by the racial and social lines that Ahmed discusses, and they are disciplined by the power structures that Foucault examines. The app, therefore, serves as a tool for psychic gentrification, "cleaning up" the mental landscapes of its users by directing them toward normative emotional states and away from potentially disruptive or challenging thoughts and feelings, such as those related to systemic inequities.

This form of gentrification is deceptive because it purports to advance equity practices. Implicit in this is the often-unspoken expectation that users develop resilience to understand racist actions in the context of inequity. However, the app sanitizes the emotional and mental spaces it inhabits, eliminating any "undesirable elements" that could challenge existing power structures. In doing so, the app disciplines its users into compliant figures and reshapes their mental landscapes to align with dominant norms. In the case of Joyce, this psychic gentrification restricts her capacity to engage with and address the racial dynamics she encounters fully. This, in turn, reinforces norms centered on whiteness that prevail in both the physical and social environments she moves through, an effect that is further magnified by the digital device.

The Unsettled Subject and Self-tracking as Performative Whiteness

In this work, I presented three accounts that explored various mechanisms through which discipline operates that speak to three aspects of the production of the "unsettled subject." The three aspects discussed are regenerative marginality, habitualized duality, and the gentrification of psychic space, each presented within the analysis of a particular case of user experiences with self-tracking. The aim of this chapter was to discuss how self-tracking devices and datafication act as modern tools for extending racial technologies to various types of bodies beyond the traditional means of racialization based on physical appearance. I suggest that technologies of race, such as binarism, hierarchies, and the interpretation of bodies based on surface data, can now be scaled to a broader audience, thus decentralizing racialization. In the following discussion, I review the central claims from each vignette presented and situate the conversation within self-tracking's potential to scale technologies of race. The pervasive use of such devices contributes to a racialized periphery that extends to anyone other than data arbiters, arguing that

they can effectively enforce models of normative whiteness without needing to involve appearance or visible marks of race explicitly.

The allure of self-tracking apps, particularly in health and well-being, often lies in the promise that these technologies will foster "better" habits. A habit is generally a routine behavior or practice, sometimes unconscious, acquired through frequent repetition. Ahmed (2007) extends the concept of habit, describing it as a second skin (p. 155). The formation of habits involves consistently directing the body in specific ways, aided by features like goal setting, feedback, rewards, reminders, and progress monitoring, highlighting opportunities for adjustment.

Self-tracking mechanizes whiteness as a habit by creating a boundary that constricts sense-making to the field of view of the device or app. Making the device the primary point of reference allows for the repeated circulation of normative logic about the body that cultivates a retrospective gaze. By retrospective, I am to bring attention to how the body is placed into a (Eng, 2010), a dialectical image from the past that requires continuous reckoning. The unsettled subject speaks to the potential for automating and manufacturing the white-Other dichotomy. The unsettled subject speaks to how difference is not only manufactured by self-tracking devices but made productive. This form of production is powerful due to the ambiguity of data, which can fragment experiences, bodies, histories, and so on, so that they circulate in multiple forms within singular bodies, reinforced by how individuals inhabit space.

The *unsettled subject* refers to a feedback loop that perpetuates normative behaviors and makes individual differences self-referential. This unsettled state is productive because it stabilizes the relationship between the individual and the state, extending the individual's potential for productivity. In essence, the marginalizing effects of self-tracking reinforce state

power by maintaining a stable link between individuals and the state. This unsettled condition gives the state the variation it needs to define its identity, norms, and expansionary projects.

In this context, differences—organized along axes of inclusion and exclusion—become integrated into the institutional practices extended by these apps. Consequently, these differences are transformed into management techniques that can reinforce existing social hierarchies. The unsettled subject thus becomes a productive form of difference, serving as a resource for perpetuating dominant ideologies. Marginalization is not an accidental byproduct but a manufactured outcome in a production cycle that divides and reforms. Self-tracking is not merely about producing normative subjects; its biopolitical power lies in its ability to create dichotomous arrangements on a continuous, daily basis. The ambiguity of data further empowers this form of production. The ease with which whiteness can extend spatially is amplified when individuals act in ways that displace the labor typically performed by more formal or site-specific institutional practices. Users themselves perform the work of marginalization, either in ways that are anticipated or require anticipation by the device. The device needs to nudge users in specific directions for this marginalization to take root.

The unsettled subject speaks to how self-tracking manufactures differences in social differences. It manufactures differences by creating a white-other binary. This binary of oppositional kinds places the user in a power relation. The way that the white-other binary is created is by forming a dialectical image of the self. The dialectical image of the self is both retrospective and haunting. The real-time updates, programmed nudges, highs and lows quantification aesthetics, and features that enforce a linear timeline present and fix and hold the dialectical image constant. The dialectical returns to the user a retrospective gaze such that the image is always in the past, placed on a linear timeline, no matter if the last image is linear. and

it is always an image of the past. The retrospective gaze and its constancy position the dialectical image as haunting. It is retrospective because the app and the data that it records is always a record of something that occurred. To this end, the user understands themselves through a retrospective gaze, which becomes stable as data is always changing and assumed to be changing in its natural state.

The static snapshot of data users encounter reinforces the stability of the retrospective gaze, a perspective distinct from the presumed dynamism of data. Data is constantly collected and changing, while the past has already occurred and become a fixed entity. However, because data inherently lacks meaning outside of human interpretation, users must draw from their own experiential knowledge, social interactions, and other cues from their lived experiences to imbue the data with significance. In essence, users must look beyond the system to attribute meaning to the data they encounter.

This abundance of different meaning combinations derived from data aligns with Foucault's (1995) notion of the power of "semio-techniques," which speaks to the dialectical image of the self is equally haunting, characterized by a dissonance that arises in various ways (pp. 102). For instance, this dissonance can manifest when the dialectical image is forced into a linear timeline, where the fluidity of experiences is not recognized as something ongoing. This discrepancy can lead to dissonance, as the lived experience is not necessarily relegated to the past, even though the app frames it as such.

Dissonance also occurs by the limited meaning found in data heightened and shadowed by design aesthetics that present graphs or pie charts to users that appear to represent them even though this data is always partial. The hidden partiality of the data creates a dissonance as users must make sense of this perceived wholeness which is at odds with the wholeness of their lived

experience. Dissonance also occurs in the stability of the dialectic as something of the past. When users are presented with their past as "having occurred," it can cause dissonance as sometimes users do not want to change the aspect that the data is emphasizing. In this regard, the dissonance relates to users wanting to keep a connection to the last image not in the sense of memory but rather in the sense of their lived reality. For instance, Mark does not want to consider his mobility as something of the past. Instead, he wants to consider it as something still present, but the self-tracking devices work against this desire by framing it as an unachievable goal. So, the dissonance and stability of the retrospective gaze create the haunting as the haunting rests on trying to reconcile the manufactured dissonance the device has created. It's haunting because it usually remains unresolved as the dichotomy present is arbitrary and manufactured.

In the following chapter, I seek to discuss two alternative designs to the bio-power/other schema that help discuss possibilities for expanding self-tracking design outside of normative systems of governance and control.

CHAPTER 5: DESIGN AS SELF DEFENSE

In the previous chapter, I argued that self-tracking technologies produce differences using manufacturing social marginality in which the design of the applications turns sense-making inward so that users see marginality as a matter of interpellated difference. In this chapter, I analyze how self-tracking technologies orient bodies toward differences in specific ways. My starting point is experiences of disorientation, marked by experiences of dissonance between self-tracked data and the lived experience of users that cannot be reconciled with the self-tracking tool. The proposition of design as self-defense is used to illustrate how experiences of disorientation offer sites for resistant practices to emerge.

This work seeks to contribute to research on design justice (Costanza-Chock, 2018), social justice (Dombrowski et al., 2016; Fox et al., 2016), feminist HCI (Bardzell, 2010), and critical design (Bardzell & Bardzell, 2014). The concept of self-defense relates to various strands of existing scholarship on self-tracking, encompassing terms like empowerment, access, resistance, and subversion. I offer design as self-defense to bring attention to how individuals seek to renegotiate oppressive social structures through engagement with self-tracking. Self-defense as a heuristic for design illustrates how participants engage with and make sense of social differences in socially constructive and material ways and offers a mechanism for which technologies can engage in transformative design.

This chapter is organized as follows. It begins with exploring resistance literature related to self-tracking, focusing on two primary critiques of current scholarship. Two cases illustrate how disorientation offers a site for resistant self-tracking practices. The chapter concludes by connecting the findings of self-defense with formative human-computer interaction research to

emphasize the proactive ways social difference is experienced, negotiated, and contested through self-tracking practices and tools.

Resistance and Subversion of Normative Data Practices

The "Fitbit Vision". Understanding self-trackers resistance and transformative potential has become a robust line of inquiry. Through habitual tracking of behaviors and consumption, self-trackers are positioned as agents that empower individuals so they can attain their desired health states (Bradway et al., 2015; Fotopoulou & O'Riordan, 2017; Pantzar & Ruckenstein, 2015). Derivatives of this narrative have been aimed at specific populations, from those concerned with or at risk of diabetes (Bennett et al., 2018; De Vries et al., 2016) to the general notion of a patient becoming an expert and advocate for personalized care that resists the traditional structures of medical practice (Swan, 2009). Self-tracking devices have even been positioned as a form of financial empowerment that enables health insurance consumers to take control of the cost of their premiums (Charitsis, 2019). The positioning of self-tracking devices is essential, as Lupton (2013), for "data utopian discourse on the possibilities and potential of big data, metricisation and algorithmic calculation for healthcare" (Fotopoulou & O'Riordan, 2017, p. 14). In this world, wearables are linked to imaginaries, where self-monitoring provides citizens with agency and control (Paton et al., 2012).

A common criticism of self-tracking is that these devices act as a disciplinary mechanism that regulates and manages the body and fuels the biopolitics of neoliberalism. It is a form of market-driven logic with which individuals voluntarily engage in the surveillance and quantification of their bodies. However, recent scholarship indicates that users' behaviors and responses to data collection and analysis are not as straightforward as one might assume as they navigate between compliance and resistance in their interactions with these practices (Esmonde,

2020, p. 82). These works suggest that the relationship between self-tracking and individual agency is more complex than initially perceived, as users are observed engaging in alternative practices.

As data-driven surveillance becomes more pervasive in society, the focus on resistance in scholarly work signals a positive development. Scholars critical of the big data practices that normalize surveillance of the self have sought to conceptualize resistant tracking as pushing against the fixity of computational categorizations and data collection. Researchers in this space have argued for a refusal to the tracking of data about the body (Moore & Robinson, 2016). Work on the subversive potentials of self-tracking include critical data projects that track the commercialization of personal genetic information to the creation of biohacking products to push against "genetic policing" (Mularoni, 2021, p. 2). Most notable is the work of Nafus and Sherman (2014) who propose the practices within the Quantified Self movement constitute a crucial form of resistance against dominant datafication approaches, which they term "soft resistance" (p. 1785). Soft resistance brings attention to how Quantified Self participants make deliberate decisions about what data they collect, analyze it, and what it means to them, frequently modifying the data and practices to gather it based on idiosyncratic shifts in priorities and objectives. This form of resistance is not outright or absolute but rather partial, nuanced, and continually shifting, which challenges the totality of big data practices.

Scholarship on resistance has offered hope in understanding strategies or means through which individuals can safeguard their personal autonomy, privacy, and humanity in the face of the prevailing dominance of data-driven modes of production and comprehension of the world. Nonetheless, within this literature, two primary criticisms circulate, which will be addressed in the subsequent section.

Privileging The Self

The first critique concerns an over-representation of the Quantified Self movement. Most works on resistance (especially in the beginning) have considered the practices of this group. While existing scholarship on resistance has made significant contributions to comprehending the potential and community dynamics of the Quantified Self, findings are frequently generalized in a manner that might be misapplied to the broader population of self-trackers (Hepp et al., 2021; Pink & Fors, 2017). The Quantified Self has been vocal in producing spaces that support and encourage alternative data activities since its formation in 2007 (Wolf, 2010). The QS community tends to be homogeneous, predominantly consisting of middle-class white males in their 20s and 30s (Lee, 2014), and is not representative of the general population that uses technologies for self-tracking (Pew, 2013; Ruckenstein, 2014).

When the Quantified Self-movement is assumed as a standard or general signifier (e.g., Barta & Neff, 2016; Lupton, 2016; Neff & Nafus, 2016), it serves as a constraint to the potential and shape in which resistance can emerge. Researchers have found that QS practices have been difficult to integrate into different settings and social groups. For example, Lee and Briggs to explore whether the practices of the QS community could be adapted to different demographics and backgrounds. In a study involving several high-school-aged Latina girls over a five-week workshop, Lee and Briggs (2014) have detailed how principal assumptions underlying these devices like behavior change, is a privilege that speak to socioeconomic disparities inherent in the design of these technologies (Charitsis, 2019). When the basic assumption of tracking is violated such as a user not being able to adjust routines based on data, then the potential for resistance could very well look different than the characteristics that Nafus and Sherman (2014) describe.

Its strict enforcement of personal experiences and the hyper-focus on individualism echo principles underlie the Quantified Self ethos, which emphasizes personal experience, individual control, and technological mediation (Natarajan, 2016). These concepts have historically been aligned with and favored by cultures dominated by white individuals. These intrinsic values within the Quantified Self might foster and reinforce an environment that primarily accommodates and benefits white users, thus perpetuating a pattern of whiteness (Natarajan, 2016). The demographic of Quantified Self participants reflects the racial disparities among technologist workers nationally and a broader socioeconomic division regarding who has the resources to purchase and use such devices (Pew, 2013).

It would be difficult to deny the Quantified Self-movement's influence on discussions of the resistant potentials of self-tracking technologies. At the core of the Quantified Self ethos is a fixation on personal experience, a pattern easily traced in scholarship on self-tracking. As Nafus and Sherman (2014) acknowledge, the movement remains entangled in the broader biopolitical operations of late capitalism that depends on individualism that positions consumption as the dominant mode of expression, which conceals societal and system inequalities by presenting them as individual choices. Presenting all actions as personal “choices” frequently ignores the deeper structural inequalities shaped by broader societal influences (Lupton, 2013).

Everyday Resistance

Within critical digital health studies, scholars have cautioned against bounding resistance to a locus of the individual. In turn, they suggest that cultivating a “resistance sensibility” is essential to counter the normative aspects of these devices (Fox, 2017, p. 146). This perspective reframes resistance as an everyday practice integrated into mundane activities, making acts like disuse, misuse, and removal a form of diffuse yet collective activism. Episodic use and

discontinuance of self-tracking technologies are recognized as significant patterns. Often, abandonment is considered a failure, signifying the lack of ability of a user to follow through with their goals or adhere to a program or a problem that requires a technical solution (Gorm & Shklovski, 2019). However, scholars find that people intentionally regulate the use of their devices as a form of stress management (Wilcockson et al., 2019). Others have found users are actively denying the device's influence on data tracking by prioritizing their memory over the device's reasoning (Esmonde, 2020).

Scholars of sociotechnical systems have encouraged a critical understanding of how individuals think through their digital encounters with data in embodied, enacted, and articulated ways, which beckons a theoretical reorientation regarding how we recognize boundaries and borders within these systems (Bode & Kristensen, 2015; Dourish, 2003). For example, Gorm and Schklovski (2019) have shown that Mol's framework of care and choice can be effectively applied to demonstrate how episodic use helps users maintain positive experiences and a sense of control. They argue that viewing abandonment of tracking as a failure pacifies the agency of users and limits the potential field with which we recognize resistance to arise. Moore and Robinson (2016) have discussed how acts of removal can produce new theoretical avenues that afford inquiry into the resonance and interpellation of self-tracking practices even when not in use.

While these works have done well in theoretically charging us beyond the dichotomy of discipline and control, they continue to reside within the observation of the individual (Ball & Wilson, 2000), which circumvents addressing underlying structural issues affecting health (Lupton, 1995). A reframing of resistance as an everyday practice, one that is woven into the fabric of the everyday, mundane, and quiet, refers to things or actions that are not necessarily

extraordinary. Everyday resistance is ordinary; it is part of everyday life, carried out by regular individuals in their normal routines or interactions rather than through grand or dramatic actions (Scott, 1986). Everyday resistance can involve small, subtle, or hidden acts of defiance or opposition aimed at "pushing back" or "putting in place" dominant norms and systems.

Under this perspective, I consider works of disuse, misuse, and removal (Homewood et al., 2020) as everyday resistance. Both episodic use and discontinuance of self-tracking have long been regarded as a primary barrier to self-tracking's empowering and positive potential. As such, people who intentionally disrupt their use of self-tracking can be considered a method of self-defense from the normative or anxiety-provoking pressure these devices carry. For instance, disrupting, halting, and misusing devices is a way for users to engage in "digital detox" (Wilcockson, 2019), or subverting the surveillance of worksite wellness programs (Whitson, 2015), and denying the device agency in the data tracked by prioritizing memory over the reasoning of the device and data (Esmonde, 2020) can be indicative of organic strategies of everyday resistance. As Gorm and Schklovski (2019) have suggested, a significant portion of this research perceives individuals discontinuing their tracking as a failure, attributing it to either a lack of internal motivation or the device design and caution against myopia that defaults to technological solutions or individual deficits. These everyday acts of resistance provide an illustration of how designers might interact with and participate in this practice of collective resistance, engaging with the users of their devices in ways that may lead to more substantial structural change.

In the following section, I discuss how everyday resistance is an opportunity to link individual resistant practices with the actors enforcing dominant structures. Stated concretely, design as self-defense offers technologists a way to engage with the resistant practices of

individuals and reorient the goals of technological design so to face a direction of social transformation. As a communication device, the heuristic of design as self-defense can be offered as a common ground, in which deviance is welcomed as an opportunity for engagement.

Self-Defense as a Heuristic for Design

In Martha McCaughey's ethnographic work on women's self-defense courses, she demonstrates how self-defense performs an embodied enactment of counter-discourse, one that reshapes the boundaries of womanhood to include typically male characteristics such as strength, aggression, anger, and protection (McCaughey, 1997). Influenced by McCaughey's interpretation, namely, the relational aspect of self-defense as inclusive of the self as well as structural pressures, I consider the lens of design as self-defense as an opportunity to engage with the lived experience of self-tracking and to discuss how the design of self-tracking practices and tools are incorporated into enactments of embodied counter-discourse that can work against marginalizing designs. Through thinking of design as self-defense, I seek strategies for engaging and designing tools for human-computer interaction.

Within this research, participants often declared that they had "no goals" or were not focused on changing but "staying the same." These declarations resonated more greatly than any predefined norm or ideal amplified by their devices. Forms of modified use often extended beyond the tracking device system as well from purposefully not having a weight scale at home to unplugging and turning off electronic devices before bed. These actions were always joined with a story. Participants recounted memories of stigma related to their gender, age, weight, and ability. Others shared stories about social alienation related to being home-schooled, being the "black sheep" of the family, and being an immigrant, in which their tracking tools aided their acceptance into various social groups from being a woman, injured or aging, to being an

immigrant or a person with chronic illness. about means to be various kinds of people, from defending against stereotypes about being an immigrant to defending against normative body standards, aging, and ableism. Participants also spoke about their relationship with their devices, sharing various tactics for "putting technology in its place," from refusing to wear their activity tracker on certain days to comparing it to "having to walk the dog."

Over time, I understood these small acts as self-defense, with their tracking tools playing various roles. Self-defense is an actor's category, meaning that it was supplied by the study participants, not through engagement with extant theory. Participants would describe their habits as protection, defense, survival, and existence. These terms activated their stories and helped maintain their agency while recounting them. At times, the self-tracking tool was the antagonist, but trackers played valuable allies in other instances. These acts of self-defense were ways participants asserted agency, protected their autonomy, and safeguarded themselves from external pressures. Significantly, participant stories of self-defense consistently extended beyond the individual. These were more than stories about quelling anxiety or wanting to feel in control. As participants recounted moments of self-defense, their stories were woven with a discussion of social norms, bigotry, privilege, surveillance capitalism, and oppression.

In their research on digital voice assistants Alač et al. (2020) demonstrate how these technologies are intentionally "incomplete," relying on user participation for functionality. Similarly, self-tracking also falls under the "incomplete" technology category, requiring human interactions to fulfill its purpose. Accounts of self-defense illustrate this incompleteness as a locus of resistance, serving as a platform for the emergence of resistance. The incompleteness of self-tracking devices serves as a gateway for shaping their usage. The incompleteness of self-tracking technologies also helps illustrate how self-tracking is a discursive agent. Works on the

discursivity of self-tracking have primarily focused on how institutional narratives are distributed, circulated, and reified via various media texts and designs of these devices (Fotopoulou & O'Riordan, 2017), that addresses the "many-to-one" communication architecture that makes the device biopolitically productive. Orientating toward self-defense can help us address a "many to many" as it gestures to building a more conscious language. As a design heuristic, self-defense may help break from the dominant binary aesthetic of quantification (e.g., high/low; good/bad) that is all too often transcribed onto positions of individual bodies. And encourage the development of a collective resistance mindset. When equipped with tools to protect themselves, individuals are more likely to share knowledge and strategies with others, fostering a broader resistance movement.

Further, design as self-defense may promote a shift in societal norms. As more individuals embrace and adopt resistant practices, it challenges the status quo and pressures larger structures to adapt or respond to these changing behaviors. Such as heuristic can encourage individuals to advocate for their rights and privacy. By becoming more conscious of the potential risks and vulnerabilities, individuals may seek to influence policy changes or demand greater accountability from institutions. Lastly, larger structural forces may be exposed or challenged through self-defense-oriented design. Realizing that individuals actively counter intrusive practices can create public awareness and prompt discussions about the need for more transparent and ethical systems.

Case Selection and Organization

I present two cases from this research to articulate how design as self-defense emerges from moments of digital dysmetria. Two forms of self-defense are highlighted. The first form addresses anticipatory design as a form of self-defense. It follows one individual through the

design of an augmented reality/self-tracking tool to assist in defense against everyday racism. The second case addresses reciprocal design as a form of self-defense. It follows the emergent design of a self-tracking tool. This tool considers hormonal fluctuations experienced by women across their menstrual cycle. It treats these fluctuations as a guiding practice for creative action rather than a function of managing health or monitoring their bodies for purposes of fertility. These cases were selected because each expresses the nuanced forms of self-defense I observed throughout participant accounts of their self-tracking experiences.

Each case is loosely organized based on the stages of the participant's design process. I begin with a description of the self-tracking tool that each is designing. Subsequently, I adopt a retrospective approach and elucidate the individual "origin story" of each participant, detailing their journey that led them to recognize the necessity of design as self-defense. Within each case I delineate the participants' involvement in processes of sense-making, wherein they not only reflect upon being disoriented by current tools, but also the realization to create something new as motivated by a need to defend against social forces. I then discuss how their experiences influenced the identification of crucial design features for their self-tracking tools, thereby embodying the attributes of design as self-defense.

The selection of the two cases under discussion was based on their ability to encapsulate numerous nuances that are dispersed throughout the participant accounts in this research. These narratives contribute to the discussion that complicates the prevailing narrative suggesting people engage in self-tracking primarily to enhance themselves. These case studies help to revoke the notion that there is a universal user that aids in a more nuanced understanding of how collaborative systems emerge, highlighting diverse and multifaceted perspectives.

As the reader engages in seeking to understand the following cases, imagine self-defense like an everyday person inventing personal practices and strategies to protect from being exploited by ubiquitous data collection. And to consider how the common consumer can find ways to manipulate the boundaries enforced by technoscientific endeavors.

Case 1: Designing "Out" as Anticipatory Design

The following case presents the anticipatory design logic of Jordan. Anticipatory design offers a nuanced alternative to traditional self-tracking technologies, particularly in how it engages with the concept of sense-making. While traditional self-tracking often confines sense-making upon the individual body, anticipatory design is about social interactions. Significantly, anticipatory design moves the site of struggle away from the individual body, offering a more liberating technological interface that challenges the often marginalizing frameworks imposed by society.

Navigating Dissonance

Jordan founded Human-iT-E (pronounced, *humanity*), which designs immersive experiences based on self-tracking data and analytics. Jordan is currently engaging in a self-tracking project directed at designing of an augmented reality system that will coach users in how to develop empathy and cultural agility. Using remote sensors and physiological and mood-aware technologies, *Quantify the Black Experience* aims to detect real-time feedback regarding the physiological experience of racism. This data will then be used to produce measures, models, and predictions that offer suggestions for measuring an individual's level of cultural agility (their ability to engage with various cultures in a non-harmful way), in which cultural bias is not considered an individual phenomenon, but a collective struggle.

When asked how Jordan arrived at self-tracking, he described an experience with a microaggression. Microaggressions are the ordinary acts of prejudice minority bodies encounter daily, such as asking an Asian-presenting person if they speak "Chinese." The microaggression Jordan experienced was having the police called on him during an appointment with his university's financial aid officer. Financial aid offices are standard at universities in the United States. These offices act as facilitators of student loans, which many students rely on to pay for the cost of higher education. Jordan shared how the financial aid officer filed a report with the police, who then "went on to treat me like a criminal," sending him "harassing emails" and ultimately putting him "in an interrogation room, trying to get me to admit to something that I didn't do." This experience prevented Jordan from consolidating his student loans, which snowballed into several other constraints, such as being unable to obtain financial aid. Consequently, he was forced to withdraw enrollment from the university and was risking homelessness.

As our conversation unfolded, he shared his perspective on the situation, framing it as a challenge: "These [police] are individuals in positions of perceived power. How can I make them understand it was a threatening incident for me? How can I address that microaggression aimed at silencing me?" Jordan was caught in a disorienting duality: on one hand, he understands his emotional responses as rational, grounded in his lived experience; on the other hand, he is confronted with external judgments that label him as irrational. This tension is not merely a personal struggle; it reflects racialized perceptions and the imposition of normative white standards on Black bodies and minds. The term "irrational" here serves as a coded language that aligns with normative white standards, which often equate rationality with emotional restraint, stoicism, or a particular form of articulateness that is rooted in Eurocentric values (Bonilla-Silva,

2014; Fanon, 1952; DiAngelo, 2018; Hall, 1997). By labeling Jordan as irrational and a threat, he was being scripted to reinforce a racialized dichotomy where whiteness is associated with rationality, control, and normativity. This dichotomy not only marginalizes Jordan but also upholds the centrality of whiteness as the norm against which others are judged.

This experience influenced the self-tracking device that Jordan wanted to design and prototype. At the core of Jordan's project was reversing the double-consciousness experienced when traversing various social spaces. Du Bois (1994) characterizes double consciousness as a "sense of always looking at oneself through the eyes of others" (p. 3). It is the internalized self-questioning and self-disparagement that arises from the prejudices of white society that fragment Black identity. His goal centered on making visible the violence caused by these interactions that marked the body and mind. Through this process, he developed a grander design for a self-tracking device that would later be the foundation for an augmented reality wearable. Jordan's experience of his "two-ness," as he referred to it, was the virtual body he imagined creating with his augmented reality/tracking system. Broadly speaking, Jordan imagined a device that would deflect the microaggression back upon the person enacting it, details which I will explain below.

Isolating Microaggressions Through Anticipatory Strategies

Jordan's familiarity with double consciousness laid the foundation for the virtual reality tracking device he designed. Having an intimate understanding of double consciousness, Jordan wanted to relieve that labor and that stress on his body and use it as an intervention that would not only shield him from the racist engagement but would hopefully encourage the building of awareness by the aggressor. Jordan started to burgeon an anticipatory orientation to his design work, in contrast to standard self-tracking practices that seek pre-determined goals and outcomes. For Jordan, he was unsure how a microaggression would arise or when or where it

would take shape, but he knew he could capture it with changes in his physiology. As he described reflecting on the consistency of physiological responses to stress:

> I was constantly thinking of possible scenarios" like, I can't afford to get on the bus, and I don't know if the bus driver will let me on the bus so I should leave at least two hours early, this way if the first bus driver says no, then he would still have time to walk. Stating: "When you do that about everything, well then suddenly, you get really good at anticipating and understanding people's biases.

Jordan's experiences of double consciousness present an anticipatory orientation that comes with many intersections of speculative and reflective thinking; from poverty to racial ambiguity, to education, to the technoscientific imaginary of rationality, objectivity, and truth that engenders data with performative agency, and, at times, seemingly more agency than he experiences when using only his voice. For example, in one statement, he affirms his known/lived view, as well as the imposed belief, then suggests a means in which to synthesize the two via reliance on the mythology of data stating:

> I'm very self-aware, but I don't have the proof. I have my words. But if I can use data visualization in real-time and show you that your ignorance has this effect, then I can say, "Look, when you yell at me like that, it increases my likelihood by like 34% to become depressed. Do you mind not doing that? Like, let's not keep debating this. So when we say this emotion AI is doing this algorithm, well, most people don't understand what the fuck that means; they just know what artificial intelligence is and trust it. Because it's a phone, right? I trust my phone. Most people don't know why a calculator works, but it works, so if I told you 6 + 6 is 12, and you type it in, and it's 13, people would write 13 because they trust the calculator more than me.

Anticipation was also expressed in the burden of emotional labor and the struggle to claim that his worldview is credible:

> That's where people don't get it, that I've always been this person, so it's unhealthy for me to be in environments where people aren't emotionally intelligent or that lack the capacity for empathy because it's toxic. It's unhealthy because I'm constantly fighting battles I should not have to fight.

With this reflection, Jordan identifies more aspects of his struggle that emphasize the influence of past experiences on his value claims about how he should be able to live in the present as one where he should not have to engage in this burden.

More generally, proximity was reflexively understood as a factor in determining the threat. Understanding the relational aspect of how the threat was perceived (both the aggression upon Jordan as well as a perceived threat by the aggressor) about the proximity of his body was understood as significant in the decision to create an immersive augmented reality system. In his foundational work on blackness, Fanon explores the concept of the positionality of the Black body, stating that those with privilege are the ones who can construct time (e.g., ideologies of progression). In contrast, those who are oppressed merely sit in space (Fanon, 1967). Sharon Holland expands on the quality of time and space in her work on the dependency between dominant and subordinate groups; she addresses how acts of racism are social encounters between aggressor and aggressed, these moments situate those in privilege in time and those aggressed and merely "taking up space." Still, there is potential here to shift the order of things (Holland, 2012). Through Jordan's anticipatory orientation and goal of displacement of his lived experience into his augmented reality system, he asserts agency over time, a means of moving the subjective experience of anticipation attached to the bodies of subordinate identities to those

of the dominant group. In this gesture, Jordan's means of anticipatory self-defense seeks to make an "affront to the order of things" as it gives agency over his experience of time.

Anticipatory Design as Self-Defense

Jordan's experience illuminates how racialized others often live in an anticipatory space, where actions are not merely actions but reactions to various impositions. In this sense, the world becomes a space where one must constantly anticipate and navigate microaggressions and societal judgments. Anticipatory orientations made way for the logic of Jordan's design by identifying components needed to provide him with a sense of personal safety and freedom. Aspects of the threat of proximity manifested in design concepts of opacity and disembodiment, "technological speech acts," and data mythologies, all of which acted as a kind of techno-based codeswitching that emerged as a practice of anticipatory design as self-defense. In Jordan's case, the self-tracking technology he imagined is one where the interface and the mediation act as a refractive shield that sends the gaze towards the source of external impositions and judgments. This inversion disrupts the conventional flow of power relations, challenging the normative beliefs that can enforce marginalization.

For instance, Jordan speaks of algorithmic opacity as a feature of privilege that he would like to integrate into his design, saying that his project is not sharing with the world his reality through his eyes; instead, it's about constructing a world in which others can be accountable for everyday acts of racism. Jordan describes the imagined interaction users will have when engaging with this quantified self-experience, this virtual world he's made of his self-tracking data:

> Yes, we're going to tell you we measure your implicit bias, your level of cultural agility. But the algorithm, we're not going to tell you how the algorithm works. We don't care

> about what everyone else is feeling because we're helping you increase your data literacy, your human literacy, and your psychological literacy; we're entering your biometrics, and we're showing you what we're doing to you, which is helping you evolve in your capacity for empathy and consciousness.

The experience being designed is not about perspective taking or ‘putting yourself in one's shoes,’ which, as known by Jordan through lived experience, would risk affirming a dominant gaze that looks upon the Black body and imposed perspective as colonial ideologies might imagine. Instead, he's engaging the user in strategies of their own modes of dominance. This design incorporates elements like opacity and disembodiment to protect his identity, effectively serving as a digital shield against the historical over-surveillance of Black bodies. Equally noteworthy is Jordan's caution against appropriation. His virtual environment is not an open invitation for others to “steal his face” or appropriate his lived experience; rather, it's a carefully crafted space that centers his own experience of blackness. This nuance is crucial, as it allows Jordan to educate others about the harms of privilege without subjecting himself to the emotional labor typically involved in such educational endeavors. His design thus achieves a delicate balance: it provides a platform for challenging normative white standards while also offering him a sense of personal safety and freedom. In doing so, Jordan's approach subverts the external gaze that often marginalizes Black bodies, turning it into an opportunity for education and self-affirmation without compromising his emotional well-being.

Using anticipatory design as a form of self-defense, Jordan effectively eliminates a common avenue for race-based microaggressions, which often hinge on encounters with the Other. He achieves this by increasing proximity to access through "measurements, models, and predictions." In doing so, he engages in what can be termed as “technological codeswitching,”

aimed at fostering positive racial interactions without placing an emotional or physical burden on himself. In other words, this anticipatory orientation serves as a self-defense mechanism by shifting the locus of struggle away from Jordan's body, thereby imbuing his design framework with liberating potential.

Case 2: Reciprocal Design and Recognizing Social History

Ms. X is the founder and CEO of a company specializing in a unique, neuroscience-informed fertility awareness method. Her story offers a critique of menstrual cycle-tracking apps that centers on their design limitations, mainly the narrow focus on reproductive functions (Hamper, 2020). This reproductive-centric approach has drawn scholarly criticism for not only limiting the understanding of women's health but also perpetuating a historical reductionism. Such a perspective has traditionally restricted women's well-being to their reproductive capabilities. Reciprocity, in the following, refers to a design orientation focused on expanded feedback mechanisms and cyclical conceptions of time rather than the linear goal setting common in self-tracking apps.

Navigating Cultural Disaffection

Like Jordan, Ms. X's arrival to self-tracking and design began with an experience of incongruence, which she described occurring over the course of many years. Her method of reciprocal design emerged as a necessity for addressing several enforcing factors that perpetuated the reductionism of her health and liveliness. Namely, gendered expectations at work that were exacerbated by the assumed male audience of performance books and consumer health techs.

Her story began with a major life change. In her late30s, Ms. X., had worked in the creative industry for several years designing various campaigns for companies. There is a notable gender imbalance in this industry, particularly in leadership roles and creative departments. As

Ms. X remarks, “the culture hadn’t changed yet.” Not only does the male-dominated leadership present implications for how products are marketed, and which narratives are prioritized (Eisend, 2010), but the workspace operates within a set of norms, values, and expectations that were implicitly coded as masculine.

She found the emphasis on stamina and competition particularly striking. The length of the workday could vary significantly, depending on the team's position within the production cycle, often resulting in extended hours. Projects inherently included the expectation of participation during crunch time, which frequently entailed intense work and high-stress situations as deadlines approached. During these periods, employees were expected to work extended hours, including nights and weekends, to complete projects, finalize campaigns, or meet client expectations. The term crunch time is often used to describe the heightened activity and urgency that arises in the final stages before a campaign launch or a major presentation. It essentially represents a crisis of labor, in which management designs high production periods into the development process to exploit worker capital (Harvey, 2006).

For Ms. X, the production experience was exacerbated by the need to constantly create ideas, as she remarked, “Working on at a creative agency but being stressed the fuck out.” Should find herself confined to her desk for over 10 hours a day. As she shared, she felt an almost palpable force pushing her from behind, “tearing through my skin, and my body, and my sinuous, and everything, propelling me forward no matter what.” She continued describing a profound disconnection, “a competitive high-pressure career that did not acknowledge ovarian rhythm, or even biology. It only acknowledged economic drive.”

For Ms. X, the growing cultural disaffection suggested that the feelings of disconnection or disembodiment are part of a larger structure that reflects the tensions between Ms. X's desire

to sustain her creative abilities in the face of dominant cultural norms that prioritize economic gain, exploitive work practices, and development at the expense of embodied experience. The demands of project-based work not only created instability but required constant adaptability, requirements that were incongruent with the rhythms that fueled her creativity. Her body began to send unmistakable signals.

She described it as “constantly talking” and “constantly screaming,” a relentless internal dialogue that told her, “This isn't right. This isn't healthy.” So Ms. X sought support structures, but there was a lack of social support, which often led her to the self-help book aisle. However, she found that the available literature on productivity was often tailored for an assumed male audience, as she shared, “I read books on performance, and it just talks about, “If I had a male body,” that would be like 100. That would be right on, but I don't have a male body.”

Ms. X’s growing sense of alienation from her work environment was also scaled to feelings in her body. She was experiencing a corrosion of character and felt more unstable. As she contextualized: “There was no alternative to that constant linear line pushing you forward, that constant freight. Forward, forward, forward. With no sense of stop, no sense of space. It's just constant 24/7. It's really how our society is designed.” In this moment of reflection, Ms. X realized that her work environment was not just unsustainable. With her body constantly “screaming,” It was as if her body was rebelling against a life that had become increasingly discordant with her natural cycles. This realization was a turning point, a moment of reckoning that led her to question the structures that had brought her to this state of imbalance. It was a call to return to a more embodied way of being. Aware that she was struggling with adrenal fatigue, Ms. X realized her job was unsustainable. With no structures to support her, she left to pursue

her creative endeavors elsewhere, as she said, “I went off to be a woman that howls at the moon.”

Reframing Women’s Ability in a Culture of Disposal

Throughout the years, Ms. X honed her design process through numerous iterations, but two key themes remained consistent. The first concerned her goal. She understood her creative process as intertwined with the fluctuations of her hormones over the course of her menstrual cycle. As she remarked:

> Ovaries are for more than just babies. I'm using my fertility to predict when I'm most likely to conceive a thought that could potentially fuel the next 10 years of my life because it's a high-value thought. Whether Ms. X is 14 years old or Ms. X is 50. I want to understand my fertility over my lifespan because it helps me make decisions about how to take care of my health better.

However, when she began self-tracking, she could only sense this to be the case. She said, “I could feel it,” but I “didn’t have a model or words for it.” The attunement to her body is rooted in her history of dance. Since she was a child, she has danced in some capacity. Now that she had quit her advertisement position she was dancing professionally. Her body was her “tool” it was the beacon for her understanding when things were aligned or in dissonance.

The second theme that remained consistent was her awareness of how society devalues women's bodies as they age. She observed this in various social settings: “Culture wants to tell you that something is wrong with you when you're 40, and you're a woman, and you're not married.” She also faced this stigma within her own family, noting, “Every time I go home, my family members call me a spinster, or people say, Oh no, you're single! You must not be serious about a relationship.” The feeling of cultural devaluation extended to her experience with

healthcare. She expressed frustration, saying, “When you turn 40, you fall off the map with healthcare. You just do. It's like, Alright, honey, we'll see you when you get into the Mary Perry menopause.”

The period trackers were often focused on reproduction or physical performance-based measurements. Frustrated, she recalled: “I wasn’t trying to get pregnant or avoid pregnancy, and I have regular cycles, so I wasn’t interested in tracking symptoms.” In focusing solely on reproduction, fertility apps perpetuate a patriarchal narrative that equates the value of a woman's body primarily with her ability to procreate. This over-corporealization of women’s bodies limits how we understand their potential (Ball, 2005). She emphasized that she doesn't want her “power to become just empty...where it's on the outside.” Instead, she seeks "a fullness, a succulence, and a vibrancy.” Asserting, “You have to be sovereign to combat what society wants to say about you.”

Much like her experience in the work environment, Ms. X found these devices overly focused on linearity, which she interpreted as a form of control. She stated, "It's the people who think in linear terms who want to control and dominate. You can't dominate an iterative, generative, fractal process." This clash with the concept of linear time, or “calendar clocks,” as she termed it, is deeply rooted in her background in dance. She understands that her “body experiences time” in a different way. The importance of embodiment became particularly evident when she confronted the cultural narratives about aging. To this end, creating her own methods for data collection became important.

Reciprocal Design as Self-Defense

Ms. X noted that her motivations were removed from "Quantified Selfing," as she put it, "I was looking to survive," she says, her voice tinged with frustration and resolve, further explaining:

> I needed a system and structure that actually supported me. A radical way to say, 'I'm going to be better anyway, and I'm going to find my way through anyway.' Even when our society isn't acknowledging us as well as it could be.

But Ms. X was at a crossroads. She had limited resources. Her "husband" had been her career. She was not from money; she was not an EC or have a huge bank account. She said, "I was a woman in the wilderness." And she quite literally turned to nature for inspiration. She tracked her data on paper, kept journals, made drawings and diagrams, and started to chart the seasons onto levels of her hormones. After tracking 82 period cycles and observing the same tree for eight seasons, Ms. X began to see a pattern. "The tool I found was grounding, mirrored, iterative, circular, to repeating time." She continued for seven years before she could articulate the feeling she had felt for so long. She could feel her hormonal levels with her creative moments. Through this extended period of self-study, she identified nine distinct stages of creativity that correspond with three specific phases of the fertility cycle.

Reciprocity can be thought of as a process of moving from and to. Within patriarchal structures, the needs of the dominant group transfer to the subordinate group in a reinforcing nature. Ms. X is aware of the cultural imposition of a patriarchal society that positions her body as a site of exchange and imposes oppressive reciprocity. She expresses this in when describing her experiences of misalignment when trying out consumer-available fertility tracking tools to expressions of frustration with cultural expectations of aging and womanhood, to the

contextualization of her design as defending against cultural impositions that reduce the value of women: “Knowing my body's data has been the one thing that has always given me sovereignty and giving me a presence and power in the face of people saying, whatever people say.”

A reciprocal orientation was a means for Ms. X to engage in embodied practices of decoding patriarchal narratives of what constitutes a woman’s value. The ability to look at different models and label, form, and organize categories as expressive of her embodied knowledge reflects a form of defense against hegemonic narratives that position the value of women upon procreation. In this sense, Ms. X's engagement with self-tracking opened a means to challenge the dominant narrative so that she could “practice in reaching my potential and becoming a fully evolved human being who beat the odds.” In doing so, she places limits on the access that dominant narratives of women's health have upon women, affirming that her ovarian cycles are not just about reproduction and that creativity is not just for men with muses, asserting:

> I'm entering the fall equinox of my life, and I want *the right* [speaker emphasis] to observe that. Why would I deny my body that experience just because the culture says these things about what I should look like or what it means to be still valuable? Fuck that. I'm going to defy.

In this passage, the quote highlights how Ms. X's engagement with self-tracking enables her to actively challenge and resist patriarchal narratives that dictate a woman's value based solely on her ability to procreate. She counters this dominant narrative by using self-tracking to explore different models and categorizations, reflecting her own embodied knowledge. This process enables her to assert her worth beyond traditional gender expectations. By refusing to accept that her ovarian cycles are solely linked to reproduction and that creativity is reserved for men with

muses, Ms. X empowers herself to assert her individuality and challenge societal norms. She insists on the right to observe and experience the changes in her body as she ages, even in the face of cultural pressures that dictate how she should appear or what constitutes her value. In essence, she rejects these constraints and embraces the opportunity to defy them, emphasizing her agency and autonomy.

Ms. X's journey exemplifies the power of reciprocal design, an approach that empowers individuals to engage with technology to challenge and redefine her role as a woman in society. Through self-tracking, she not only deciphers her own bodily experiences but also takes a stand against deeply ingrained patriarchal narratives that have historically limited women's worth to their reproductive capabilities. This form of reciprocal design serves as a beacon of agency and autonomy, allowing Ms. X to reclaim her narrative and assert her value beyond traditional gender roles. Her story resonates as an inspiration to those seeking to challenge societal norms, highlighting the transformative potential of technology when wielded as a tool for empowerment and self-expression. In the academic exploration of self-tracking and its impact on gender narratives, Ms. X's unique approach offers a compelling perspective on how individuals can actively shape technology to redefine their identities and values, ultimately contributing to a more inclusive and diverse discourse on gender and self-expression.

Design as Self-Defense

In this chapter, I identified design as self-defense, which attempts to describe the development of digital tools and/or practices used to renegotiate marginality and social difference. In Case 1, I shared a self-tracking project about quantifying the Black experience that questions normative assumptions of wellness at the intersection of racism. In Case 2, I shared a self-tracking project about fertility data, creativity, and innovation that critiques male privilege in

understanding women's health and performance. I conceptualize two forms of design self-defense from these cases: anticipatory and reciprocal. I consider anticipatory self-defense as referring to embedded agility within design systems that critiques the neutralization of privilege in design (e.g., Case 1 renegotiates the dominant gaze upon the Black body). I consider reciprocal self-defense as referring to the use of digital tools/practices by an individual who is consciously interacting with these tools as a matter of renegotiating the oppression experienced from marginalizing categories of difference (e.g., Case 2 reorienting the value of womanhood outside patriarchal logics of fertility).

There are several ways that design as self-defense can aid in improving how to approach self-tracking technologies. Design as self-defense is a term that puts agency, action, and artistry in the hands of all actors. Rather than looking at design as a practice performed by dominant groups for the betterment of those in the margins, design as self-defense recognizes the proactive work performed by those labeled as oppressed to liberate and critique oppressive structures enabled by sociotechnical systems. These works, taken together, indicate a need to think across scales about how design is developed for adversity, adjustment, and adaptation by marginalized individuals and groups. To appropriate Fox et al.'s (2015) orientation, design as self-defense is a means for individuals to "hack culture." These works emphasize attention to local or situated knowledge necessary for the design of anti-oppressive structures and for building narratives, not of victimhood but solidarity and the emergence of collective power.

Design as self-defense contains significant promissory, hopeful, and proactive threads found in work to develop and deploy self-tracking applications for broadening approaches to social difference. Anticipatory self-defense has integrated agility in the design to act against technological aggressions affirming oppressive structures (e.g., Case 1 countering empathetic

design narratives to critique privilege). I consider anticipation a "strategy for avoidance of surprise, uncertainty, and unpreparedness, but is also a strategy that must continually keep uncertainty on the table" (Adams et al., 2017, p. 250). I also expand from the temporal aspect of anticipation is this case as questioning the persistence of uncertainty as embodied. In Case 1, Jordan is seeking to displace that feeling of anticipation into his augmented reality program. To elaborate, anticipatory design as self-defense was a means for Jordan to create an experience that was not reliant on access to his body but was also a means to insert privilege over time. An insidious aspect of racist acts, even the more 'subtle' ones like microaggressions, is in the ability of the person who is doing the aggression to affect the lived state of another individual drastically. Microaggressions happen in a fleeting moment, but only for those doing the aggressing.

There is extreme power in the ability to shift perceptions of temporality such that someone doing a microaggression can isolate that racist act in time, maybe even to an insignificant portion of the day, a fleeting moment. Yet, that same act can expand in time for the one being aggressed. In the case of Jordan's experience of microaggression, the temporality of it is continuous. Jordan experienced not only psychological trauma but also this one-act put a pause on his ability to engage in activities of higher education and threatened attainment of basic needs such as food and shelter.

Jordan's defense strategy echoes previous works on anticipation that speak of the need to consider the "mundane, local, and sometimes highly personal accommodations" (Steinhardt & Jackson, 2015, p.449). The discourse of anticipation is a hybrid actor's category and theoretical contribution of growing interest within the design community (Awori, 2016; Steinhardt & Jackson, 2015). This design orientation involves scenarios that exist beyond the now and into the

imagination, the often fraught, unnerving, or precarious futures envisioned that require intervention and work. Self-tracking design as anticipatory self-defense speaks to a connection of cultural agility, an individual and societal ability to interact with various cultures and identities without harm. This suggests that design for agility is one strategy deployed to protect personhood.

By inverting the direction of the gaze, Jordan imagines algorithmic opacity as how to design proximity away from access to the Black body. Black-male bodies are racially encoded with characteristics of threat, aggression, and violence. The focus on the physicality of Black-male bodies in size and strength is intertwined with anti-Black racism and its fixation on the physicality of the Black body to reduce its value. When Jordan said he believes his "close proximity and word choice" were the reason for the financial aid officer calling the police, it reflects how the location of Black-male bodies (e.g., close/far) are indicative of degrees of threat that reflects a reduction of blackness to physicality in which close is threatening and far is better.

Design as self-defense also uncovers how self-tracking offers a place of reciprocity that can challenge and renegotiate the boundaries of categories of social difference. In Case 2, Ms. X leaves out the paternalism of men that emphasizes women's health as centered on reproduction rather than embodied (or other-oriented) knowledge. Instead, through her design, Ms. X carves a space of sovereignty, a position that affords a defining power, the ability to assert value, and knowledge of her body that questions the hierarchical arrangement of reciprocity in patriarchal societies. I see through design as reciprocal self-defense how social relationships give rise to social codes. In turn, those social codes give rise to new social orders, new boundaries, positionalities, and relations of difference.

The reciprocal thinking of self-defense continually considers how social identity and values affect work (Sun et al., 2015). Social difference is consistently recognized through the negotiation of similarities and dissimilarities. This reflects a dependency of the dominant group upon the oppressed (e.g., men on women), as for one to exist with power, the other must be signaled as different. This engages the groups in imposed relations of reciprocity that are enacted in cultural ideologies and structures and can be internalized by both those in domination and subordination. However, this also signals a potential for shifting the arrangement in which reciprocity occurs in which reciprocal design as self-defense begins to ask: what happens when one starts to assert sovereignty that may change the requirement for them to participate in imposed reciprocity? What does this lens do to relations of dependence that dominant groups hold to persist their dominance to rearrange the relations of knowing?

Considering design as self-defense helps deepen the conversation in this area and acknowledge the active negotiations occurring within the participant's experience of self-tracking. When considering 'deviant' practices or user 'mishaps' as forms of self-defense, it helps to break from the dominant aesthetic of quantification practices that orient sense-making on moral binaries of good or bad behavior or above or below-average activity that can center or marginalize bodies. By suggesting users are engaging in forms of self-defense rather than "cheating" or "misusing" self-tracking devices or apps, it can help us reorient toward a more conscious language that may produce pathways for decoupling design from colonial undertones of regulation, discipline, and control (Awori et al., 2016; Irani et al., 2010).

CHAPTER 6: DIGITAL DYSMETRIA

The following work explores an ethnography of an idea –that data, mainly digital data– makes a difference. This dissertation originated from the observation that spaces championing the transformative potential of digital data and its tools lacked social diversity. This was in tandem with observations of algorithmic bias and data harms, in which communities of practice were cohering upon issues of racial discrimination and prejudice in online spaces. What was remarkable to me was the particular social arrangement emerging. In one sphere were upper and middle-class white individuals who could participate in various projects using highly personalized data to secure a healthier state and future. The other spheres were people of color, members of the LGBTQ, and people of different nationalities or religions. While the empowering potential of data and its potential to discriminate and harm are discussed in separate communities of scholars, I found the separation significant. In both spaces, there was a conspicuous absence of the people and communities in reference.

I started to question if forms of racial prejudice were necessary for this other, more hopeful, sociotechnical imaginary of data to exist; a necessity of unevenness—that binary and hierarchical logic so foundational to Western epistemology and development—that big data must find a way to insert this unevenness into the sociotechnical imaginary for it to survive; to be considered as something worth investing in within the collective mind. This perverse aspect of data beckoned a reorientation of my research question so to ask: How does race function—as a set of tools, techniques, and logics—in the sociotechnical imaginary of self-tracking technologies and digital data?

The research activities were guided by a multi-sited ethnographic approach, augmented with situational analysis, to navigate the often-contradictory nature of self-tracking technologies.

These technologies were investigated as both instruments of empowerment and tools of control and oppression. Following the framework outlined by Marcus (1995), the multi-sited ethnography enabled an exploration of the diverse perceptions, interactions, applications, and beliefs surrounding self-tracking. This approach was instrumental in moving beyond the binary discussions subject to recent criticism, as Sharon (2017) noted. Complementing this, situational analysis, as proposed by Clarke (2005), was employed to trace emergent patterns of liberation and discrimination. This method was pivotal in capturing the intersections of power and knowledge and their impact on subject formation across various research sites. The research activities were instrumental in centering the inquiry on the relationship between self-tracking technologies and social differences.

In the presentation of the findings, I discussed three themes. The first concerned how self-tracking technologies functioned as a form of racial technology, as Chun (2009) conceptualized, shaping narratives of access and reinforcing racial imaginaries within societal and technological domains. It highlighted how narratives of access and the maintenance of a racial imaginary served to align resources for large-scale data projects while perpetuating the segregation of creation spaces as predominantly white. This racial imaginary functioned as a technology of race, extending the agency of practitioners while enabling them to rationalize the exclusion of marginalized groups, who were included only in representational forms.

The second theme explored was the unsettled subject. This analysis examined how self-tracking devices, as extensions of racializing technologies, contributed to the creation of normative and non-normative bodies. The dichotomy between these bodies was not fixed or stable but existed within a habitualized duality characterized by individuals navigating the liminal space between normativity and deviance. This investigation illuminated how differences

were productively framed within complex affective economies and influenced by the retrospective framing of past experiences, self-criticisms, and bodily anomalies. Lastly, I discussed how self-tracking offers a space to engage with design as a form of self-defense that challenges the racializing logic that dominates the design of these tools.

In the following chapter, I offer an account of the process of racialization that occurs with the use and reuse of data from self-tracking devices. The process I reflect on is one of the bifurcated systems of feedback that create two proximal yet segregated data flows. Moving first from the group of data scientists and then to users of self-tracking devices themselves, in this chapter, I offer a reflection on the process of racialization that relates to the different orientations that the data gaze affords.

Digital Dysmetria and Self-Tracking

Digital dysmetria emerged as a core category in this ethnographic study, highlighting the dual nature of self-tracking technologies. It underscored a bifurcated feedback loop: on one hand, it served as an expansive tool for practitioners, and on the other, it created a constrained system of meaning-making for users. This dichotomy was evident in how users interacted with these technologies. They were limited in their ability to interpret data, confined within the binary logic of the applications. This confinement led to a narrowed perspective, offering only a fragmented view of the self. The split feedback loop in self-tracking technologies not only limited the interpretation of data but also influenced the direction of users' thoughts and actions.

Consequently, users' sense-making was restricted to their individual experiences, often exacerbating self-criticism and social comparison tendencies. The concept of digital dysmetria aids in our comprehension of how racialization operates, and Nemser's (2017) emphasis on race as infrastructure further clarifies its recursive nature. Each iteration of racialization feeds back

into and potentially transforms the more extensive racial system. In this context, race pertains to how governing techniques continually shape and are shaped by social and technological networks, producing social arrangements. In this regard, digital dysmetria engaged with the question of orientation as articulated by scholars like Sarah Ahmed; it questioned how data-oriented or disoriented individuals as a mechanism to produce differences. This phenomenon highlighted the importance of understanding the role of data in guiding social behaviors and perceptions, particularly in the context of self-tracking and personal data analysis. In the following sections, I offer a broad review of how the themes addressed in this research can be theoretically arranged upon a certain design of self-tracking as enacting specific spatial arrangements reliant on various racializing logics and techniques of segregation.

Digital Dysmetria helps describe the bifurcated feedback loop of self-tracking technologies that produce differences. Two feedback currents are formed with self-tracking tools. The feedback loop of the practitioners and designers is expansive compared to the feedback loop experienced by users. In particular, the designers and practitioners of self-tracking tools can extend their ideas, projects, and bodies in various spaces. This extension of themselves sits upon a single outward direction that mimics the arrangement of technoscience presented by Latour (2007). Just as Latour speaks of a periphery effect of technoscience as always looking beyond the periphery, not contained so that those who are beyond the periphery are seen as resources that can be extracted for various uses of its extension.

Practitioners' extension is also enabled by the ability to manipulate various representations. In the context of this ethnography, the racial imaginary was an important representational site for practitioners, and it afforded them various tools to extend their projects and moral desires into space. Since the racial imaginary existed as a creative act, a fictional

image of the Other, it reinforced the distance between practitioners and those they imagined in need. The distance between the Other and the practitioner strengthened the boundary between them, but it also kept the Other aligned as motivations for their projects.

In contrast, the feedback look afforded to users of self-racking tools is contained. In this regard, the mirroring effect of data plays an important role. Data is often presented to users as a reflection of who they are. This data, seen as a mirror, maintains the users' gaze in which the internalized gaze of data can occur. Moreover, there are the mythologies of objectivity and epistemological superiority that circulated discourses of data.

The bifurcated feedback loop reflects the concept of a feedback loop that gradually transforms and deforms the body's structure over time. Conveys the notion of a continuous feedback loop that reshapes the body's form into a broken or deformed state. Highlights how a feedback loop drives a progressive and detrimental modulation of the body's shape. This signifies the repetitive iterations of a feedback loop that lead to the gradual deformation of the body. Describes how a feedback loop contours the body's shape over time, resulting in a deteriorative and broken form. Depicts the trajectory of a feedback loop's influence on the body, resulting in its deconstruction over time. Emphasizes the impact of a continuous feedback loop that creates difference as it directs the body towards various normative assumptions about health and wellbeing. In this way, self-tracking technologies act as instruments of what could be termed "performative whiteness," a concept that aligns with Judith Butler's theories on performativity. These devices not only track but also discipline, control, and ultimately racialize the body, contributing to a system where whiteness is the unmarked default norm against which all else is measured.

Users must look outside the system to their own experiences, social interactions, and lived realities to bring meaning to the data they see. This is where the system's disciplinary power lies: its ability to be ubiquitous, elusive, general, and specific. The dialectical image of the self is haunting in its ability to create dissonance. This dissonance manifests in various ways. For instance, forcing the dialectical image into a linear timeline can create dissonance when the lived experience is not necessarily a past state, even though the app frames it as such. Consider the example of Mark, who does not want to view his mobility as something relegated to the past. The self-tracking device works against this desire by framing his mobility as an unachievable goal, thereby creating a dissonance that haunts him. It is this haunting dissonance and the stability of the retrospective gaze, the unsettling subject finds its most potent expression. The dissonance is further heightened by design aesthetics that present graphs or pie charts to users, giving the illusion of wholeness while obscuring the partiality of the data. This dissonance becomes haunting when it remains unresolved, as it often does, given that the dichotomy presented is arbitrary and manufactured.

This work extends previous discussions by highlighting the ongoing processes through which users and designers reinforce systems of normative whiteness in technology. Unlike a static snapshot, this reinforcement is a dynamic and degenerative process that evolves over time and across various frames, such as dis/hyper/retro/revision, rather than simply through exclusion. Furthermore, our study addresses the far-reaching effects of self-tracking technologies, which allow the normative attributes embedded in these devices to extend outward through the body, thereby influencing broader social dynamics.

Industry-focused narratives of self-tracking present the body and multiple human-nonhuman assemblages as a kind of informatics that can provide a new understanding,

interpretation, and moment of sense-making. In this spirit, I begin from the assumption that engagement with self-tracking practices and tools can provide new moments of sense-making. The sense-making that is designed as self-defense affords one that shifts the orientation of self-tracking tools to a bi-directional relationship; as the two cases highlight, it is not that self-tracking is done to push a singular body forward in isolation but can be done to move in other directions and reorient relations, to be antagonistic towards, to engage with dominant flows of oppression. When social differences are encoded into sociotechnical practices and tools, it is essential to consider how they are both naturalized (as if having some kind of inherent truth) as well as become approachable for negation. Baack (2015) suggests that individuals can resist and subvert the normative effects of self-tracking technologies by critically engaging with the data they generate.

In these cases, individuals utilized self-tracking practices to challenge social differences and actively confronted racism and patriarchy within sociotechnical systems. Adopting the lens of design as self-defense draws attention to the necessity of critically reflecting on privilege and its manifestation in design. Within the presented cases, participants engage in discussions surrounding social exclusion and oppression, recognizing both the potential benefits and the ways in which the available technologies can perpetuate existing structures of oppression. Design as self-defense is not about investigating bodies at the margins, but sociotechnical orientations to difference as experienced and lived, relational practice of design. Self-defense doesn't happen as a binary narrative vs. counter-narrative but rather is revealed across the multiple, intersectional identities of the individuals involved.

Viewing design through the lens of self-defense allows individuals to reclaim agency within a system that aims to restrict their experiences. The presence of a bifurcated feedback

loop reduces users to passive subjects, nullifying their ability to engage in meaningful dialogue. This intentional limitation hinders their information-gathering, sense-making, and resource utilization. However, self-defense serves as a countermeasure by acknowledging users as active participants. Users of self-tracking devices are not mere bystanders within these power systems; they possess autonomy, decision-making abilities, and the capacity to act.

By adopting the perspective of design as self-defense, I bring attention to the critical reflection needed regarding privilege and how it influences design processes. This approach urges caution against idealizing designers as saviors and viewing empathy as a performative spectacle, as these tendencies can mask underlying systemic issues. Within the design of self-tracking systems, the concept of self-defense exposes various imaginaries associated with big data, including considerations of access, disparities in perceptions of social difference between designers and users, and the complex intersection of these design interventions with larger sociopolitical and capitalist dynamics. It prompts us to examine the broader context in which these design practices operate and their implications within societal structures. Users of self-tracking devices are not mere bystanders in these power systems. Using design as self-defense makes way for user autonomy and decision-making power. They have agency and the ability to resist or subvert normative frames through their engagement in designing devices and tracking practices as self-defense. By engaging in the design of self-tracking devices and tracking practices, users and designers can work together to challenge and redefine the dominant norms imposed by these technologies.

Self-defense as a heuristic for design prompts us to be vigilant and proactive in diversifying the assumptions about use and identifying unrecognized consequences of design. Considering what users are defending themselves from can also help support the empowerment

of users to assert their agency and make informed decisions about their data enabling individuals to take control over their digital presence and engage with technology on their own terms., adopting the lens of self-defense provides a way to shift the focus towards the dynamics of interaction, and to consider the social relationships that involve both privileged and disadvantaged individuals (Hoffmann, 2019) that self-tracking enables or mediates. Self-defense as a heuristic for design brings attention to resistance as a social activity with which self-tracking can play a transformative role.

Conclusion

The goal of this dissertation was to critique these technologies for their potential to marginalize and examine the foundational logic that allows and even benefits from such marginalization. I explored how these technologies generate differences, implying that these differences are not inherent but are automatically manufactured. I focused on how integrating theories of difference can help parse the empowering and disempowering effects of these devices, both mechanisms for gaining autonomy and technologies of discipline and control. To do so, I conducted a multi-sited ethnography encompassing the technological sites where self-tracking devices are conceived and produced and the lived experiences of individuals who utilize these technologies. This dual focus allowed for a nuanced understanding of how racialization operates within the field of self-tracking. The technological sites, from design studios to medical researchers, provided critical insights into the ideological frameworks and normative assumptions embedded in these devices. These settings often revealed unspoken racialized perspectives that are encoded into the technology.

Drawing on Foucault's concept of modern racism, which situates racism as integral to biopower, my goal was to transcend the dichotomous perspectives that view self-tracking as

empowering or disempowering. Instead, I sought to illustrate how self-tracking functions as a locus of racialization, contingent upon the creation of both empowering and marginalizing subject positions that favor normative whiteness. The objective was not to assert that self-tracking technologies produce “white people” but rather to shed light on how these technologies reinforce the often unseen backdrop of white normativity. This focus was not on the outward appearance of bodies belonging to specific racial groups but on how the disciplinary and agentic mechanisms enabled by self-tracking, especially in their role in constructing, reinforcing, and obscuring whiteness as a dominant influence in subject formations. In essence, I aimed to demonstrate how the contradictory and opposing duality inherent in biopolitical projects, such as self-tracking, generates differences mechanistically with these tools.

Investigating the desires, values, and norms engendered in technological inventions deepened our understanding of identity and subject formation, discipline and punishment, and commodification of the self. To this end, this research sought to integrate theories of difference that could help parse these devices' empowering and disempowering effects, which served as both mechanisms for gaining autonomy and as technologies of discipline and control. The aim was to move beyond merely critiquing the technologies for their marginalizing impacts and instead interrogate the underlying logic that made such marginalization both possible and productive. This work contributed to how self-tracking participated in the commodification and governance of social life and broadened how subject formation was theorized within this scholarship.

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