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Internalizing Data Collection: Personal Analytics as an Investigation of the Self

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Abstract

Personal analytics, aka self-tracking, is the practice of using a digital device to track aspects of behavior, such as exercise habits, heart rate, sleep patterns, location, diet, and a host of other data points. This dissertation is an exploration of "self" in self-tracking, informed by theories of subjectivity, autonomy, power and knowledge. As a technological intervention, self-tracking devices change how we experience our own body and behavior. They also serve as methods to digitize human behavior. This data is combined with other data and processed using computational methods. Self-tracking devices are both personal *and* bureaucratic. They are devices used for self-care *and* institutional processes. As mediating objects, they occupy a multifaceted position that they share with other forms of mediated experience. Like social media, which is both a form of personal expression and a way to track users' behavior, self-tracking participates in changing attitudes about surveillance. People are willing to subject themselves to surveillance and are largely unaware or unconcerned with the ways in which self-surveillance is the same thing as institutional surveillance.

This study positions self-tracking as a practice of institutional population management, not simply personalized exercise tools. A Fitbit might seem to simply measure a "step," an identifiable metric that exists regardless of whether it is counted. Yet, how can this metric be considered neutral and objective when its institutional purpose guides its development? Thinking of measurement as neutral ignores the process by which anything comes to be measured. All kinds of decisions—about what to count, how to count it, and what to do with the data—are

made prior to the end user's experience. Measurement is a cultural activity and thus the outcome of this data collection is never neutral with respect to power.

By looking at fitness-tracker privacy policies, workplace wellness programs, data sharing practices, and advertising materials, I trace the discursive practices surrounding self-tracking. As we surveil our bodies and behavior, we enact a focused attention upon the self. Understanding the consequence of this focus is crucial to understanding how data operates in today's economy. My overall critique of data in this dissertation concerns how the focus on self obscures the institutional uses and abuses of data. The epistemic affordances of data flow in multiple directions. Self-tracking devices offer the promise to reveal hidden data about the self. They accomplish something different—they create the means to recraft the self into something else entirely. They make the self into an entity that is knowable and therefore able to be the subject of market transactions and manipulated by institutions.

Introduction

This dissertation is an exploration of recent technologies of self-tracking, including Quantified Self and fitness-tracking. Self-tracking is defined as the diverse set of practices in which individuals use a digital device to track some aspect of their body or behavior. While self-tracking has a history that precedes the advent of digital tools and wearable technologies, I will focus solely on the contemporary state of self-tracking which began roughly in 2007 with the introduction of wearable fitness-trackers like the Fitbit and was followed shortly by the first meeting of Quantified Self. Quantified Self is a company founded by two editors of Wired Magazine, Gary Wolf and Kevin Kelly, and is devoted to promoting the practices and technologies of self-tracking.

I am interested in how the cultural phenomena of self-tracking is informed by theories of self, autonomy, power, and knowledge. In this investigation, I seek to separate the popular marketing and advertising rhetoric of self-tracking practices from a scholarly view informed by media studies and philosophy. By providing a context within which to analyze self-tracking technology, this dissertation explores how these devices are imbued with ideology and power relations. By providing a conceptual framework within which to understand self-tracking, I hope to contextualize and theorize self-tracking practices, which are still in their infancy and growing increasingly popular.

Self-tracking devices mediate the body, creating data that is used for an abundance of purposes. End-users track their exercise habits, heart rate, sleep patterns, location, diet, and a host of other data points. As a technological intervention, self-tracking devices change how we

experience our own body and behavior. They also serve as methods to digitize human behavior—to create data—that is combined with other data and processed using computational methods. Self-tracking devices are both personal *and* bureaucratic. They are devices used for self-care and institutional processes. As mediating objects, they occupy a multifaceted position that they share with other forms of media today. Like social media, which is both a form of personal expression and a way to track, categorize and market to individuals and groups, self-tracking participates in changing attitudes about surveillance. People are willing to subject themselves to surveillance and are largely unaware or unconcerned with the ways in which self-surveillance is the same thing as institutional surveillance.

Marketers, advertisements and popular accounts of self-tracking practices promote the idea that self-tracking devices perform a neutral measurement of pre-existing activity. A Fitbit, for example, would seem to simply measure a "step," an identifiable metric that exists regardless of whether it is counted. Thinking of measurement as neutral ignores the process by which anything comes to be measured. All kinds of decisions—about what to count, how to count it, and what to do with the data—are made prior to the end user's experience. Measurement is a cultural activity and thus the outcome of this data collection is never neutral with respect to power.

Self-tracking is a way to generate data based on one's body and behavior, but the infrastructure to do this requires institutions to manage this data, create the algorithms to interpret the data, and manufacture the device or develop the app that users interact with. The decisions that those companies put into their product about how to collect data, what to do with this data, and how to market their product are largely of a political nature. That is, they are concerned with how to organize, separate and manage large groups of people. By voluntarily

self-tracking, people are willingly contributing to this sorting. Self-tracking devices are a unique display of the tight integration of personal improvement and willingness to engage in institutional structures.

By looking at fitness-tracker privacy policies, workplace wellness programs, data sharing practices, and advertising materials, I trace the discursive practices surrounding self-tracking. My conceptual framework relies heavily on philosophers Michel Foucault, Judith Butler, Brian Massumi, Don Ihde and Bernard Stiegler, media and communications scholars Mark Hansen, Katherine Hayles, and business researcher Shoshana Zuboff. While not all these scholars offer theories that are fully commensurate with each other, they all deal with how the self exists within a matrix of power relations. Self-tracking is a media form that brings the self under scrutiny. As we surveil our bodies and behavior, we enact a focused attention upon the self. Understanding the consequence of this focus is crucial to understanding how data operates in today's economy. My overall critique of data in this dissertation concerns how the focus on self obscures the institutional uses and abuses of data. The epistemic affordances of data flow in multiple directions. Self-tracking devices offer the promise to let me know myself better. In actuality they accomplish something different—they create the means to recraft the self into something else entirely. They make the self into an entity that is knowable and therefore able to be the subject of market transactions and manipulated by institutions.

Several themes will appear throughout this dissertation and will inform the arguments found within each chapter and the threads connecting each chapter.

Theme 1: The tension between personal and institutional use of data

In political scientist Langdon Winner's work[1], he argues that artifacts have politics. An artifact—e.g. a device, an architectural feature, a tool—can be crafted with political motivations just as it can have political consequence. Sometimes these motivations and consequences are nefarious or hidden, but just as often they are unintended or benign. The political side of the discussion—i.e. how self-tracking affects the management and decision-making of large groups of people—is often obscured by the advertising and marketing rhetoric that touts self-empowerment, self-knowledge and self-improvement. This focus on the "self" can serve to hide the collective consequences of self-tracking.

While much of the marketing behind fitness trackers, as well as the ideologies of wellness and improvement found in self-tracking tout the *self* as the putative object of study or investigation, what is often hidden from view is how that same data is not only directed towards the self, but is directed towards institutional uses of the same data. Often a focus on the self is not untrue—that is, personal data really can tell the user something meaningful about their body or behavior. However, an investigation into the full picture of the self-tracking world reveals a network of connections and flows of data back to institutions. At worst, these institutions use this data to develop statistics and models that are used for predictive purposes, often without the users' knowledge. The domains of this prediction can extend to insurance pricing and policies, workplace policies and pressures to conform to employee wellness programs, and the selling of data to third party companies.

I flesh out this idea in a few central ways. First, Self-tracking is not and should not always be considered purely representational. Data points *about* our bodies and behavior are a

[1] See Winner, "The Whale and the Reactor;" "Autonomous Technology"

structural element for institutions and companies to use. It is this functional role of self-tracking data that is missing when we think of self-tracking as solely producing representational data about ourselves. Second, self-tracking data produces power imbalances between self and institution that are obstructed when we only think about the self- uses of data. While a fitness-tracker may reveal some insights into one's own body and behavior, the fitness-tracker company (and any partners or subsidiaries) owns the entirety of data about all its users. Any insights that it gleans from that data is more powerful from an institutional lens than any singular user's data.

Theme 2: Self and Other

In media/communications theory, James Carey's supposition that communication creates and maintains community is of relevance here with respect to self-tracking[2]. Self-tracking devices mediate the body and create a new way to conceptualize and order our behavior. Wendy Hui Kyong Chun's *Updating To Remain the Same: Habitual New Media* makes the argument that new media offer a different form of community than "old" media like newspapers and television. Like Carey, Benedict Anderson argues that media serve to create *imagined communities*[3]. 18th century newspapers served to create a national consciousness. People envisioned themselves as moving through empty time, as a national group, sharing the same language and sense of identity. In large part, it was the imaginative aspect of this media that lent its particular power to organize people into a recognizable community, even if they would never meet most of the people with whom they shared this community (Anderson).

[2] See Carey, *Communication as Culture*
[3] See Anderson, *Imagined Communities*

Chun argues that new media, particularly social media and video and photo sharing sites like YouTube and Instagram, do not encourage an imaginary "we." Instead, they foster a sense of individuality in their users: A "You," that expresses its uniqueness, rather than a "we" that is bound by powerful (but imaginary) threads. Because new media encourage the speaker to address "you," they occupy a stark expression of neoliberal individualism. In this new media landscape, collectivity and a sense of public gathering—a "we"— recedes, and we are left with "You." Chun relies on the ambiguously singular/plural form of "you" to drive this point home.

In self-tracking, as with other forms of new media, when users express their own uniqueness, they also contribute data to those systems designed to track, predict and control. Chun argues that the narrative of people using the internet to express "freedom" is contradictory within a technology designed as a control protocol. She writes, "The media have exploded in the social. YOU are a character in a drama called Big Data" (23). Self-tracking may engender sharing, but without a shared engagement with the most powerful forms of control enacted through that data. Companies, not individuals, control this data and profit from its analysis.

Theme 3: Power/Knowledge of Quantification

As Google and Facebook have demonstrated, the dominate business model of internet-based companies is to collect data about user behavior, and then sell these insights to advertisers and other business customers. Detailed fully in economist Shoshana Zuboff's *The Rise of Surveillance Capitalism,* this system allows companies to provide a free service to their users, while making money from the myriad ways that its users can be "known," i.e. how their behavior can be analyzed for patterns and therefore predicted.

Self-tracking apps and devices give users the ability to collect their own data. While some argue that this reversal (i.e. *I collect my own data, rather than someone else collecting my data*) means that users are wresting control from big data institutions, the truth is that institutions never get out of the data-collection game. As individuals collect their own data, this data is then used by institutions in ways that categorize people and are often used for the same predictive analytics used in Google-style data-gathering on the web.

Power and knowledge are key terms in self-tracking because of the way that self-tracking practices provide the conditions to create power imbalances. As Oscar Gandy argues in *The Panoptic Sort: A Political Economy Of Personal Information,* once data about people enters into wide circulation, that data is inevitably used to sort and categorize people. Data about people becomes the foundation for power over those people. The distinction introduced with personal self-tracking is that people willingly collect this data themselves, often without the knowledge of how it can be used in ways that categorize them.

Theme 4: Crafting of the Self through our tools

Throughout this work, the theme of the self being a creation—one that we craft partly using our technological tools—figures prominently. At the root of this understanding of the self is that our gadgets and apps are more than tools. They are part and parcel of the way that we interact with ourselves and others. This understanding of the self has a rich tradition in philosophy. As far back as Descartes, machines have been thought of as akin to the human body, with our minds the immaterial substance that animates us. Even though this dualism has fallen out of favor, the image of the machine as a metaphor for understanding our place in the world

has not. As our machines have become more life-like, our metaphors have changed. Computers are now the fundamental metaphor that we use to understand the mind. Beginning with cybernetics and continuing today with the computational theory of mind and neural networks in psychology and philosophy, and cyborg theories of agency, the image of the machine/human hybrid dominates our cultural and intellectual background.

Donna Harraway's *Cyborg Manifesto* was the first sustained attempt to argue for the liberating possibilities of the blending of human/machine. By breaking down the binary opposition between animate and inanimate, her feminist reading of the cyborg produces a creature without the constraints of gender and sexuality.

In Foucault's work on the "technology of the self," he describes techniques, some ancient, some modern, of crafting the self. While, with much of Foucault's actual written texts, his object of study is often arcane historical techniques, his study is relevant to a modern understanding of the self. The self is not defined by some inner, unchanging essence, but is to be created through the techniques, categories and power relations that exist during any particular historical epoch and culture. Foucault is also invaluable as a touchstone for understanding the relationship between power structures within society and how those power structures produce the self. In other words, what can appear as intimate aspects of personal identity do not come from within. The self is not "discovered" so much as made to match the models and normative formations that exist outside of our control.

In more contemporary theoretical works on the self and technology, Sherry Turkle[4] has made a career of investigating the interrelations between our technical objects and crafting our

[4] See Turkle, *Life on the Screen; The Second Self*

self. A psychologist by training, her work often investigates the ambiguous status of computers as not quite alive, but not inanimate either. In this border between animal and machine, computers often interact in complex ways with the self: as a mirror, an extension, or even as a peer. With advent of the internet, she argues that abstract theories of poststructuralism play out in living form through identify formation online. In online forums, games and social networks, people experiment with multiple personalities, fractured identities and a de-centered approach to normativity.

In this dissertation, the theme of creating the self through our tools is explored through our relationship with not only the tools of self-tracking, but with the images, ideologies and discursive formations around self-tracking practices. Whether it is the Quantified Self group's reaction against medical norms, or the fitness-tracker industry's marketing based around wellness and data as a means of self-management, self-tracking is indelibly tied to the use of technology as a means of creating, crafting and improving the self.

Background of Study

In the following four chapters, I take a close look at the theoretical formations that surround self-tracking technologies and practices. My study is informed by the groundbreaking work of scholars like Katherine Hayles, Donna Haraway, Andy Clark and Don Ihde, who, in their fields of philosophy and cultural studies, sought to investigate the ways in which humans and machines form hybrid biomechanical systems. Derrida's analysis of the logic of the supplement, particularly his analysis of *Plato's Phaedrus*, argues that western metaphysics goes astray when it conceptualizes the exterior forms of memory as distinct and inferior to internal

memory, or biological memory. Writing is not the by-product or supplement to thought. Despite the long history of defining writing as the absence of speaker, Derrida argues that all meaningful acts (speech, text, gestures), refer to each other and gain their meaning from other meanings. Nothing is self-evidently meaningful. Therefore, the presence or absence of the speaker means little. For as soon as we utter a phrase, we separate it from out self.

Bernard Stiegler, Derrida's student, takes his work and extends it into the era when memory is exteriorized in a multitude of ways through computational processes. Stiegler's investigations of the intertwining of "organs"—some biological, some social, some mechanical—informs my commitment to seeing technology as a kind of drug or medicine. Technology can improve life, enhancing our biological capabilities. But in the wrong dose or directed in the wrong way can cause suffering, anxiety and loss. As we give more and more power to our technological gadgets, we lose certain abilities and gain others. For example, consider how GPS-enabled navigational tools increase our ability to travel effortlessly, while making us utterly dependent on them and thus, in a way, more ignorant of our surroundings. Sherry Turkle (*Alone Together)* touches on this same trade-off, as she details how text-based communication and the internet expands our ability to talk to anyone, anywhere, but has also contributed to a measurable loss of empathy and the art of conversation.

Martin Heidegger's analysis of technology as a way of ordering the world as "standing reserve" speaks to the way that technology can overpower our ways of thinking (Heidegger, *The Question Concerning Technology)*. Technology is first and foremost a mode of thought, he argues, rather than a set of inventions or devices. In his historical milieu, he was concerned with technology being used to interpret the world in terms of its potential to provide power for human activities. Thus, the river turns into a hydroelectric dam, the forest turns into lumber for building

materials and fuel. In our own time, our wearable technology and ubiquitous computing tools have turned us into perpetual data gatherers. The danger is not the tools themselves, but how the tools have warped our sense of potential energy, so to speak. Exercise is now reduced to steps taken, miles walked, and calories burned. Experience is now mediated through our ability to track, collect and improve our behavior.

Within media studies, I am indebted to those scholars who described media's affect on our own sense abilities. Marshall McLuhan argues that media technology should be understood according to its effects on the human body and sense perception[5]. Media can extend our senses or attenuate our senses, and by doing so can encourage particular ways of thinking. Writing, for example, inculcates a linear way of understanding the world. Self-tracking technologies mediate our understanding of our own bodies and behaviors. Through the use of numbers, charts and graphs, as well as real-time feedback through our wearable technologies and smart phones, self-tracking gives us a particular lens through which to view our bodies and behavior to the detriment of other ways of understanding. Our intuitive sense of our bodies is attenuated in favor of a data-informed way of understanding.

Fredrich Kittler's *Discourse Networks 1800/1900* is a study in the ways in which our media technologies and the cultural systems surrounding them create the conditions for meaning within a given culture and historical epoch. By contrasting these two eras, Kittler argues that by 1900, the gramophone, the typewriter and other technical means of recording had separated words and meaning from the human body. Roughly corresponding to the rise of Romanticism and the rise of Modernism, these two eras approach truth and meaning in a way that is

[5] See Mcluhan, *Understanding Media*

determined by the media landscape at the time—its *aufscreibesysteme* "discourse network" or "system of writing down'" (Kittler xii). In today's discourse network, digital tools rule the day. What counts as truth about the body is that which passes through a digital inscription method and enters into systems of collecting, sorting, and processing this data.

Summary of Chapters

Chapter one analyzes the paradox of the anti-normative and "resistance" rhetoric of the Quantified Self group in light of the neoliberal political theory. Self-tracking tools inform us about aspects of our bodies and our behavior previously unavailable to us, thus opening up many in the "Quantified-Self" movement to tout personal data gathering as a new domain of freedom from big data entities and the medical establishment. Data-gathering is seen in these circles as a way to express one's freedom, autonomy and to break free of the constraints of Big Data. By collecting one's *own* data, they argue, individuals resist the normalizing categories created through traditional demographic research, the accessibility and quantity of which has exploded via the internet and social media. By applying philosophical and cultural studies theories of the self to this paradox, I question the validity and basic assumptions of QS. Drawing on Foucault's theory of neoliberal governmentality and the theory of possessive individualism, I argue that the QS model of selfhood is inextricably tied to market forces and economic outcomes for the self-tracking industry. Self-tracking is neither a form of resistance nor an expression of individuality in this light.

Chapter two focuses on how fitness-tracker advertisements participate in narratives about self-improvement and self-empowerment, specifically as it relates to healthy lifestyle. These

self-improvement narratives bring with them hidden ideological commitments to theories of cybernetics, according to which "information" is the communication and control mechanism that binds humans and technologies as interconnected systems. By using "information" as the catalyst for improvement and control over one's own body, fitness trackers encourage the use of data as a means for self-management. Despite research that suggests that fitness trackers do not lead to a healthy lifestyle, fitness tracker advertisements tend to depict fitness trackers as unlocking the key to knowledge about the body, and therefore a pathway towards improvement. Capturing data about the body, absent of other interventions, has not been shown to improve health and can even hinder efforts to improve health in some conditions. Thus, the claims of fitness tracker marketers are ultimately tied to an ideological stance about the supposed benefits of using data to manage the regulate the self.

Chapter three focuses on prediction as a means of control. By combining Shoshana Zuboff's *Surveillance Capitalism* and Mark BN Hansen's *Feed Forward*, I argue that fitness trackers open up the body to the same mechanisms of prediction found in Google and Facebook's methods of surveillance and prediction. Like those industries, self-tracking creates a market for behavior futures, in which insights into behavior are generated based on analyzing the data supplied by end-users. This data is shared and sold to business customers (like health insurers and life insurers) and used to predict future customer behavior.

Chapter four covers "Employee Wellness Programs." These projects are organized around employees engaging in tracking, often in a competitive nature. Some recent studies indicate that workplace wellness programs are not an effective way to improve health or to reduce health costs. I use Judith Butler's theory of moral responsibility to argue that self and other are intimately tied together, so much so that individuals can not tell the story of "I" without

invoking others' stories, and aspects of their life over which they have no control (such as genetics, family, and childhood experiences). Workplace wellness programs offer a unique microcosm to discuss the flows of data drawn from digital self-tracking devices. Many employers and health insurance companies rely on this data for long-term planning, to set policies and even structure premiums.

Chapter 1: Critiques of Big Data, Critiques of the Self

Introduction

"Quantified-Self" ("QS") is a company devoted to promoting the tools and practices of self-tracking. QS members and scholars associated with the group consistently describe QS as embodying an anti-normative stance regarding traditional medical models of authority, research and diagnosis. By tracking one's own body and behavior, the Quantified Selfer is purportedly engaged in a questioning of "norms" associated with the medical community especially those practices of diagnosing and identifying diseases and disorders.[6] This chapter highlights the writings associated with the QS movement that situate QS as actively questioning the very idea that there are "normal" categories that accurately describe people. QS members see themselves as fighting against the constraints of medical and social norms by generating their own data in order to develop knowledge about the causes and outcomes of their behavior[7].

Summarizing these and many scholars, I argue that advocates in the QS movement have articulated their practice as A) recognizing that norms, especially as used in medical diagnosis, can unfairly place people into categories in which they do not fit and B) that by generating one's own data, one can take power away from medical establishments that would seek to create these broad categories that are too general to be useful. By invoking the power of data to overcome the normalizing effects of medical practices, the QS movement positions itself as anti-normative, in the sense that it denies the usefulness of medical categories. QS members and scholars associated

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[6] See Wolf, "The Data Driven Life;" Nafus, "The Quantified Self Movement;" and Wright, "Break Free of the Tyranny of the Norm."
[7] See Lupton, "Quantifying the Body" and *Quantified Self.*

with the group therefore invoke concepts related to power and knowledge as forming the anti-normative practices surrounding QS.

The Quantified-Self group espouses an "N=1" ideology, referencing the scientific nomenclature for the number of human subjects (the "N") in a scientific study. Humans are unique, they say, and our uniqueness shines through in the light of our data trail. By engaging in knowledge creation through self-tracking, users can harness the power embedded in taking command of (and making explicit, through data) one's own uniqueness. This uniqueness is rhetorically opposed to the abstraction and averages found in studies that draw from an "N" of hundreds or thousands. This ethos is summed up in the QS slogan, "self-knowledge through numbers."

Much of the Quantified Self discourse related to power, knowledge and normativity dialogues with "big data," through what Dawn Nafus and Jamie Sherman call a "soft resistance" (Nafus and Sherman 1784). In this resistance, Nafus and Sherman argue, Quantified Selfers internalize the practices and knowledge structures of big data, yet do so in a way that actively changes and questions the categories built into big data statistics. "Big Data" is a term that initially developed to describe the ways in which large data sets allow researchers to make correlational and ad-hoc associations to develop insights about that data set. One defining feature of these analytical techniques is that models and hypotheses are not necessary for reaching conclusions. The "soft resistance" that QS demonstrates, argues Nafus and Sherman, treats data as an indispensable way to draw conclusions about behavior, yet eschews the practice of generating categories of "normal" behavior.

As a group of early adopters, QS members see themselves as articulating new standards of knowledge for material practices of personal data collection, as well as supporting a practice

that attempts to free oneself from dominating cultural and medical norms.[8] This chapter paints a different picture of the self-tracking practices championed by QS. Far from breaking free of normative constraints, Self-tracking is embedded within the same sociopolitical regimes of normalization that it purports to critique.

As self-tracking becomes more widespread, the theories and practices espoused by Quantified Self serve to legitimize data collection as a way to learn about one's body and behavior. While Quantified Self has developed a coherent narrative about its own anti-normative practices, I argue that we need to place their practices within a broader context: whatever anti-normative impetus Quantified Selfers invoke is rhetorical flourish on an essentially *normalizing* activity. By focusing on discovering the truths of the "self" through data (and *only* through data) QS is embedded within the practices of the self-tracking industry—even as it is defining those evolving practices. QS is on the forefront of developing techniques, technologies and practices that are coming to stand-in for self-tracking in general. We should see Quantified Self not solely as a kind of "soft resistance," but as the vanguard of a practice that is becoming more normal and widespread in the workplace, within insurances practices, and as a vital part of the surveillance economy.

Much of the work referenced in this chapter uses the rhetoric of liberation, freedom and wresting power from big institutions to describe the practices of QS. As a practice of the self, QS is bound up with these ideas. Foucault's exploration of subjectivation shines light on these practices of the self. As neoliberal ways of governing replace social policy with market relations, data collection becomes a way to monetize behavior and predict outcomes. QS misses this

[8] See early reporting from Fleming, and Swan "The Quantified Self: Fundamental Disruption"

critique because it can not see itself as espousing an agenda that builds self-knowledge through the same terms as big data institutional analysis. In this way, QS encapsulates what is unique about selfhood in our data-obsessed age: the more data we create, the more that data is used to define us. What originates from the "inside" of our bodies and behavior is not separate from the power relations that create the conditions for that data. Indeed, "resistance" to these power structures has a way of strengthening and refining them. By placing Quantified Self within the context of neoliberal ways of governing, I argue that the claims of anti-normativity use the rhetoric of liberation and individuality to promote a conservative political agenda.

Origins of the Quantified Self

In 2007, Gary Wolf and Kevin Kelly, two editors from Wired magazine, founded "Quantified-Self Labs" to organize a new practice they had witnessed in Silicon Valley: self-trackers using data to learn about themselves (Wolf, "What is the Quantified Self?"). Quantified Self has been routinely compared to the "homebrew computer club" that kick-started the personal computer revolution in the 1970s and 1980s in the Silicon-Valley area.[9] Depicted as a cutting-edge group, Quantified Self is often seen as the future of health care and of the growing importance we attach to the meaning of data in everyday life.

In a widely-cited 2010 New York Times article, Gary Wolf describes the ethos of the Quantified Self by first describing our inherent deficiencies; "Humans make errors," he writes ("The Data Driven Life"). The method of the QS takes "a dry, abstract, mechanical type of knowledge" and applies it to the personal realm. The goal, he writes, is not a neo-Taylorism, in

[9] Wolf 2011 makes this comparison. See also Hill; Watson; "Counting Every Moment"

which people seek to turn themselves into efficient workers. For efficiency to be the goal, there would have to be a clear end-result in mind for any specific tracking project.[10] Rather than efficiency, Wolf insists that the goals of QS are knowledge and power. He writes, "[Self-trackers] believe their numbers hold secrets that they can't afford to ignore, including answers to questions they have not yet thought to ask" ("The Data Driven Life").

Their company promotes small, informal meetups in cities around the world, as well as larger conferences. At the time of writing, there are Quantified Self groups in 141 cities in 48 countries.[11] At the heart of these QS events are "show and tells," in which QS members explain what they tracked, how they tracked it, and what they learned. "Quantified Self" is often referred to as a "movement." As a thoroughly corporate-sponsored entity, the use of "movement" I find disingenuous. However, it is uniquely positioned to influence top thinkers in Silicon Valley given its distinguished pedigree. And given that it is well-funded and easily attracts media and tech world attention, QS has attracted enough scholars and proponents to cohere around identifiable goals and methods of the group.

Topics at Quantified Self conferences range broadly but tend to appeal to a technology-focused crowd. Talks at the 2015 Quantified Self conference in San Francisco included the following:

> "Using Self-Tracking to Hack Musculoskeletal pain" by Bryan Ausinheiler
>
> "Daily HRV as a Measure of Health and Will Power" by Mark Leavitt
>
> "How I zapped my brain with a 9v battery to overcome analysis paralysis" by JD

[10] Many researchers have similarly concluded that QS eludes a too-simple frame of "optimization" or "efficiency" to explain the motives, methods and conclusions of Quantified Self members. Quantified Self conferences embraces a "big tent" approach. (Boesel, 2013).
[11] http://www.quantifiedself.com, accessed January 31, 2020.

Leadham

"Breaking the TV Habit" Valerie Lenard ("QS15 Conference Program")

Based on the titles of those talks alone, the QS group admits of wide-ranging interests. The common element among all QS "show and tell" speakers is their desire to learn about some aspect of their behavior by utilizing technological tools and data. Experimentation, idiosyncratic data collection methods, and a general willingness to treat oneself as a *project* organize this wide array of people into an identifiable and self-selecting group.

By popularizing this new kind of "self-tracker," Quantified-Self combines several older ideas related to self-observation and data. The idea that we can learn about our self by close observation of our body and our behavior has been with us for a long time. Quantified Self participants frequently point to Gordon Bell, a veteran Microsoft researcher and founder of the MyLifeBits project, Nicholas Felton, an artist and author of the yearly "Feltron Report", and even Benjamin Franklin as ideological forbearers of their approach. Quantified Self invokes the history of self-observation, while adding a focus on contemporary wearable sensors as invaluable to the practice.

In the last several years, anthropologists and sociologists have been attracted to this group as an object of study. Dawn Nafus and Jamie Sherman are sociologists at Intel Labs who write theoretical and ethnographic work about QS. Nafus is a frequent speaker at QS events. Anthropologist Natasha Dow Schull's forthcoming (2020) book, *Keeping Track: Personal Informatics, Self-Regulation, and the Data-Driven Life* is drawn from some of her work with QS, including a discussion she held at the Quantified Self Global Conference in 2015. Sociologist Deborah Lupton has published numerous articles about Quantified Self, and her book *Quantified*

Self is a sociological account of personal data collection, focusing on QS. Many other scholars have published articles and books concerning QS.[12] The work of these scholars makes up the academic wing of the QS discourse. Their work appears in this chapter as evidence of disciplinary formations forming around QS, as both confirmation of its cultural importance as well as the diverse research one can conduct about this group.

My intention is not to dispute the ethnographic accounts of QS that elaborate the anti-normative narrative emerging from the practice. I largely agree with the ethnographic accounts. That is to say: QS adherents have indeed constructed an anti-normative narrative that informs their practices and rhetoric. My intention, instead, is to attack the assumptions at the heart of this narrative and to reveal where the logic of this narrative leads. By placing the Quantified Self movement within a sociopolitical frame, the ideological forebears of QS shine light on their claims concerning power, knowledge, and normativity.

Instead of breaking down normative categories, this QS practices leads to a proliferation of normative categories. Instead of questioning the need for categories, QS actively cultivates a more nuanced understanding of categories that strengthens the regime of normativity built into self-tracking tools. QS is an early adopter group that designs new practices and technologies that will aid ever more specific tracking and surveillance, especially as self-tracking moves from the early adopter set into more mainstream (and sometimes compulsory) environments. Drawing on Foucault, I argue that biopolitical and neoliberal styles of governing people are perfectly at home with the supposed anti-normative activities of QS.

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[12] See Boesel, "What is the Quantified Self Now" and "Return of the Quantrepreneurs;" Swan, "Sensor Mania!" and "Quantified Self;" Lupton, *The Quantified Self* and "Quantifying the Body," Neff and Nafus "Self-Tracking."

QS as Neoliberal Ideology

Self-trackers see themselves as participating in an activity devoted to self-enhancement, in which deficiencies of the body are "corrected" through technology. Sociologist Deborah Lupton writes,

> Using self-tracking technologies encourages people to think about their bodies and their selves through numbers. The implication of the 'self-knowledge through numbers' motto is that 'self-knowledge' as it is accomplished via self-tracking and the production of 'numbers' is a worthy goal for individuals to aspire to. ("Quantifying the Body" 399)

In Lupton's study of self-trackers, she finds that the supposedly objective data offered by quantification gives self-trackers a feeling that numerical data is truer than "haptic" feelings about one's own body. The desire for numerical data that articulates "truths" about the body, argues Lupton, is part of a rationalistic quest to control and maintain the body through quasi-scientific instruments. For Lupton, the quest to take responsibility and control over the body echoes the rhetoric of responsibility found in neoliberal political discourse. She writes, "These individuals have readily adopted the subject of the responsible, entrepreneurial citizen as it is privileged in neoliberal governmentality in seeking to take action to achieve healthy and fit embodiment and engaging in self-governance" ("Quantifying the Body" 398). Governmentality refers not just to styles of political rule-making (i.e. laws and policies), but to how all institutions re-imagine the people who would be their constituents, and how people think about themselves in relation to the institutions around them.

The ways that the emerging neoliberal style of governing emerged in the late 1970s transferred considerable risk into individuals and away from groups and communal approaches.[13]

[13] See Beck, Giddens

As economist Philip Mirowski details in *Never Let a Serious Crisis Go To Waste: How Neoliberalism Survived the Financial Meltdown*, neoliberal governance infuses all aspects of life with a market ideology. Foucault ("History of Sexuality, Vol 1," "The Birth of Biopolitics") elaborated the first consistent and influential account of how this shift in governance changes the way that "self" functions within a sociotechnical matrix. Neoliberal subjects are encouraged think about all aspects of their life in terms of economic transactions and individual responsibility. David Harvey sums up neoliberalism with the following definition in his *A Brief History of Neoliberalism*:

> Neoliberalism is in the first instance a theory of political economic practices that proposes that human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets, and free trade (2)

Foucault theorized that neoliberalism, rooted in the German ordo-liberal governance that emerged from post-World War II reconstruction, sought the defining characteristic of a person as "homo oeconomicus," or economic man. He writes, "homo oeconomicus is an entrepreneur, and entrepreneur of himself" ("Birth of Biopolitics," 226). While Quantified Self is not focused on economic issues per se, the style of self-examination that defines QS overlaps with Foucault's theorization of the internalization of market ideology in neoliberalism. He writes,

> The individual's life itself—with his relationships to his private property, for example, with his family, household, insurance, and retirement—must make him into a sort of permanent and multiple enterprise. (241)

Foucault's focus on the "enterprise" as the framework through which this new kind of person understands their "self" is consistent with his larger description of neoliberalism as a governmentality in which society is thought of as a set of market transactions. As in his other

work, Foucault's analysis of neoliberalism seeks not just an explanation of the rationality of a particular kind of governance, but seeks to explore the ways in which people who would be subjects of such a government internalize these rationalities and use them to define themselves. Foucault's theory about neoliberal governance can be applied to QS as a lens through which to analyze self-tracking practices.

The ethos of QS internalizes data-collection as a way to define the self, yet also views data collection as a way to fight against the inherited categories and ways that medical and social norms have defined people in the past. Their "resistance," is therefore not a resistance at all, but an ongoing process of internalizing the rationality of the "enterprise" of the self. The QS ethos of "self-knowledge through numbers" denotes an ideological commitment at home in the world of homo oeconomicus. Sociologist David Beer describes this expansion of neoliberalism into techniques of voluntary and individualized data tracking as "ordinary measures." The "constant, ongoing and underlying presence" of data collection enacts a neoliberal agenda, argues Beer, in that we are constantly subject to the laws of competition (Beer). He writes, "neoliberal ways of thinking permeate all aspects of social life. We are pushed into competition by the systems of measurement that act upon us – either encouraging us or commanding us to join in." Monitoring used to be considered a sign of something gone wrong. If you were subject to increased monitoring, you may be in legal or professional trouble. Yet in our current age, measuring has become not only commonplace, but has become the mark of responsible, engaged citizen who organizes their behavior into discrete chunks to be analyzed, tracked and improved upon.

QS understands behavior as a series of events to be broken down into data points, plotted and charted in order to impose rationality onto unruly experience. The practices being developed by QS are described as anti-normative, yet seen in this context, they are only resisting a

particular set of practices (say, of medical diagnosis), but are inculcating a new set of practices in which data serves as a means of self-regulation. Looking inward towards one's body and behavior for clues to how to "improve" creates a new kind of normativity, one in which self-tracking is espoused for generating new kinds of truths about the body that require constant, active participation on behalf of the user.

The forms of truth found within Quantified Self are described by media scholar Sun Ha Hong as creating new forms of epistemic authority ("Data's Intimacy"). Hong argues that Quantified Self technologies and the ideologies surrounding their practices participate in a long line of modern epistemological tradition in which new devices create supposedly more objective and therefore more real measurements and accounts of truth. These new forms of truth solidify self-surveillance as the latest form of institutional power manifesting as self-knowledge.

Foucault's theorization of neoliberalism therefore stands here as a counter-argument to the claims made by QS adherents that QS is an anti-normative activity. QS is often depicted as fighting against a kind of power wielded by big data institutions, particularly in the medical realm. Foucault's account suggests an alternative story: neoliberalism encourages individuals to track their own behavior. In Foucault's analysis of neoliberalism, it is the rationalization of economic behavior that marks individuals as governable; The matrix of power relations acting upon individuals produces them as subjects because these power relations are the standard by which we define our selves. He writes,

> Considering the subject as homo oeconomicus does not imply an anthropological identification of any behavior whatsoever with economic behavior. It simply means that economic behavior is the grid of intelligibility one will adopt on the behavior of a new individual. It also means that the individual becomes governmentalizable, that power gets a hold of him to the extent, and only to the extent, that he is an homo oeconomicus. ("Birth of Biopolitics" 252)

Despite the absence of a sustained discussion of economics from the QS discourse, Foucault's analysis lets us consider QS as nonetheless a kind of economic activity. It is precisely this kind of inquiry—treating the self as an enterprise (i.e. self-tracking as a method of discovery and improvement) that creates data that feeds into big data algorithms. Insurance companies, themselves a crucial part of the individual assumption of "risk" in neoliberal society, are rapidly adopting surveillance as a business model, offering discounts for customer data and structuring their services around the constant influx of self-generated data.

Based on Foucault's reading of the neoliberal application of an economic grid as the dominant interpretive model to understand any social or biological behavior, QS appears now as a way for individuals to become susceptible to the power wielded by self-tracking companies and the data they collect. Further elaborated in the following chapters, the *surveillance capitalism* cycle needs steady streams of behavioral data in order to draw inferences based on this data (Zuboff). These inferences form predictive products that are useful for a wide range of industries: advertising, insurance, workplaces, policing. In this cycle, data moves from individuals to corporations and data brokers, who often sell the data or aggregate statistics to a variety of institutions. Instead of subverting power and norms through self-tracking, it is the self-tracking activity itself that creates a "surface of contact" through which power is exercised on individuals. The economic grid is the "interface" between government and individuals ("Birth of Biopolitics" 253).

By adopting a view of "self" as a constant work-in-progress that uses data as a means of self-knowledge, the Quantified Self discourse sees data-collection as an act of power and even rebellion against Big Data and medical norms. Yet, due to their largely unexamined assumptions

about the nature of "self" within neoliberal ideology, the focus on data as a way to resist power, improve one's health, and gain self-knowledge falters in light of the ways that neoliberal regimes *encourage* the questioning of categories because this practices places the onus on the individual to define their own uniqueness. Self-tracking compels users to reveal certain "truths" about themselves through data. As data moves into institutions that predict behavior, this data is used for ever-increasing and more nuanced categories.

Biovalue

Nicholas Rose's work details the changing ways that we conceive of life in contemporary neoliberal governments. Paying particular attention to the technologies of genetic manipulation, Rose's work also introduces the general concept of "biovalue." "Biovalue," writes Rose, "refer[s] to the plethora of ways in which vitality itself has become a potential source of value: biovalue as the value to be extracted from the vital properties of living processes" (Rose 32). This concept is particularly important for an analysis of fitness tracker data because it introduces an economic imperative for fitness-tracking companies.

The way in which fitness-tracker companies collect and sell customer data in aggregate is an example of biovalue. Biovalue is a concept that bridges the worlds of health information and economic strategy. The lifecycle of fitness-tracker data encompasses a "bioeconomic circuit of exchange" which captures the "latent value in biological processes, a value that is simultaneously that of human health and that of economic value" (Rose 32-33). Simply put, fitness-tracker data can be immensely valuable not just for personal improvement but for companies and institutions who profit from this data.

One hallmark of neoliberalism is the extending of market transactions into domains not previously thought of as economic. Self-reflection and the management of one's own body using a self-tracking app or device falls into this category. As users collect their own data for personal reasons, it quickly escapes the personal realm and enters an economy of biovalue. Defining the exchange of fitness-tracker data as an *economy* opens a field of inquiry onto data as not just personally meaningful, but structurally important for the governing of individuals in a market. It is this definition of economy that shines more light on the claims by Gary Wolf and the Quantified-Self camp. Rose writes,

> the government of an "economy" becomes possible only though discursive mechanisms that represent the domain to be governed as an intelligible field with its limits, characteristics whose components parts are linked together in some more of less systematic manner. *For the bioeconomy to emerge as a space to be mapped, managed and understood, it needs to be conceptualized as a set of processes and relations that are amenable to knowledge*, that can be known and theorized that can become the field or target of programs that seek to evaluate and increase the power of nations or corporations by acting within and upon that economy. And the bioeconomy has indeed emerged as a governable, and governed, space. (33 [emphasis added])

Looking at the claims of Gary Wolf and others, Wolf's founding of Quantified Self was animated by an imperative to define the limits of a bioeconomy—to conceptualize it as a "set of processes and relations that are amenable to knowledge" (Rose 33). For Rose, the bioeconomy is exclusively the domain of corporations and institutions that would profit from the sale and exchange of biodata. Yet for many in the Quantified Self camp, personal analytics are a way to take power *away* from those institutions by performing those data collection techniques themselves. Seen as a functioning part of an economy of biodata, the same claims about knowledge thus appear more so about how the individual contributes to create a discursive field

that is then acted upon by large institutions like health and life insurers, employers and the legal system.

Rose further describes the economy of bio data as "a new kind of dis-embedding." He writes,

> vitality has been decomposed into a series of distinct and discrete objects, that can be stabilized, frozen, banked, stored, accumulated, exchanged, traded across time, across space, across organs and species, across diverse contexts and enterprises, in the service of bioeconomic objectives. (38)

While QS adherents describe their practices of quantification as liberating and increasing their autonomy over medical norms, Rose's evaluation turns this on its head. By dis-embedding their data from the context of their life, that data can then be used in a multitude of ways to extract value, establish norms and track individuals and groups.

In "Our Metrics, Ourselves: 100 years of self-tracking" Kate Crawford, et al. describe the networked power relations that make up the fitness-tracking world as a system "designed for mass collection and analysis" (494). Despite the immediate appeal to self-knowledge and personal empowerment, fitness-tracking also creates a power imbalance in which the user gets to see their own statistics, but the company gets to see everyone's statistics. This leads to the creation of concepts of normality based on aggregate statistics, some of which companies like Fitbit regularly publish regularly.

Crawford has also detailed the ways in which Fitbit data is now admissible as evidence in legal cases. In a 2014 case, a defendant provided evidence for her disability claim by submitting her Fitbit data as evidence. Using the analytics firm Vivametrica, her lawyers compared her

Fitbit data with national averages based on her demographics to show that her statistics showed a decrease in physical ability.[14]

By creating an economy of biovalue based on fitness-tracking data, companies like Fitbit contribute to the restructuring of institutions. This fleshes out some of the claims about "self," because when we only see fitness-tracking as self-representational we forget to see that it is also a material entity that changes the world in which it exists. Once this economy is created, we have statistics about how demographics and populations are represented by these devices. This in turn gets built back into the system and used for further prediction and analysis. In their privacy policy, Fitbit claims the right to use user data for a variety of purposes, including using any user data to develop aggregate statistics that can be used for further research and published without consent.[15]

Quantified Self: claims to self-knowledge and questioning regimes of normalization

Rather than seeing data collection as a form of control by large institutions, QS members and scholars associated with the group see self-tracking as a way to avoid domination by norms. Gary Wolf, founder of QS, invokes the idea that QS gives people access to a unique form of self that empowers users by eluding social and medical norms. He writes,

> People are not assembly lines. We cannot be tuned to a known standard, because a universal standard for human experience does not exist. (Wolf "Data Driven Life")

[14] Both Olson, "Fitbit Data," and Crawford, "When Fitbit is the Expert" reference this case.
[15] See chapter two for a detailed analysis of privacy policies of fitness trackers.

And continues,

> One of the reasons that self-tracking is spreading widely beyond the technical culture that gave birth to it is that we all have at least an inkling of what's going on out there in the cloud. Our search history, friend networks and status updates allow us to be analyzed by machines in ways we can't always anticipate or control. It's natural that we would want to reclaim some of this power: to look outward to the cloud, as well as inward toward the psyche, in our quest to figure ourselves out. ("The Data Driven Life")

Thus, for Wolf, the Quantified Self movement is about knowledge (i.e. mining data for "secrets"), and power (reclaimed from the Big Data algorithms outside of our control). This dual focus on knowledge and power is doubly directed upon the self, as both an individual endeavor (one only collects one's own data) and a way to construct a new kind of self through data.

Wolf writes that self-trackers are not concerned with a "deep" knowledge of themselves, but rather with strengthening a different kind of self: the fleeting self that disappears without the help of data. He writes,

> When we quantify ourselves, there isn't the imperative to see through our daily existence into a truth buried at a deeper level. Instead, the self of our most trivial thoughts and actions, the self that, without technical help, we might barely notice or recall, is understood as the self we ought to get to know. Behind the allure of the quantified self is a guess that many of our problems come from simply lacking the instruments to understand who we are. ("The Data Driven Life")

Wolf again reiterates here the supposition that QS is about gaining self-knowledge as a pathway towards questioning regimes of normalization. He writes, of a typical Quantified Selfer named "Adler,"

> Adler's idea that we can — and should — defend ourselves against the imposed generalities of official knowledge is typical of pioneering self-trackers, and it shows how closely the dream of a quantified self resembles therapeutic ideas of self-actualization,

> even as its methods are startlingly different. … Self-tracking, in this way, is not really a tool of optimization but of discovery, and if tracking regimes that we would once have thought bizarre are becoming normal, one of the most interesting effects may be to make us re-evaluate what "normal" means. ("The Data Driven Life")

Adherents and scholars associated with QS largely accept the idea that QS questions normalizing categories. About the QS commitment to questioning "normal," sociologist Sarah M Watson writes,

> People in the QS community are actively questioning the construction of fact. ….they are critiquing the firms who support the self-tracking process. They are challenging the notion of a "step" or "fuel point" to which commercial activity trackers assign meaning. The core of the current QS community is actively engaging with the more philosophical questions posed by the practice. (Watson 32)

Anne Wright, a former NASA scientist and frequent speaker at Quantified Self events, delivered a talk at a London QS meetup in 2014 called "Breaking Free of the Tyranny of the Norm," in which she details her quest to track her food and stress levels in an attempt to diagnose her unique medical condition, which had previously eluded her doctors. Her talk references what she calls the "industrial model" of medical diagnosis, in which people are placed in categories according to where most people fall along a bell curve for a given condition. In her case, her symptoms baffled doctors who do not readily test for sensitivity to cholinesterase inhibitors found in the nightshade family (including bell peppers, tomatoes and eggplant). The "normal" reaction to cholinesterase inhibitors is taken for granted; there is simply no routine test to determine the people on the tail end of the distribution.

Her description of how to overcome the problems of "normalization" within medical diagnosis nicely captures the ethos of resisting norms through self-tracking and reclaiming power from those who would create the normalizing categories. She says,

> [According to] the diagnosis myth, which pervades our culture, the idea is that either you've been diagnosed, or you have not yet been diagnosed but there's still hope, or it's all in your head (go away). And you're not in control of which side of this boundary you're on; somebody else is in control of that. So what do you do when the industrial model fails? My take on it is that you have to define your own axes, define your own scales, learn to discern your own state, be able to capture those sensations in the moment and then reflect on them. And I think that's basically a description of the sort of self-tracking that QS is all about. (Ramirez; see also Wright "State of the Net")

Expressing a similar point about the nature of QS' focus on uniqueness, Dawn Nafus writes,

> Early in my research, a self-tracker and MD told me: "Clinical trials are great for figuring out the side effects of a drug for the first 500 people. The problem is, you could be number 501 and have a very different reaction. (Nafus "Data, Data, Everywhere")

Of course, there is nothing at all tying the "person 501" problem to data collection of the kind that QS promotes. One can judge one's own bodily reaction without the use of data. However, uniqueness as evidenced by data turns a fuzzy and untrustworthy feelings into cold hard numbers. If, as Anne Wright argues, we should use our own axes of truth, we need data in order to provide the proof of our uniqueness.

Elsewhere, Nafus reflects upon the value of questioning norms through self-tracking. She writes,

> In many ways they [QSers] see their activities as a response to big data and big science dictums that make claims about the healthy body from on high. In the face of generalized, anonymous one-size-fits-all prescriptions derived from population studies, they seek to understand what is right for me…QSers self-track in an effort to re-assert dominion over

> their bodies by taking control of the data that many of us produce simply by being part of a digitally interconnected world. (Nafus "The Quantified Self Movement")

Nafus describes QS as a "soft resistance, one that draws on and participates in the cultural resources available" (The Quantified Self Movement"). Describing the resistance as "soft," is a way to hedge her argument against the narrative of resistance that other QS members fully embrace. Describing QS as a "soft" resistance evades a full discussion of what "resistance" means. If "resisting categories" ultimately means accepting the basic premise that people can be categorized into more or less coherent groups based on some shard characteristic or behavior, then QS participates in resistance. But often the rhetoric of resistance within QS blocks a further discussion of how power functions as it relates to data. One of Foucault's lasting contributions to the concept of "self-knowledge" is his insistence that knowledge is inseparable from power. Truth is produced within a specific context and emerges out of background assumptions that are largely unquestioned. While the anti-normative rhetoric of QS does, on its face, question some underlying assumptions about the usefulness of categories, it ignores its own complicity in creating newer and more specific ways of categorizing people.

In "This one does not go up to 11: The Quantified Self Movement as an Alternative Big Data Practice," Nafus and Sherman write,

> Soft resistance happens when participants assume multiple roles as project designers, data collectors, and critical sense-makers who rapidly shift priorities. This constant shifting keeps data sets fragmented and thus creates material resistance to traditional modes of data aggregation. It also breaks the categories that make traditional aggregations appear authoritative. This enables participants to partially yet significantly escape the frames created by the biopolitics of the health technology industry. (1784)

In their analysis, I am particularly interested in the idea of the "frames created by the biopolitics

of the health technology industry." Much of the description of Quantified Self offered by Nafus and Sherman describes it as subverting the concept of "normal" in health parlance. Nafus and Sherman, speaking about several of their informants, write,

> Healthy practice for Charlie is completely different from that for Michael and Angela, not just in terms of what they think or believe, but at a data level. The difference cannot be thought of as a standard deviation from a norm; rather, they are not on the same curve. Their differences are embodied in diverging practices that cannot be meaningfully assembled together using the categories in current circulation. In fact, attempts to elicit participation in coordinated studies within QS have rarely succeeded because people have such wildly different ideas about what constitutes an interesting measurement. (1791)

Nafus and Sherman conclude "QSers … resist the categories that are built into devices and into the market for data" (1791). In this way, their resistance is "soft" because they still work alongside of Big Data practices like "N=all" data collection. Yet the authors argue, QSers are distinct from Big Data researchers because they "critically question what constitutes relevant information, whether individual data points or entire categories of knowledge. In these ways, QS resists *through* its softness" (1791).

Researchers Tamar Sharon and Dorien Zandbergen similarly describe QS as resisting social norms. They describe one of the early heroes of the QS movement, Larry Smarr, who engaged in self-tracking (against his doctor's wishes) to correctly diagnosed his own Chron's disease. They write,

> QSers challenge and remodel the assumptions, norms and categories that are built into tracking devices, sometimes quite literally as they assemble their own projects. … In this context, self-tracking takes on an oppositional value, by which practitioners enact various forms of agency and autonomy vis-a-vis a larger society, its institutions and corporations, by resisting and remaking social norms and conventions. (1702)

Sharon and Zandbergen's account of QS approaches a real critique when they acknowledge the prevalence of "resistance" as a narrative trope in Silicon Valley. They write,

> This is not to say that the QS celebration of digital resistance to mainstream socio-technical norms should be taken at face value. This trope of resistance has always been a tell-tale feature of mainstream technological culture, certainly in Silicon Valley, where leading corporations like Google and Apple thrive on the values of individual ingenuity, creativity and courage vis-a-vis the norms of society at large. (1703)

Expressing a similar sentiment of self-tracking as resistance, Jamin Brophy-Warren describes artist Nicholas Felton's self-tracking investigations as "liberating."

> The objective for Mr. Felton and others is to seize data back from the statisticians and the scientists and incorporate it into our daily lives. Everyone creates data -- every smile, conversation and car ride is a potential data point. These quotidian aggregators believe that the compilation of our daily activities can reveal the secret patterns that govern the way we live. For students of personal informatics, the practice is liberating because it shows that our lives aren't random, and are more orderly than some might expect. ("The New Examined Life")

Like Big Data, Quantified Self is dataist, in the sense of the term offered by technology journalist Steve Lohr. QS is one of many institutions in contemporary society embodying a general trend to re-think problem domains in terms of data, and a faith that this will lead to new insights (Lohr). The difference between QS and Big Data, argue Nafus and Sherman, is that QS is more radically involved with experimenting with the complex and dynamic meaning of data, rather than developing supposedly universal models of behavior and health.

Nafus and Sherman conclude that QS methods and practices invoke a sense of self that transcends Foucault's critique of domination. They position the kind of "self" that QSers are investigating as developing normative standards that are "not captured in Foucauldian

understandings of the disciplined body, where internalized normative standards are determined top-down" (1792.) They continue,

> In QS, the self is made subject in the double sense of the word (as both "subject of" and as "subject to"), through self-objectification, but *this self-objectification lays claim to more far reaching sovereignty than Foucault's model allows.* (1792, [emphasis added])

Combining the approaches detailed by Nafus/Sherman and Wolf, we can see that the "self" that Quantified Self aims to achieve, at least in their estimation, tries to overcome the dominating and normalizing effects of power. To fully examine the claim that the Quantified Self is not about knowing the "deep, inner truth" of a person, but something else—that which can only be captured by "external" data collection, we need to examine western concepts of "self." QS is indebted to a concept of self that is a constant work in progress and a site of individual exploration and knowledge. Data collection provides the pathway to this knowledge that is necessarily external to the body. Data is a grid of intelligibility that comes to shape and determine how we think of the self. QSers claim to reject "norms," yet they embrace a practice in which norms are nevertheless created and flourish. As Quantified Self practices move from the small group to a wider culture, the influence of big data and constricting norms is all the more evident.

As seen above, much of the anti-normative rhetoric of QS relies on its relationship to (and divergence from) big data. Nafus and Sherman's definition of QS as a "soft resistance" specifically invokes big data as the larger cultural trend that frames and informs QS. The characterization of QS as anti-normative is meant to portray big data as *normalizing,* while QS is anti-normalizing. Because big data separates people into categories, QS is said to resist this

categorization because an "N" of 1 cannot possibly feed into mysterious big data algorithms that sort, process and predict behavior.

QS and Big Data

Crawford et al. describe how the concept of what is "normal" acts as a phenomenological and political constraint on freedom in the digital realm. Speaking specifically about fitness-tracking devices like the Fitbit and Jawbone *Up* devices, they write,

> Users get a personalized report, yet, the system around them is designed for mass collection and analysis. It functions as a 'biopolitical public domain', to use Cohen's term, designed to 'assimilate individual data profiles within larger patterns and nudge individual choices and preferences in directions that align with those patterns.' (494)

The critique, expressed here by Julie Cohen and buttressed by Crawford, et al, is that self-tracking apps contribute to biopolitical control. That is, they contribute to ways in which institutions nudge us towards behaviors that they deem appropriate, normal or healthy. By using wearable technologies and utilizing existing smart phones and network infrastructure, fitness-tracking companies allow us to track our own metrics. Yet, as Crawford, et al. argue, the companies themselves receive a large data set from *all* their users, whereas individual end-users merely receive their own fitness data. The massive data set flowing back to the parent company allows the company to wield power through predictive data mining. Fitness-tracking data is sold to multitudes of industries including social media sites like Facebook (Statt). Critics have already warned that programs like employee-wellness programs, in which companies collect fitness data from employees who opt-in to the program allow both the parent company and the health insurance provider to dictate policies that will ultimately harm some individuals (Pasquale). In

addition to privacy concerns, there are concerns that data will be used against employees in hiring and firing decisions.

The use of self-tracking data in the so-called surveillance economy serves to create predictive markets for behavior (Zuboff). Many free smart phone apps, for instance, allow users to track certain behaviors. This data is transmitted to the parent company, who in turn sell this data to 3rd parties, including insurance companies and data brokers. Further elaborated in chapter three, this practice builds upon the massively successful model developed by Google through which data is extracted for little or no cost, analyzed using machine learning algorithms for patterns and insights, and then sold to business customers. "Personal data" is not sold, per se, but instead is re-packaged as predictive products.

The anti-normative line of reasoning from QS ignores the ways that data often ends up building the very categories that QS advocates seem to disavow. In fact, the entire promise of big data in some ways relies on an ever-increasing number of categories and statistical aggregation in order to detect patterns in large amounts of data. Often, the data-driven business models of fitness-tracking apps, as well as more traditional big data applications in health care, public policy, policing and government, rely on a seemingly magical ability to detect correlations in large data sets. In the social media realm, Facebook relies on ever-increasing behavioral models in order to target specific groups of people for advertisements. Digital advertising in general relies on proliferation of categories and fine-grained description of groups of people.

In his 2013 book *Infoglut: How Too Much Information Is Changing the Way We Think and Know,* communications scholar Mark Andrejevic examines the ways in which people and businesses in our contemporary era of information overload have developed new ways of negotiating knowledge. Specifically applied to Big Data, he believes that earlier concerns about

"social sorting" in society have given way to concerns about predicting future behavior based on probabilities (Gandy, Bowker and Star). Whereas advocates for social equality have always taken issue at the way that any population is categorized and sorted, in today's Big Data age, this sorting is all pervasive and mostly invisible. And by using probabilistic and correlational methods, institutions can claim ignorance about any overt forms of discrimination ("Infoglut", Sweeney).

His critique frames big data as responsible for blocking individual access to the corporate and institutional control of data. He writes,

> The sense of powerlessness that individuals express about emerging forms of data collection and data mining reflects both the relations of ownership and control that shape access to communication and information resources, and growing awareness of just how little people know about the ways in which their data might be turned back upon them ("Big Data Divide, 1675).

Quantified Self's anti-normativity rhetoric must be balanced against the recognition that self-tracking apps and services flow into larger data sets that are analyzed using big data statistics. Despite Wolf, Wright and others' claims that QS fights against normalization, Crawford and others make a convincing case that this normalization is endemic to self-tracking, at least those self-tracking tools that collect data en mass. Quantified Self, as a well-funded and well-connected company, plays a crucial role in popularizing self-tracking. It has established itself as somewhat of a popular "user group" in the domain of personalized health. As I will show next, big data "categories" are very much as home among the more business-centric aspects of Quantified Self.

QS builds categories

In her blog post titled "Return of the Quantrepreneurs," QS regular and researcher at the Berkman Center for Internet and Society at Harvard, Whitney Erin Boesel describes a growing rift in the QS community between people who self-track in order to learn something about themselves, and people who attend QS meetings looking to monetize self-tracking apps. She writes,

> Put simply, a quantrepreneur is someone who turns up somewhere in the Quantified Self milieu because he or she is looking to capitalize on the growing interest in self-tracking, frequently (though certainly not always) via a startup that's making an app or a device. ("Return of the Quantrepreneurs")

Her post describes her surprise at the motivation of "quantrepreneurs." She writes,

> the question these representatives bring is not "How can I learn _____ about myself, or accomplish _____ in my life, through collecting data about myself," but rather, "How can I get other people to collect data about themselves, and then use that data to get those people to do what I want them to do? ("Return of the Quantrepreneurs")

The difference, as she sees it, relies on the focus of the inquiry. Quantrepreneurs want to take advantage of the QS movement in order to promote tracking in ways that can earn them money, possibly by incorporating tracking into health care practices. Traditional QS attendees want to ask questions about their own habits and form knowledge that only applies to them. This split between quantrepreneurs and regular QS attendees led at least one large QS group (in Boston) to separate into two distinct groups.

Yet the difference between these two approaches—self knowledge vs "traditional" institutional and monetized data—is increasingly difficult to pull apart. Many self-tracking apps

provide both self-knowledge to the individual use as well as institutional knowledge to the company behind the app. And if quantrepreneurs are interested in QS, it is because QSers represent a group that is conceiving of more ways to effectively track individual behaviors. As self-tracking tools go mainstream, there is more pressure to standardize the methods and the technology. Despite the fact that QS is often depicted as an early-adopter group, this categorization elides the fact that the so-called "quantrepreneurs" look to QS users for new ways to track and to popularize tracking. The larger QS conferences, after all, also include a consumer trade show component[16]. Like the homebrew computer club, which laid the ideological and consumer groundwork for the coming computer revolution, QS embraces both the anti-normative narrative as well as a generally pro-consumerist approach to self-tracking.

Big data presents a normative constraint on behavior through its ability to create categories and then drive consumer behavior. If more and more self-tracking apps and devices are going "mainstream," the anti-normative argument seems very similar to the anti-establishment ideology of Silicon Valley, most clearly articulated by Apple in the late 1990s. They encouraged consumers to "think different," so long as their individual uniqueness was expressed using a unified consumer platform.

The anti-normative rhetoric embraced by QS and articulated by the scholars cited above demonizes big data because of the way in which it centralizes power despite providing individual users with some insight or knowledge. QS participates in the same regime of big data, often in

[16] The "Global Conferences" usually include a trade-show component. E.g., the 2015 Quantified Self conference, held in San Francisco, CA was advertised as a "Conference and Expo." The "expo" space was integrated into the "conference" spaces, such that one had to walk amongst product vendors to reach the keynote address, as well as any of the presentations or roundtable discussions (personal notes).

ways that are at direct odds with the dissolution of categories. Yet, the argument that QS is a critique of big data persists. In the following section, I discuss the failure of the QS movement to politicize and historicize their project. Because of this failure, this so-called "resistance" to big data is in fact no more than a wholesale acceptance of a neoliberal ideology that treats individuals as entrepreneurs of the self. Accepting personal responsibility for one's own data-trail may increase "freedom," but it does so in ways that are clearly acceptable or even desirable in an economic and political environment in which market relations are held up as the model form of selfhood.

What is the Self?: Social and Political History

So far, I have described QS as committed to a "self" that is examined and studied by collecting data. Contrary to the QS argument that self-tracking is a resistance to norms, Foucault's elaboration of neoliberal ideology demonstrates that the neoliberal self is defined by its ability to investigate itself and to prove its own uniqueness. And with the growth of self-tracking tools and practices, the data generated by individuals is used to generate a proliferating set of statistics and norms, all understood against the grid of economic analysis that produces subjects.

The confluence of self and capitalism predates the neoliberal tradition. CB Macpherson's groundbreaking 1962 work *The Political Theory of Possessive Individualism,* in which he argues that an assumption of the ownership of the self has permeated the theory of individual rights stemming from 17th century liberal political theory. Market relations, he argues, are an unstated assumption in Hobbes' elaboration of our moral obligation to submit to a sovereign political

authority. Although Hobbes's "state of nature" argument invokes the idea of unorganized mass of people who come together to form political unions for the sake of their collective protection, Macpherson shows that this formulation specifically aims to protect individuals' rights who already live within a market society. In other words, our moral obligation to submit to a political authority was an expedient way to guarantee that our economic transactions within a market society would be protected against fraud and non-compliance.

At the heart of possessive individualism is the idea that for those people who are allowed to enter into market transactions, the central element of that exchange is of the self. Those who do *not* own their self (slaves, for instance, or women under certain sets of laws) cannot enter into market transactions because they do not "own" the central element of that exchange. The racist and sexist assumptions at the heart of this dynamic point towards Macpherson's central thesis: that ideology and power relations create and reinforce our understanding of self, and not the other way around. If only certain people have the legal right to exchange their labor for wages, they can do so only because of an ontologically earlier possession—that of the self. Those who cannot work are therefore not in full possession of their "self." Yet it is precisely that designation of ownership that separates those in power from those without.

As liberal political theory evolves from its origins in the 17th century, political rights are extended to a multitude of people, slavery is abolished and universal suffrage is established, the concept of *possessive individualism* remains at the heart of our political conception of people. The idea that my "self" is my most personal possession remains with us. By uniting market relations and individual uniqueness, the theory of possessive individualism made it seem as though the self was naturally something that was indelibly tied to ownership. To see evidence of the strong pull of this commitment, look no further than the unification of consumerism and

individual expression that emerged in the mid-20th century. Advertisers constructed marketing campaigns around the idea that buying a certain car or smoking a certain cigarette let you express your individual true essence. In our age, we are told that the truest way to express your uniqueness is by collecting data or "sharing" on social media.

Macpherson's critique is important for the theory of "self" proffered by the Quantified Self. By seeing data as the pathway towards self-knowledge, Quantified Self seems to accept that the self is not something that is found deep within us, but rather is constituted by a specific set of methods and practices. MacPherson shows that the market system reified the existence of the "self" as an inner essence. There is no transcendent truth of the self, there is only cultural practices and power relations that define and constrain our ineffable sense of individuality. So long as the self is unquestionably tied to its ideological underpinnings of possession and ownership, political critique will fail to overcome this pull unless it addresses the failures of this belief system.

Foucault's work, detailed earlier, is an extension and strengthening of Macpherson's study. Instead of theorizing the self as a creation of market relations, Foucault embraces the absolute fiction of the self. Foucault's "self" is only momentarily stable. It has no pre-existing unity, but is defined and experienced according to the power relations of any given epoch. The self is radically historical in Foucault's work. Foucault and MacPherson both historicize the self by looking at the ways that social and institutional conditions produce the truth of what we have come to call the self. Without a pre-existing and fixed essence, the self takes its shape within the context of economic and political power. By ignoring the history of how concepts of self and truth interact with power, QS sees the "enemy" to be a particular entity—normativity within medical models of diagnosis. Yet, within a broader context of political power, self-tracking using

"individualized" devices (which also benefit institutions) is an even more pernicious example of institutional power creating the truth conditions for the self.

Foucault on Technologies of the Self and Subjectivation

Many scholars reference Foucault's term, "technologies of the self" to describe the Quantified Self movement (Dow Schüll "Data for Life"). There is an obvious grammatical link between "technologies of the self" and "the Quantified Self," yet Foucault's actual description of technologies of the self fails to support the characterization that many scholars apply to QS.

For Foucault, technologies of the self are interrelated with top-down technologies of power stemming from sociopolitical institutions. Technologies of the self are a kind of self-domination (Foucault "Technologies of the Self;" "Cultures of the Self"). At the end of his career, Foucault lectured about the ways in which people were involved with their own self-creation as subjects. If his previous work was about how systems of domination instill the social norms of the self, creating the "soul" of individuals, this later work concerns more closely how those techniques were adopted by individuals. But even these self-making techniques are not free of the structures of power, rather they are some of the most insidious ways in which power installs itself on the "inside" of individuals. He writes,

> technologies of the self…permit individuals to effect by their own means or with the help of others a certain number of operations on their own bodies and souls, thoughts, conducts, as a way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality. ("Technologies of the Self" 18)

But just as his work on punishment and sexuality[17] details the regimes of truth set up to produce an understanding of the essential nature of humans, the self-domination he refers to is likewise guided by intersections of power. Our essential makeup is not given to us by God or nature but is crafted through history and sociocultural conditions. The self has no existence prior to society but emerges as a condition of power/knowledge. Turning those same knowledge structures inward, a "technology of the self" is the result of layers of power and knowledge-structures that people use for themselves in a conscious attempt to craft their own selfhood and experience of being a person. Self-tracking is one such technology of the self.

Yet, as a way to increase autonomy or gain some freedom from constraints, it is important to recognize that technologies of the self cannot be considered in isolation. If the self represents some kind of "inside," it is deeply intertwined with the "outside" of social and political power relations. This Foucauldian concept shines light onto what QS adherents are truly accomplishing. On one hand, QS is a form of "positive power." Yet, we cannot view these forms of power as separate from other forms of top-down or dominating power. Just because QS adherents are self-tracking voluntarily (although compulsory self-tracking is also on the rise) does not mean that is it is necessarily a liberating exercise. In fact, it is a tenant of neoliberal governments that we internalize power structures and then use them on ourselves.

Jamie Sherman argues that while the Foucauldian concept of internalizing surveillance is useful, it is more accurate to say that self-tracking tools provide us with the means to externalize surveillance. She writes, "Such applications encourage us to see ourselves as imperfect observers

[17] See Foucault, *The History of Sexuality: An Introduction, Volume 1; and* Foucault, *Discipline and Punish.*

of our own behaviors, and poor monitors of our physiological states, even while they position us as empowered executives restructuring and optimizing our corporeal selves." Self-tracking, she writes, "unmoors experience from its roots in the place, time, and person" ("How Theory Matters").

Sherman's claim here seems to be that self-tracking can pull data out of experience, thus allowing us to use that data to improve our behavior. Yet, this "unmooring" also allows institutions to use our data. In Foucault's work on the relationship between self and institutional power, he demonstrates that discursive practice of power and knowledge are instrumental in creating subjects (*Discipline & Punish*, *History Of Sexuality Vol I*). Even our bodies are constitutive of power relations. Our bodies are created through discursive practices in the sense that our bodily movements covey meaning only by virtue of the frames of reference established in each epoch of history.

In his discussion of the transition from feudal power to modern power, Foucault details how the kinds of domination previously enacted directly on bodies in the public sphere soon gave way to more hidden and pervasive forms of subjugation. Using regimes of panoptic surveillance, the modern state sought to control populations through knowledge systems. Biopolitics is founded on the idea that knowledge of the population is necessary to control issues of life and death. Thus, birth rates, death rates, state-managed health care and a complete census became tools of institutional control.

Within Foucault's historical account of how institutions control individuals as thinking and acting subjects is the overall concept that even knowledge of the self is not free from the same forms of knowledge/power that would seek to control populations. Thus, the truth of the self in any given epoch is dictated by the same frames of reference that govern population-wide

control. We understand ourselves by the same frames of reference by which we are controlled and made docile by large institutions. In effect, we internalize the truth of our "self" that is best suited to dominating us.

Conclusion

Using technical devices to mediate the body and behavior produces what Foucault calls "the grid of intelligibility." While the rhetoric in the Quantified Self group sees this as way to claim power and knowledge by engaging in one's own self-improvement, they ignore the ways that they internalize power relations by doing so. By seeing data collection as ethically neutral, they do not see the ways in which data practices are imbued with ideology. Practices of self-care and self-knowledge are bound up with how we define the self. Within the QS community, collecting one's own data is a way to break free from the "tyranny of the norm" to establish one's own unique data set. Discovering and defining one's behavior through data is exactly the same practice that big data companies, data brokers, and social media algorithms wish to accomplish. The QS group refines the tools, practices and ideologies surrounding self-tracking.

As Wendy Chun forcefully argues in her *Habitual New Media: Updating to Remain the Same*, "new" media are often defined by the ways in which they inculcate habits into our daily lives. Habits are practices that are automatic and involuntary and seem to come from the depths of our self. Collecting data one's own behavior is one such habit, and like any habit it needs to be embedded into life practices to be normalized. David Harvey writes that given neoliberalism's emphasis on market transactions, governing and institutional bodies will create the structures to extract data and create a market where none existed before. Quantified Self acts in this capacity

to popularize techniques of data extraction and to invent new techniques for collecting data.

Quantified self both creates and promotes new habits, and by doing so creates fields of inquiry that open new markets and forms of data extraction. In the next chapter, I delve deeper into the ideology of improvement within self-tracking. Self-tracking promotes data collection as a habit, without necessarily improving health of well-being.

Chapter 2: Health, Self and Information: ideology of improvement

In this chapter I examine several underlying assumptions related to discourses in self-tracking for fitness and health. I look at how fitness-tracker marketing aims to convince users that wearing a fitness-tracker device increases agency, improves health, and empowers users (Lupton "The Quantified Self"). Clinical evidence suggests that fitness-trackers do not necessarily improve health (Bloss; Finkelstein; Jo; Jakicic; Stiglbauer). Without clear health benefits, fitness-tracker advertising relies on ideologies of self-improvement that enact cybernetic concepts of agency, framing users as managers of data. By presenting data management as an aspirational lifestyle choice, while simultaneously using data to structure their services, fitness-tracker companies are an example of how data companies use the rhetoric of individuality to advance institutional/collective goals.

Fitness-trackers and improvement

Popularized by the Fitbit, and now encompassing dozens of different device manufacturers, fitness-trackers are expected to be a $62 billion industry by 2023 ("Allied Market Research"). Advertisements and marketing materials for fitness trackers rely on a presumed narrative that tracking one's own bodily metrics makes the user not just healthier, but a better person. By invoking a quasi-moral imperative to *improve*, fitness-tracking is ideologically tied to healthism. Healthism is defined as the unexamined assumption that good health is the loftiest goal that humans should aspire towards (R. Crawford). Healthist rhetoric in the self-tracking discourse invokes a cybernetic view of agency. According to cybernetics, an "agent" is not defined by bodily boundaries, but rather consists in flows of information that may cross between

one's body and the world. Self-tracking marketers make the implicit claim that gathering data about one's own body *increases* or *improves* agency, making one more aware and more in control over one's health and fitness. Some consequences of this improvement include changing insurance practices based on fitness-tracking data, exploitative and obfuscating data sharing practices and a robust economy of biodata.

In an April 2017 *Wired* review of the Fitbit Alta HR, a new fitness-tracker offering from Fitbit, the reviewer wrote the following:

> No one needs an activity tracker. Sure, you feel a whiff of superiority wagging your wrist and boasting about how much ground you've covered today. But let's not pretend that wearing a wrist computer makes you a better person. (Padres)

The idea that a fitness tracker can "make you a better person" is a prevalent enough marketing scheme for a Wired magazine writer to invoke the sentiment for a tongue-in-cheek rebuke. Everyone knows that wearing a fitness-tracker cannot possibly make you a better person, yet somehow consumers feel as though they need a wearable fitness-tracker to live a more self-aware and digitally-connected lifestyle. How that consumer mentality is depicted in advertisements is a large part of why fitness-trackers are a fast-growing industry. Fitness tracker advertisements feature images of fit people exercising and eating healthy foods, all monitoring their own behavior via the data stream created by their wearable gadget. The definition of agency implicit in this marketing relies on a model in which improvement is managed by a continual stream of data. The "self" in cybernetics is defined by these data flows, and managing this data well becomes the supposed benchmark of improvement.

Given the cybernetic view of agency implicit in self-tracking marketing, "improvement" as I analyze it here does not simply mean "better health," but instead invokes a sense of getting

better at being a particular kind of person—one who uses data to monitor and regulate their behavior. Marketing materials assume that gathering data makes one a *healthier* person, despite the inconclusive clinical evidence for this outcome. On the contrary, many studies conclude that fitness-tracker users were healthy already before they began using a tracker. At best, fitness-trackers are a corollary of good health and not a cause of good health. Fitness-trackers have become a fashion accessory denoting an allegiance to a lifestyle choice, and a sign of disposable income. High-end fashion and jewelry brands Swarovski, Tory Burch and Coach all sell fitness trackers, and Fitbit and other companies make fitness trackers that look like jewelry (Levi). Fitness-tracker users tend to be wealthier than non-users. One study of 66,000 participants indicated that fitness-tracker users who volunteer to share their fitness data with their doctor were typically young, white and male. They concluded that "patients most at risk for poor health outcomes are least likely to share PFT [personal fitness tracker] data" (Pevnick).

> In a 2014 Nielson study, fitness trackers wearers were mostly young and affluent.
>
> The majority of wearables owners are young, with nearly half (48%) between 18-34 years old, and men and women are equally likely to don wearable tech. Perhaps not surprisingly, three-quarters of wearables owners consider themselves "early adopters" of technology (while only 25% consider themselves "mainstream"). And to support their love of the latest devices, these digital trendsetters typically have more disposable income, with 29 percent making over $100,000. ("Tech-Styles")

These findings led a 2015 study to conclude that the majority of people who use fitness trackers are the people who need them the least (Patel et al. 459).

Fitness-tracker marketing invokes a view of the self that is expressed in informational terms. Information is a key term within cybernetics (Weiner). Information is the channel or medium through which communication occurs—communication can mean a conversation

between two people, or the communication between the central nervous system and vital organs, or between a person and a machine. Fitness trackers allow users to measure data based on bodily processes and movement (i.e. step count, heartrate, or blood pressure), and moreover allow users to experience their body and behavior *as data*. Fitness-tracker marketing seizes upon this concept of the body-as-information. From this basic assumption, consumers are led to believe that more data about one's own body leads inexorably to better health, an unproven assumption that purports to buttress the supposedly self-evident claim of the body-as-information.

At first glance, it may seem obvious that wearing a fitness-tracker leads to more knowledge about one's state of health and therefore to healthier habits. And indeed, fitness tracker advertisements assume a self-evident stance that more knowledge must lead to healthier behavior. However, the effectiveness of fitness-trackers to change health and fitness habits is dubious. Despite rhetorical claims to improvement and increased agency, fitness-tracking devices do not put users on a clear path towards good health. Ultimately, the rhetoric of improvement targets not healthy behaviors at all, but a reliance on data as a means of self-management.

Data as a means of self-management is not simply an extension of older methods of self-observation. By utilizing wearable devices that create data as a proxy for movement, the fitness tracking industry capitalizes on a trend in the technology world to make technological "quick fixes" for complex social and behavior problems that are ill-served by the kinds of solutions offered by Silicon Valley (Morozov). As fitness trackers become part of cost-saving initiatives from insurance companies and workplaces, the supposed health benefits of fitness-trackers become reified despite ample evidence to the contrary.

The growth of wearable fitness trackers in recent years has been accompanied by a vibrant advertising effort to popularize these devices. Advertisements depict healthy people taking control over their exercise habits by applying contemporary forms of data-based management to their own bodies. By using data that appears to be self-evidently "true," fitness-trackers purport to offer a better way to relate to the body. By positing the self as a data-hungry managerial entity that observes, critiques and improves the body, fitness-trackers advertisements offer a unique viewpoint into the cultural currents surrounding fitness, self, technology and data.

Marketing for fitness-trackers revolves around tracking the body and improving one's health by collecting metrics based on bodily movement. Fitness-trackers can improve our health, these advertisements purport to show, by giving us access to the previously hidden data about our bodily movements. We are empowered by data, and we experience an increased agency because of data, the implicit claim goes. Even more than this, the rhetorical claims of *improvement* go beyond merely health-related behaviors, and embrace a wholesale improvement of the self.

Moral concepts of Self and Health

The connection between moral evaluation and the self has a long history in western culture. Philosopher Charles Taylor's 1989 book *Sources of the Self* details the evolution of "self" in western civilization as a moral concept. He argues that our conceptions of self take place against often unseen moral backgrounds. Examining our experience of inwardness, for example, Taylor traces philosophical approaches to how one should attune oneself towards the external world and in seeking the good life and truth. In the ancient world, Platonic and

Aristotelian concepts of universal order came to be seen as guides for behavior. Truth was understood as emanating from realms outside of the body and mind.

During the enlightenment, Cartesian skepticism and rationality separated the worldly sensible realm from the mental inner realm. The inner realm of the mind had access to pure rationality and order, not the messy and untrustworthy realm of bodily senses and the external world. As an immaterial and immortal substance, the mind had exclusive access to the rational order given to us from God. Thus, how to live a good life and how to make good choices was believed to emerge from a world apart from physical objects. The material world could not be trusted to provide the basis for moral action.

Echoes of this cleaving of the world into two domains, mind and matter, can be seen today in how we approach truth, sensation and instrumentation. Data emanating from wearable gadgets supposedly produces "truths" about the body that are *more* true than those feelings and sensations produced by the body itself. As Don Ihde explores in his work[18], scientific and quasi-scientific instruments are often construed as *creating* truth, but in reality, these devices are mediating between humans and the world by changing how we experience the world. When we see an object *through* a telescope, for example, what we really experience is the mediation of the instrumentation itself. Taking a cue from Heidegger, Ihde describes how this relationship can become transparent (it "withdrawals" or becomes "ready to hand"), such that it seems as though we experience the world directly. By exploring the phenomenology of mediated experience, Ihde

[18] See particularly *Technics and Praxis; Existential Technics; Technology and the Lifeworld: From Garden to Earth*; *Bodies in Technology*; and *Heidegger's Technologies: Postphenomenological Perspectives.*

argues, we can recognize this withdrawal or transparency of technology, and start to bring the mediation itself into focus.

Instrumented experience often has the flavor of seeming more real or more true than un-aided experience. Debates about whether humans are capable of discovering transcendental truth outside of our own interpretative mechanisms run the risk of dissolving into arguments about the relative "realness" of objective truth. Ihde does not dwell on idealist interpretations of truth but focuses on a phenomenological approach to technology's mediating role on revealing our world to us. Technology changes experience and therefore alters our conceptions of what the world is like. Ihde's point in this research is to remind us that truth is a slippery concept, especially when we neglect to theorize and take notice of the tools that mediate our world.

Ihde and Taylor coalesce around issues of self, experience and action. How we frame questions about action are bound up with own place in the world relative to reason and sensation. Fitness-tracking, and the imagery and narratives surrounding personal data collection, highlight a particular example of this blend of personal identity/moral evaluation and the search for truth in a complex world. By positing healthy behavior as the ultimate moral good—the way that people *should* live their lives—fitness-trackers participate in "healthism," first coined by Robert Crawford in 1980. Health, or "wellness" (a term used more often today to refer to a host of lifestyle choices[19]), is an example of a "hypergood." Hypergoods are, for Taylor, those "goods which not only are incomparably more important than others but provide the standpoint from which these must be weighed, judged decided about (63).

[19] See, for instance, Cederstrom and Spicer, *The Wellness Syndrome*

Crawford used the term "healthism" to explain the general assumption behind a set of popular health trends at the time. The self-help movement and the holistic health movement both involved the regime of "healthism" that, like medicine, placed medical intervention at the site of the individual and elevated health as a "super-value," or "a metaphor for all that is good in life." Healthism, he argues, "reinforces the privatization of the struggle for generalized well-being" and excludes the targeting of community or social causes of poor health (365).

Many of the critiques of healthism offered by Crawford equally apply today to self-tracking. Like those movements that Crawford characterized as healthist, self-tracking enforces an individual approach to health that removes the individual from the context in which "health" is defined as a value. Importantly, both healthism and self-tracking create the conditions to nourish the "illusion of autonomy" in spite of actually producing conditions in which "private efforts become the model for social practice…[reinforcing] a medicalization of life which leaves us powerless to control our own fate" (375). While fitness trackers are advertised for their ability to give users a perch from which to use data as a means of self-improvement, they also force an intervention into "regular life" that medicalizes and creates data from behavior that was previously outside the realm of computation and datafication.

Healthism (and its corollary, "medicalization") are regimes of truth that seek to define health matters at the level of the individual, and tend to produce a model of health that proclaims that the individual is the substantial cause (and source of cure) of their own health problems. Even if this type of solution works for some particular problems and produces a feeling of increased autonomy for one person, once individual-oriented health solutions become a matter of public policy, we run the risk of losing the political will to solve to solve health problems at a society-wide level. Crawford writes,

> Those who adapt such models [of individualized care] choose to ignore the structural conditions which produce in our society the behaviors, attitudes, and emotions upon which so much attention is now focused." (375)

By focusing on individual responsibility and "empowering" individuals to be the site of their own cure, healthism cultivates a depoliticized thinking about the causes of poor health. As we focus on individuals, we go down a path of denying structural solutions to complex social problems.

Fitness-tracking likewise places the onus on individuals to find their own cures for poor health. Crawford's description of healthism as it emerged in the late 1970s forecasted many of the ideologies behind contemporary trends in self-tracking today. The Quantified-Self focus on empowerment and questioning "norms" eschews the established medical models in favor of individualized approaches to diagnosis and treatment. Emerging from the same context, narratives surrounding fitness-tracking approach health as an individual behavior, even if it is tied to "social" networking. Thus the individualized approach to health care and improving one's own health behaviors by taking personal intervention echoes the same neoliberal governmentality ideology explored in chapter one.

That fitness-trackers lead to healthier habits is taken as a matter of course in fitness-tracker marketing. This "obvious" fact is arrived at by an assumption: a major cause of poor health stems from our lack of knowledge of our own bodies. The more knowledge we have, the better decisions we can make. This is seductive reasoning, and one that has clearly taken hold for the millions of fitness-tracker users. Yet this stance also narrows the problem-space of "health" to within limits that are amenable to particular solutions—those involving computation, data

gathering and wearable sensor technology. By utilizing the language of improvement and knowledge, all held together by an emphasis on information, fitness-trackers epitomize what Evgeny Morozov calls “solutionism.”

Morozov on Solutionism

In his 2013 book, *To Save Everything, Click Here: The Folly of Technological Solutionism,* political scientist and technology critic Evgeny Morozov lays out a theory of Silicon Valley’s approach to innovation that he terms “solutionism.” Borrowing this term from architecture and urban planning, in which “solutionism” describes designers with an “unhealthy preoccupation with sexy, monumental, and narrow-minded solutions.” Quoting designer Michael Dobbins, Morozov writes that solutionism “presumes rather than investigates the problems that it is trying to solve, reaching ‘for the answer before the questions have been fully asked’” (Morozov 6).

Throughout his work, Morozov takes aim at the solutionist tendency in Silicon Valley, where seemingly quick, easy and efficient technological solutions are designed to disrupt current processes in government, education, medicine, and other institutions. Morozov is not against technological progress per se, but raises valuable questions about what is being erased and ignored as we push for technological-based solutions to problems that are ill-suited for a technological overhaul. As Silicon Valley entrepreneurs re-frame problems in our current institutions to be amenable to technological innovation, they may ignore actual problems in favor of concocted ones that fit the narrative they are trying to tell. As it applies to self-tracking, Morozov’s take on solutionism develops an important critique against the self-tracking trend.

Ultimately, solutionism is about putting the means ahead of the ends. Tracking one's metrics of "health" using a digital self-tracking device, or even using non-digital tools, defines the problem-space of "health" in the terms and units that are amenable to quantification and "datafication." Morozov argues that instead of deliberating about structural causes or complex sets of factors, quantification appears to reduce the complexity of problems to manageable bits. The problem in attempting to achieve efficiency is that sometimes we are not solving for actual problems but are creating new ones in an attempt to cut through complexity. For example, fitness trackers have been shown to increase feelings of anxiety and depression surrounding body image and weight loss, and can exacerbate eating disorders, as well as increase feelings of competition, guilt, and negative internal pressure in adolescents (Kerner; Etkin)

The rhetoric of self-tracking marketing applies a solutionist spin on health, wellness, autonomy, improvement and knowledge. By collecting one's own data, self-tracking purportedly puts us on a pathway towards better health. By turning "health" into a series of data points, the murky, ill-defined questions about *how to be healthy* are reduced to a manageable set of numbers and trends. But we cannot assume, Morozov reminds us, that that our metrics are well-equipped to answer important questions. The danger is in assuming that the questions are settled, and that the data simply gets us closer to answering those questions. Often, he argues, the data-collection mechanism is what drives the questions being asked, not the other way around. We ask the questions for which our technologies can give us the answer, even if that answer does not help us very much. The power and money of Silicon Valley propels this cycle forward, in which the technological tools often drive the questions being asked, not the other way around.

Research in Fitness Tracking for Health

Fitness-trackers, also variously called “wearables,” make up a large and growing sector of the technology and health industry. Companies such as Fitbit, Garmin, Apple, Samsung, Huawei, and Xiaomi sell wearable devices that communicate with smart phones and computers to detect movement using relatively inexpensive sensors. An accelerometer, for example, is a common sensor found in many wearable devices that measures motion in multiple directions. Using proprietary algorithms, a Fitbit or similar device analyzes the motion detected by an accelerometer and identifies the bodily motion of, for example, riding a bicycle or walking. The user typically sees a graphical display indicating their cumulative metrics on the wearable device itself or on a wirelessly connected computer or smartphone. Fitness-tracker devices can also include a GPS for location, altimeter for altitude, and bioimpediance or light sensors for heartrate (Nield).

There is substantial evidence that self-tracking does not lead clearly towards better health outcomes. Given this body of research, the trend of reducing complexity in favor of a simple, efficient way to manage one’s health is revealed to be just that—a management schema that reduces complexity but ignores the nuance of a complicated phenomena with many factors involved.

The aesthetics of fitness-tracking advertisements echo a strong commitment to the ideologies of wellness, improvement and cybernetic agency. These strategies to popularize and sell fitness-tracker gadgets rely, at least somewhat, on the assumption that fitness-tracking is good for one’s health. Fitness tracker advertisements purport to show an increase in knowledge and motivation which leads to an amorphous “improvement.” However, many scientific studies about the effectiveness of fitness-trackers reveal that this assumption is misplaced. Fitness-trackers do not put people on the road to good health just by virtue of wearing a tracker. Of the

empirical research on the effectiveness of fitness trackers, results are inconclusive and some show a neutral or outright negative effect on health outcomes.

In a large 2016 study, researchers at the University of Pittsburgh designed a study to measure how much fitness trackers contributed to weight loss outcomes, compared to other interventions (Jakicic at al.). Recruiting almost 500 overweight men and women, researchers found that using an activity monitor made no significant difference in the participants' ability to lose weight. During a six-month period, all participants followed a low-calorie diet and were urged to exercise at least 100 minutes per week. All participants in the study lost weight during this six month period. For the next 18-month period, half of the group kept an online exercise journal, and half of the group wore an activity tracker. The group that wore the activity tracker lost, on average, 8 pounds during the entire length of the experiment. The group that had self-monitored their activity using an online journal lost, on average, 13 pounds during the length of the study. While the authors stress that this difference is not *statistically* significant, their results indicate that fitness trackers alone cannot drive behavioral change leading to weight loss.

The design of the study compared the difference between standard weight-loss intervention program and an "enhanced" intervention program. The standard intervention included daily journaling, exercise and food consumption guidelines, and encouragement from clinical staff, and the "enhanced" intervention added the activity tracker. The authors conclude that, "Devices that monitor and provide feedback on physical activity may not offer an advantage over standard behavioral weight loss approaches" (1170). This study is important because the enhanced intervention group (using fitness-trackers) also practiced the journaling, exercise and food guidelines practiced by the standard group, thus directly comparing the benefits of adding a fitness tracker to a weight-loss routine. This study was the first of its kind in its duration and

large number of participants. Weight-loss is, of course, not equivalent to improving health, and a wealth of research suggests that there is no ideal weight. Yet as research into the effectiveness of fitness trackers to help people lose weight, this study casts doubt on whether activity trackers live up to the claims. Given that weight-loss is one of the most cited reasons for wearing a fitness tracker, their effectiveness in this domain is crucial to addressing the accuracy of their marketing.

One important and often-found result in fitness-tracker studies is that many people will simply stop using them after a short period of time. In one study of over 6,000 users by Boston-based Endeavor Partners, a technology business consulting firm, they found that more than half of users stopped using their tracker altogether, and one-third of them stopped using it within six months of purchasing the device (McCaffrey). A 2016 study, measuring the effectiveness of fitness trackers on weight-loss, reported similar statistics. Despite some monetary incentives, 40 percent of participants stopped wearing their fitness tracker within 6 months, and 90 percent had abandoned their fitness tracker by 12 months (Finkelstein 983).

That same 2016 study that reinforced the abandonment rate of fitness trackers also concludes that fitness trackers, by themselves, do not aid weight loss or overall health outcomes. This study, led by Eric Finkelstein at Duke-NUS Medical School in Singapore, summarized the study by saying, “Knowing how active you are doesn’t translate into getting people to do more and the novelty of having that information wears off pretty quickly” (“Fitbit likely won’t improve your health”). The study looked at 800 adults, dividing them into 4 groups. The first group (control group), received information about healthy exercise habits and about $3 per week for participating in the study. All other groups received a Fitbit Zip tracker in addition to information about exercise. Of the 3 “Fitbit” groups, the first group received about $3 per week. The second group received about $11 per week if they logged over 50,000 steps. The third Fitbit

group received the same monetary reward, but this money was donated to charity on behalf of the participant and was not given to the participant personally.

The results of the study showed that, after 6 months, the group who received the Fitbit and the cash payments demonstrated the largest increase in physical activity. They recorded, on average 29 extra minutes of moderate to vigorous physical activity (MVPA) per week, compared with the control group. The charity group recorded an average of 21minutes of MVPA per week over the control group. At the 12-month mark, the groups who received either cash payments or charity donations showed the most improvement over the control group. Important to note here is that none of the participants, even those in the Fitbit groups who showed modest increase in physical activity, had any measurable improvements in weight loss or blood pressure.

The authors stress that "we identified no evidence of improvements in health outcomes, either with or without incentives, calling into question the value of these devices for health promotion… The preponderance of evidence suggests that activity trackers have little ability to improve health outcomes related to inactivity" (Finkelstein 983-84). The differences between the control and the Fitbit groups were not maintained after the monetary incentives were removed after 6 months. These results indicate that the presence of a Fitbit itself, separated from any other incentives does not improve health outcomes. A different study concluded much the same, that the presence of a fitness tracker alongside of a traditional exercise program did not offer any additional benefits for patients recovering from knee surgery (Smith et al.).

As a 2018 systematic review in the American Journal of Medicine revealed, there have been relatively few randomized control clinical trials of wearable fitness trackers. Of the 550 studies looked at by Jo et al., only 6 met the criteria of studies with "randomized clinical trials and quasi-experimental studies that demonstrated the effectiveness of wearable devices." Based

on these studies, the authors found "little indication that wearable devices provide a benefit for health outcomes" (1394). They write,

> There is no effect of wearable devices alone without feedback on reducing blood glucose level, blood pressure, and cholesterol levels. The use of wearable devices alone was not associated with weight loss. (1395).

While they write that there may be motivational effects of wearing a fitness tracker, there is no evidence for consistent health benefits. Despite their findings, they also write that adoption of wearable fitness trackers is expected to increase, and that the growth of these devices is especially prevalent in the health insurance and workplace wellness contexts.

Another study, this one conducted by Scribbs Wired for Health organization in 2014, showed that a variety of health-monitoring devices failed to improve patient outcomes or costs to patients. In the randomized trial, 160 patients were separated into either a control group or an intervention group. Those in the intervention group were given a health monitoring tool customized to their condition. Patients with hypertension were given a Withings blood pressure monitor, patients with diabetes were given a Sanofi IBGStar blood glucose monitor, and patients with heart arrhythmia were given an AliveCor ECG device (Bloss et al.).

Despite the increased knowledge that these patients supposedly had concerning their condition, the study saw no reduction in costs or better health outcomes as a result of their device. For instance, the patients saw no reduction in the number of hospital visits. Director of the Scripps Translational Science Institute Eric Topol said in an interview,

> A lot of people thought, if people have access to their data they're going to end up tapping more into medical resources. Well, we certainly didn't see that. So that was

encouraging, but obviously we would have liked to reduce the need for emergency rooms and office visits and hospitalizations. (Comstock)

Increasing motivation is a complex phenomenon. The above studies indicate that wearing a fitness tracker does not by itself increase motivation or improve health outcomes. Part of this lack of behavioral change may be that fitness-tracker users start to pay attention to their digital gadgets and not to their own internal assessment of their activity level, eating habits and exercise habits. Anecdotal articles[20] on the curious phenomena of people *gaining* weight while using a fitness tracker may indicate a conclusion Morozov would agree with: the "quick-fix" of wearable fitness trackers leads to a mis-assessment of one's own exercise habits. More "knowledge" about step count, calorie intake and other measurable metrics produces more information but less understanding. These reports back up the 2016 Pittsburgh study, during which the Fitbit group gained weight during the overall course of the study.

A 2017 study from the University of Brunel in the UK demonstrated another negative outcome for wearing fitness trackers (Kerner). In a study aimed at 13- and 14-year-old adolescents, researchers sought to show how fitness-trackers affected their motivation for physical activity. Based on questionnaires and focus group interviews, the researchers concluded that fitness trackers increase feelings of competition, guilt, and internal pressure. It is believed

[20] See "My Fitbit is Making Me Fat." *NY Post.* Christian Gollayan December 20, 2016; "Fitness band frustration: Users complain of weight gain with trackers." Jacoba Urist. *Today.* Jan. 8, 2016. https://www.today.com/health/fitness-band-frustration-users-complain-weight-gain-trackers-t66146

that these feelings caused an increase in physical activity initially, leading to an eventual decrease in motivation.

Mitesh Patel, the director of the University of Pennsylvania Pearlman School of Medicine "Nudge Unit," wrote in 2015 that the missing link between health outcomes and mobile wearable devices is the difficult task of creating new habits. He writes, "If wearable devices are to be part of the solution, they either need to create enduring new habits, turning external motivations into internal ones (which is difficult), or they need to sustain their external motivation (which is also difficult). This requirement of sustained behavior change is a major challenge, but many mobile health applications have not yet leveraged principles from theories of health behavior" (Patel).

In Carl Cederström and André Spicer's book, *The Wellness Syndrome,* the authors describe our current preoccupation with wellness as a type of ideology which has overrun our concepts about health, individuality and moral evaluations of personal identity. They write, "When health becomes an ideology, the failure to confirm becomes a stigma" (4). Healthy behaviors (and worse, unhealthy behaviors) are viewed as ingrained into one's character, not as isolated aspects of one's daily routine. This conception of wellness fits in neatly with healthism, and well as with the growing reliance on cybernetic metaphors to describe the self and the body. If wellness is the ideology, then data collection in the form of personal fitness-tracking is the tool that is now inscribed as necessary and natural in order to live one's life in attune with contemporary forms of wellness.

Wellness, for Cederström and Spicer, is an ideology that is firmly embedded into contemporary capitalism. Obesity is equated with lazy, unproductive workers. Workplace wellness programs enforce compliance to wellness regimes in which workers are expected to attune their bodies to the demands of the job. Knowing about your own health (including through

self-tracking), is increasingly seen as part of being a productive member of the economy. These practices are tied to moral evaluation because they set the scope of how we ought to perceive ourselves. Tying this back into Taylor's argument that moral evaluation is inseparable from concepts of selfhood, Cederström and Spicer write,

> Today, wellness is not something that we choose. It is a moral obligation. We must consider it at every turn of our lives. While we often see it spelled out in advertisements and life-style magazines, this command is also transmitted more insidiously, so that we don't know whether it is imparted from the outside or spontaneously arises within ourselves. (6)

Through advertising images depicting fitness-trackers are part of a healthy lifestyle, fitness-tracking is seen as simply accompanying other markers of wellness like healthy foods and exercise. The "desire" to self-track therefore, comes from the murky origin that Cederström and Spicer describe—partially from the "inside" as a genuine desire to learn more about one's own body, and partially from "outside" as the ideology of wellness makes us see fitness-tracking as natural and normal.

Security and Accuracy Concerns with Fitness Trackers

In additional to doubts about the effectiveness of fitness trackers to change health outcomes and the consistency of use, researchers are casting doubts on the accuracy of consumer fitness trackers. In a 2017 study, researchers at Stanford University tested seven different fitness trackers: The Apple Watch, Basis Peak, Fitbit Surge, Microsoft Band, Mio Alpha 2, PulseOn and the Samsung Gear S2 (Shcherbina et al). While heart rate was fairly accurate for 6 of the 7

devices (5% error rate), all of the devices had an error rate of greater than 20% for energy expenditure. Using clinical grade FDA-approved equipment as a control, researchers tested the consumer devices against their medical counterpart. The authors conclude that device manufacturers should be more transparent in their relative accuracy of their devices, especially as these devices are starting to be perceived by the public as medical devices and are presumed to be accurate.

The relative inaccuracy of fitness tracker devices led one group of users to file a class-action lawsuit against Fitbit for their claims made in advertisements and marketing. Based on the "PurePulse" product, the lawsuit maintains that Fitbit misled customers about the accuracy of its product. Plaintiffs claim that the product often failed to measure any heart rate at all, and when it did detect a heart rate, it was inaccurate up to 75bpm. As of June 2018, the lawsuit was allowed to continue. A judge threw out the motion from Fitbit to dismiss the case ("Federal Court").

Fitness trackers companies, like any other data-rich industry, are a target for malicious hackers. In March of 2018, Under Armour suffered a data breach, and 150 million users of their "My Fitness Pal" application were affected, including stolen usernames and email addresses (Aiello). One year later, in February 2019, those credentials were being sold illegally on the "dark web" (Newcomb).

In January of 2018, the United States military became aware of compromised security and privacy of supposedly secret overseas US Military bases due to the data sharing practices of fitness-tracker company Strava (Hern). In November 2017, Strava published a "heatmap" comprised of over 3 trillion individual GPS points collected from users' running routes. Some of these routes included soldiers on US Military bases whose locations were not publicly known. In

areas such as Afghanistan, Djibouti and Syria, the heatmaps were mostly dark—with the exception of bright dots in areas suspected to US Military bases. Soldiers on bases who were using Strava fitness trackers and tracing their running routes were inadvertently revealing the location of these bases. Because some of the GPS points were of individual users, the patrol patterns and the general movement of personnel through the bases were clearly evident on the heatmap, raising significant privacy and safety concerns for solders (Martin).

A 2018 report by security firm Symantec revealed the poor security practices of many fitness trackers (Barcena et al) [21]. Using $75 worth of consumer grade electronics and minor programming, researchers were able to build a portable device that could effectively hijack data coming from a fitness tracker. Using a Raspberry Pi mini-computer, together with Bluetooth receiver, their device was able to steal passwords. 20% of fitness trackers they tested sent passwords over unencrypted clear text. They also found a vast number of marketing/analytics where data was transferred to, including marketers and analytics firms. In many cases, they write, the privacy policy of the fitness tracker did not disclose the data transferred to these companies. The data transferred was often metadata.

> Metadata collection appears to be considered as fair game. Therefore, it is not surprising to find that many of the third-party domains being contacted belong to CRM/analytics and marketing services. These services allow the app provider to monitor and track user behavior in relation to how users use the app and respond to different offers and features. It is great for the app developers because it allows them to conduct user research and gain insight into user behavior. (Barcena 26)

"Improvement" in Fitness-Tracker Advertisements

[21] See also "Doping your Fitbit: On Fitbit Firmware Modifications and Data Extraction" https://media.ccc.de/v/34c3-8908-doping_your_fitbit

Fitness-tracking has become not simply a way to achieve healthier habits, but a way to redefine and reduce what "health" means for the individual. Fitness-tracker marketing capitalizes on a specific narrative about improvement to bolster its claim to healthier outcomes. Fitness-tracking promotes the idea that our un-aided bodies are untrustworthy sources of information, while prioritizing the idea that achieving a healthy body is technical problem to be solved by gathering data. The "improvement" touted is both an attempt to gain mastery over the unruly and untrustworthy body (echoing Descartes), as well as an epistemic strategy to redefine what makes for a valid truth about the body and health. By defining the space and limits of truth as it relates to the body, fitness-tracking engages in (per Taylor) the age-old debates about how questions about how to live relate to truth, reason and worldly sensation.

By positioning the body as an untrustworthy source of information and the self as in need of improvement, fitness-tracker advertisements create a narrative in which truth cannot originate from bodily sensation. Simply put, our un-aided bodies can't compete with the kinds of truth produced by technological gadgets. Quantitative information, not proprioceptive sensation, is what humans needs to truly improve. The trouble with this narrative, as seen above, is that the health outcomes are dubious. Yet what is undoubtable is the strong association made in the marketing materials between data collection and improvement. Simply put, fitness-trackers may not improve health, but they inspire a certain kind of aspirational lifestyle—one in which we can become better cybernetic agents who use data flows to manage behavior.

Fitness-tracker advertisements position the user as better equipped to use information as a basis for change. These rhetorical claims are quasi-moral because they see healthy behaviors as not simply beneficial to health, but an overall improvement of one's life and well-being; a new

way that we ought to be. In their advertisements for wearable fitness-trackers, Jawbone and Microsoft invoke the concept of a "better" self that is just out of reach (see figure 1 and figure 2).

Figure 1. Advertisement for Microsoft Band.

https://money.cnn.com/2014/10/30/technology/innovationnation/microsoft-band-better-human/index.html Accessed 6 March, 2020

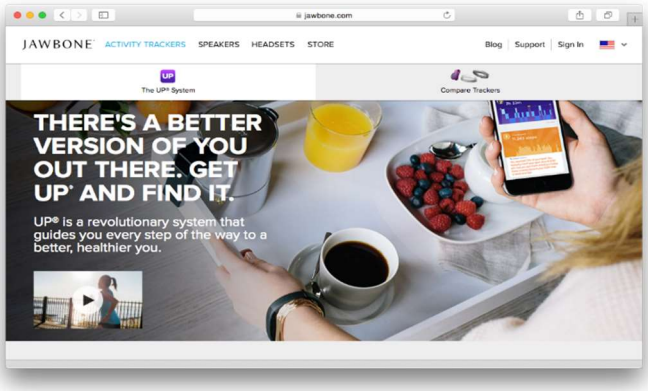

Figure 2. Advertisement for Jawbone Up. http://www.jawbone.com. Screenshot taken October 15, 2016.

Other fitness-trackers implore users to "perform better," (see figure 3 and figure 4) or "live smarter" (see figure 5). The terms used in these advertisements point to a narrative in which the

unaided human body is faulty in some way, and that these devices correct and improve upon a faulty “natural” substrate.

Figure 3. Advertisements for Oura. https://ouraring.com/ Screenshot taken October 15, 2016.

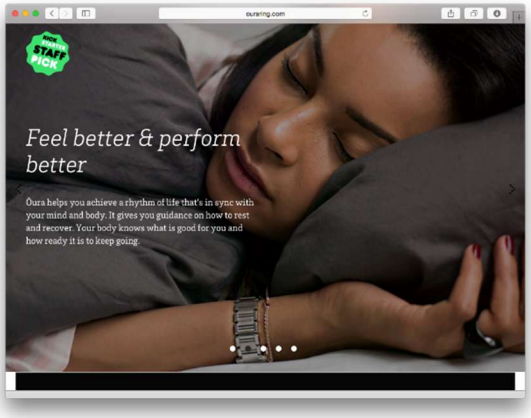

Figure 4. Advertisement for Oura. https://ouraring.com/ Screenshot taken October 15, 2016.

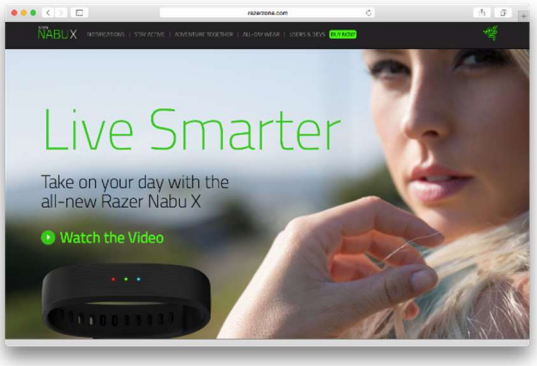

Figure 5. Advertisement for Razer Nabu X. https://www.razer.com/ Screenshot taken October 15, 2016.

Motivation is a complex phenomena. As much of the above research suggests, behavioral change is difficult to achieve and gathering more data does not necessarily aid motivation. The idea touted here is that insight is instant. The presumption being that all users were lacking previously was the ability to view their progress. Again, we see the faulty assumption that information is the same as knowledge, and that information inspires behavioral change.

Fitbit's "Charge 3" advertises its usefulness: "to improve your health, you have to know yourself." And to "make the invisible visible.[22]" The rhetoric here stresses that the numbers generated from the Fitbit are simply invisible before they are gathered. Quantification is a matter is revealing what is already there; an "objective" measurement. Learning one's numbers is a way to improve one's health.

[22] https://www.fitbit.com/shop/charge3

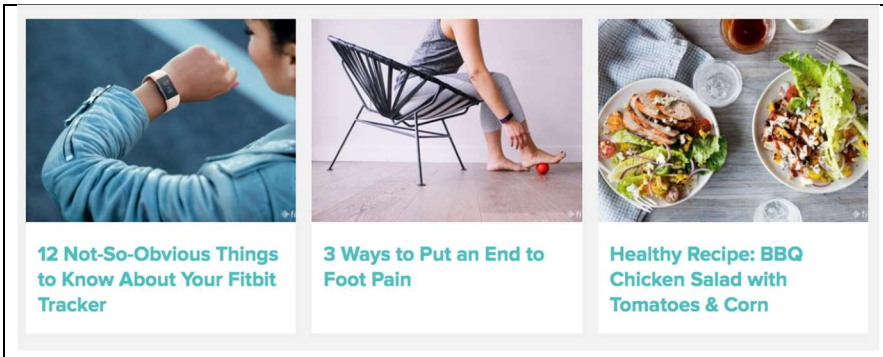

Figure 6. Screenshot taken from http://www.fitbit.com/blog. September 14 2018.

Fitbit's blog (Figure 6) showcases posts about the technical capabilities of their products and tips on how to use them. It also features stories that have nothing to do with fitness-tracking per se, like this post on a healthy recipe. This triptych encapsulates a clear marketing strategy: convince people that fitness-tracking is an important part of living a healthy lifestyle. Here we see the progression from technical gadgetry to health tips and food. These topics are combined with a strategy of simplification and reduction through quantification (e.g. *12 things*, *3 ways*). This imagery is so common that we may forget that healthy eating and fitness-tracking are bound together only through narratives about how to live; A moral imperative to be particular kind of person is on display through these images.

Apple's watch adopts many of these same terms and marketing strategies that have come to be associated with the wearable computing market. Apple writes, "Apple Watch Helps you make progress and see the results" and they describe their watch as "The most personal product we've ever made." [23] By harnessing the term "personal," Apple promises a product that delivers a unique and individualized experience.

[23] http://www.apple.com/watch

Like many of their fitness-tracking competitors, Apple's watch trades on the rhetoric of self-empowerment. By promising increased knowledge about your behavior, and a useful method to track your health statistics, Apple's advertising message conveys that their watch increases agency. It is a way to take control over certain aspects of your life. Under Armour uses the slogan "Exercise Smarter. Feel Better. Live Longer" to advertise their *Healthbox*, a collection of multiple health products: a wearable fitness tracker, a "smart" scale, and a heart rate monitor ("Under Armour Health Box"). This language privileges a tight connection between technology and health, in which more technology and more information about one's own body will lead to better health, and even to an increase in life span. In addition to this *healthist* language, Under Armour also depicts their smart phone app (the central control mechanism for their products), as "your body's dashboard" ("Under Armour Health Box"). This claim is *cybernetic* in that it views the body in terms of information.

Through harnessing the power of information about one's bodily movement, fitness-tracking advertisements offer a compelling narrative that "truth" about the body leads to improvement in health. Fitness-trackers increase our sense of agency because we are better equipped to handle certain kinds of problems, we are led to believe. By reducing the causes of poor-health to a lack of quantitative data, technology companies are seemingly offering us a cure-all. If agency (per cybernetics) is expressed in terms of information flows, becoming a better equipped agent means collecting data and controlling those information flows.

Cybernetics and the Body of Information

In *The Human Use of Human Beings,* Norbert Wiener outlines his theory of communication called cybernetics. Beginning with the series of "Macy conferences" in the 1940s and 1950s, Wiener and a group of other scholars sought to devise a theory of messages that would explain information exchange between biological and mechanical entities. Wiener's contribution adds several key terms to cybernetics: the concepts of feedback, information and entropy. In general, his goal in this work is to explain communication between humans and machines in terms that apply equally well to both entities.

Learning, for Wiener, is a process by which past results are fed back into a system. Any system can learn, provided that it uses feedback to direct future performance. Cybernetic communication is essentially about information exchange. Just as two humans can exchange information via words, a human can communicate with a machine through whatever "sensory" organs the machine has—be they photoelectric cells or the "taping" system that controlled computing machines of the time.

Throughout his book, Wiener uses analogy to describe humans and machines in the same terms. He writes, "when I give an order to a machine, the situation is not essentially different from that which arises when I give an order to a person" (Wiener 16). Messages, for Wiener, contain information, regardless of physical format. Whether the recipient of a message is a human or a machine is irrelevant, provided that the machine or the human has the right sensory organs. Machines have "sense organs" that act as "receptors for messages coming from the outside" (Wiener 23). The human body, argues Wiener, is made up of message relays. Memory, for both human and machine, is a matter of storing data and retrieving that data when needed. The nervous system is a switchboard that sends or blocks electrical impulses from traveling down certain pathways.

In all of his equivalences between man and machine, Wiener focuses on one concept that binds them all: entropy. Entropy is the inevitable loss of information that comes whenever a message is sent. And, because organisms are primarily made up of information relays, keeping entropy to a minimum is the essential function of any system—biological or mechanical. Wiener writes, "the machine, like the living organism, is…a device which locally and temporarily seems to resist the general tendency for the increase of entropy" (Wiener 49). Thus, machines and organisms receive their ultimate construction of equivalence in terms of entropy. The essential feature of both organisms and machines is that these systems resist entropy, at least temporarily.

In Wiener's concentration on information, he argues that the ultimate essence of any individual is the way in which their organizational structure resists entropy. Organization is the mark of individuality, not bodily presence or a transcendental self; We are patterns of information, argues Wiener. Combined with his formulation of the informational nature of messages and feedback, he constructs a theory of the self and individuality that is inseparable from the data coming in and out of the organism.

Contemporary fitness-tracking maintains the same central tenets of the cybernetic concept of "self:" information exchange is not just a management schema, but is inseparable from what it means to be a person. If the self is seen as the aggregate of all the information flows in and out of the body (and within the body), then the differences between technological devices and biological material is erased. "Improvement" is equivalent to increasing one's awareness of data and becoming better at managing that data.

Katherine Hayles, in her 1999 book, *How We Became Posthuman*, argues that Wiener and the other cybernetics scholars relied on a theory of information in which information is essentially dis-embodied. For Hayles, this poses a problem for cybernetics because information

must always be embodied in some medium, and the specific format or medium of information matters for what a system can do with that information. Hayles argues that the only way that Wiener can show that humans and machines are essentially similar is through the rhetorical strategy of analogy. Simply by stating that humans and machines sometimes do things that seem similar, Wiener sets up an analogical relationship that is difficult to argue with conceptually. In his use of analogy, Hayles argues, Wiener "erases from view the very real differences in embodied materiality, differences that the analogies did not express" (Hayles 99). By abstracting to the analogical relationships between things and processes, Wiener avoids the specificity and materiality that accompanies any procedure, including scientific experimentation. Analogy ensures conceptual matches, but erases physical and real differences.

And indeed, looking at the history of cybernetics, Hayles correctly argues that the analogical relationship between humans and machines is embedded in the language that Wiener and others used to describe cybernetics. By using "information" as a bridging term that connects humans and machines, the cybernetics movement re-conceptualized actual human bodies in terms of immaterial, non-embodied data. The success of cybernetics concepts to overtake our understanding of diverse fields such as psychology, ecology, cognitive science, and economics leads us to what Hayles calls the "posthuman." If *human* was defined by physical presence, *posthuman* is defined by pattern and information. The problem, argues Hayles, is that our bodies never went away, they were simply hidden conceptually, or seen as less important than data flows.

The view of the body that privileges information and pattern (what Hayles calls a *posthuman* viewpoint) over presence and corporeal boundaries (a *humanist* perspective) brings with it the assumptions that underlie cybernetics systems. As argued by Hayles, these posthuman

claims “sneak in” pernicious assumptions about the nature of bodies. When we think of our bodies as producing information for fitness trackers to collect and transfer, and information itself as body-less, we neglect the very real ways that some bodies are seen as not participating in the regiment of continual improvement. A healthy body is an improving body, these claims suggest, and an improving body needs continual data to maintain its never-completed quest for improvement.

Fitness tracker advertisements never feature bodies that actually “need” improvement (as if we could even describe such a thing). By focusing the visual imagery on bodies that are already fit, muscular and active, they enforce the conception of who is supposed to be using fitness trackers. As with any lifestyle advertisement, the idea is to showcase the kind of life that the user can live, if only they would use the product. Yet these images have a way of focusing on the means rather than the ends. Fitness trackers have a dubious track record in improving health outcomes. If fitness trackers are *not* the means to a healthy lifestyle, but are rather a marker of other things such as wealth and an allegiance to a certain technological aesthetic, fitness-tracker advertisements put the cart before the horse. Per Hayles, fitness-trackers rely on an equivalence between actual bodies and information *about* bodies. Advertisements assume that information about bodies leads inevitably to a healthier body.

Despite the ostensible focus on bodies, fitness-trackers have a way of erasing the presence of actual bodies and replacing them with information *about* bodies. As Ihde warns in many works, instrumentation reveals a world that seems more real or true than our natural or un-aided sensation. Since cybernetics erases corporeal presence and replaces it with posthuman patterns of information, any appeal to cybernetics has the same effect. Fitness-trackers reveal a world of information that can seemingly replace our unaided senses. The outcome of this

ideological commitment is the conclusion that improving the body is equivalent to managing the streams of information *about* the body.

The ideological force of improvement in the fitness-tracking world brings with it a reliance on data as a means of self-management. The dominant fitness-tracker advertisement sentiment conveys a moral imperative to "improve" in the sense that it portrays a lifestyle that we ought to see as aspirational. This healthist rhetoric prioritizes an individualistic approach to health, while elevating a cybernetic claim that information has no material presence of its own. Information is presented here as merely a control mechanism, a weightless byproduct of physical movement. By seeing data as merely an instrument to achieve an improved perception of health, we ignore the fact that the data is already interpreted and generated with a specific set of goals in mind.

The erasure of bodies from a conceptual understanding of "self" has a history that extends at least as far back as Descartes and has its origins in Plato. In Descartes' Meditations on First Philosophy, his famous "cogito" argument depicts a thought experiment in which an evil demon deceives Descartes into believing that all his sensations are false impressions. The only thing that the demon cannot deceive Descartes about is the fact that he is thinking. Descartes proves his own existence in the face of extreme existential doubt because he can prove that he exists. So long as Descartes can have a doubt—and doubting is a form of thinking—he must exist because thinking is existing. The mind, he argues, is a thinking-thing. The body, while important, is secondary in terms of combating the extreme doubt induced by his thought-experiment. While Descartes eventually proves the existence of his body, his proof nevertheless starts from a place of deep skepticism about the kinds of truth that we might glean *from* the body, *about* the body.

Susan Bordo argues that Descartes' privileging of the mind over the body has implications for feminist epistemology. Descartes' degradation of the body and the implication that the mind is the final source of truth is a "masculinization of thought" (439). She writes that in an era in which reason and science were starting to doubt the medieval worldview, Descartes and other rationalist were simultaneously questioning the idea of a "mother earth." Descartes does violence to women, Bordo argues, when he relegates the body to a place characterized by doubt, uncertainty, even evil (his doubt is manifested as a demon after all). Femininity had long been associated with the earth, with fertility and with the body. By prioritizing the mind over the body, Descartes is emblematic of the rationalist worldview, which seeks knowledge by first breaking apart that which is whole and interconnected.

Hayles similarly argues that the cybernetic tradition sees the body as a superfluous addendum to that which can be expressed in information. Consciousness is an informational process, the cybernetics tradition argues, and can therefore be implemented in a computer. The body is only one medium among many that can sustain consciousness. Similarly, Cybernetics assumes that information itself is not medium-specific. By arguing that certain human and social processes are analogous to computational processes, the cyberneticists ignored the fact that all information must be instantiated within a medium. There is no data without a medium, just as there is no way to "extract" information from an existing medium without changing its meaning.

The rhetorical strategy of improvement, as well as the depiction of a fitness-tracker lifestyle, combines to embed fitness-tracking into the same ideology of disembodied information that Hayles critiques. Despite the fact that the purported goal of fitness-tracking is to make us more healthy and more aware of our bodies, what it actually does it make us more aware of the *data* of our bodies, not our bodies per se. We may want to equate "body-awareness" with

"information-awareness," yet this is an example of the way in which technological tools can overpower our concepts, terms and ways of being. Data can not simply be "extracted" from the body without changing (or establishing) its meaning.

Don Ihde's phenomenological approach is helpful here again to think through what exactly we are perceiving when we use any piece of technology that mediates our own body. Instrumentation creates an object of perception (numbers and graphs on a screen) that Ihde would describe as embodying the hermeneutic relation between people and technology (Ihde *Technology and the Lifeworld* 80). The term hermeneutic usually implies a text-based interpretation. Writing has a particular implication for Ihde's analysis, since writing necessarily implies technological apparatus as well as a specific medium--the words on a page, the text on a screen, etc. Writing produces an object that can subsequently be read and understood by using a particular decoding strategy.

The hermeneutic relation implies the creation of meaning through experience (i.e. reading), and also of the transparency of the object that produces that meaning. The words on the page are the actual *object* of perception, yet the words themselves tend to "disappear" in experience, giving way to the meaning. If I am a fluent reader, I decode the text so quickly that it seems like I experience the meaning directly. The words on the page are the immediate object of my experience, yet I also see *through* the words to their underlying meaning. The transparency is not a perceptual transparency, but a hermeneutic one. My interpretation becomes transparent, while the material object (the words) remains opaque.

Ihde writes, "what is referred to is referred to by the text and is referred to *through* the text. What now presents itself is the "world" of the text" (Ihde *Technology and the Lifeworld* 84). Hermeneutic transparency is not just a textual phenomena, although for Ihde much of the

relation is based on a reading paradigm. A nice example Ihde uses is a thermometer. Imagine standing inside a warm house, looking out of a window onto a blustery winter's day to see a thermometer mounted outside. When you look at the thermometer and see the temperature, in what sense do you know how cold it is? You clearly do not know it with your embodied self, since you cannot feel the cold. Yet you know how cold it is outside even though you do not feel it. Ihde writes, "you hermeneutically know that it is cold. There is an instantaneity to such reading" (*Technology and the Lifeworld* 85). You know how cold it is because you know how to read a thermometer, and you have an understanding of the Fahrenheit scale. Note that the thermometer, phenomenologically, stands in between you and the world. It mediates the world for you, but in a non-embodied way. It mediates the world in a hermeneutic way. The intentional direction of your experience passes through the thermometer, but the object of your perception ends with the device itself. The thermometer "translates" the world for you, provided that you have the relevant background knowledge about temperature.

For any piece of information, how that information is instantiated (i.e. in numbers, graphs, etc) greatly affects its meaning. Hayles' critique of cybernetic ideology is that within cybernetics the medium itself is erased from critique and made irrelevant for analysis. She argues that data can not simply be extracted from the body without introducing some interpretation, i.e. hermeneutics. Numbers and graphs on a screen offer an opportunity for interpretation, but do not self-evidently mean anything on their own. While the actual perceptual object "withdrawals," as Ihde describes, giving way to the meaning underneath, the primary relation is one between the person and the object. It is easy to forget that there is an interpretation happening here, yet there is no meaning created whatsoever without that hermeneutic relation.

The ideological commitment to "bodiless" information sneaks in assumptions into

cybernetics that align it with the long history of the dismissal of the body as a source of truth. Fitness-tracking accomplishes the same erasure of the body, despite its purported focus on discovering our hidden patterns of bodily movement. Self-tracking operates on assumptions about what the user should "fix" about their current state of health. Morozov's theory of solutionism reminds us that technology companies often mis-diagnose or overly-simplify their purported problem-areas in such a way so as to position their product as the perfect cure for a particular problem. Combined with a similar concept of healthism, in which health is held up as the highest moral good, fitness-tracking is embedded in a coalition of ideologies that serve to give it its rhetorical thrust. Despite lack of evidence as to its effectiveness, these ideological assumptions undergird the adoption and deployment of self-tracking technologies.

Lifestyle **in Fitness Tracker Advertisements**

Despite (or maybe because of) the numerous studies showing that fitness-trackers are not a magic fix for poor health, the advertising claims of fitness-trackers frame these devices as part of general images of a healthy lifestyle. Fitness-trackers encourage a view of bodily movement that sees information as the essential nature of movement. Data, it seems, is what underlies all action. This conceptual frame makes it easy for advertisers to claim that fitness-trackers lead to more information about one's body (it's a tautology; if information is *in* our body, then clearly fitness-tracking gives us more information *about* our body). "Information," here serves a referential or representational role. Information, often in the form of quantified metrics, acts as a control mechanism for "health:" e.g. you are getting healthier if your numbers are improving. Yet as social scientists have shown repeatedly, statistics and numerical data collection is never in a "raw" state (Gitelman). Before any data collection begins, choices are made as to what data

will be collected and how the instruments work. In order for data collection to seem natural and "invisible," fitness-tracking advertisements often depict a lifestyle setting for their products.

The rhetoric surrounding fitness trackers—mainly that increased knowledge leads to healthier habits—contributes to an overall assessment of fitness tracker data as being prima facie true. Yet, the metrics that these devices collect is never raw for a few of reasons. The data is already processed before users ever see it because a physical sensor such as an accelerometer produces data that is then analyzed by algorithms to produce, for instance, a "step." The data is also processed through layers of interpretive mechanisms. Ideologies such as healthism, solutionism and cybernetics are the background assumptions and truth conditions that produce meaning in this context. We come to see fitness tracker data as meaningful because we have accepted the general interpretive framework related to this kind of information.

Despite evidence that *knowledge* of bodily metrics does not make you healthier, fitness trackers become seen as an indispensable part of exercising. Yet, given Hayles critique of cybernetics, we also see another corollary phenomena. Actual bodies tend to disappear from the general background of truth through which fitness tracking data is described as meaningful. The posthuman mindset of pattern over presence means that we see data as important, and not the body that produced the data. As the interpretive framework itself tends to be invisible, we are confronted by supposedly self-evidently true data. We simply don't recognize that any kind of interpretation is going on because, as Ihde argues, sensors and screens tend to have a hermeneutic relation. We ignore the interpretive framework and the device itself, and instead only attend to the meaning of the data.

Fitness-trackers give users the opportunity to experience their body as if it were made out of data. Fitness trackers are depicted as seamlessly extracting data from bodily movement; the

wearable gadgets simply record and store the byproduct of behavior. The marketing and rhetorical strategies of fitness trackers focus on "improvement" by encouraging the sense that more data about our bodies makes us better people. Not only does the rhetoric of improvement make a conceptual link between data, knowledge and self, but the push towards "invisible" technology makes this conception seem inevitable and natural.

Because wearable computing is worn on the body, many of the marketing tactics for wearables are similar to those related to the fashion industry. Many of these ads depict a lifestyle in which wearable technology and personal data collection is naturalized as normal and as an important part of health and fitness (see figure 7).

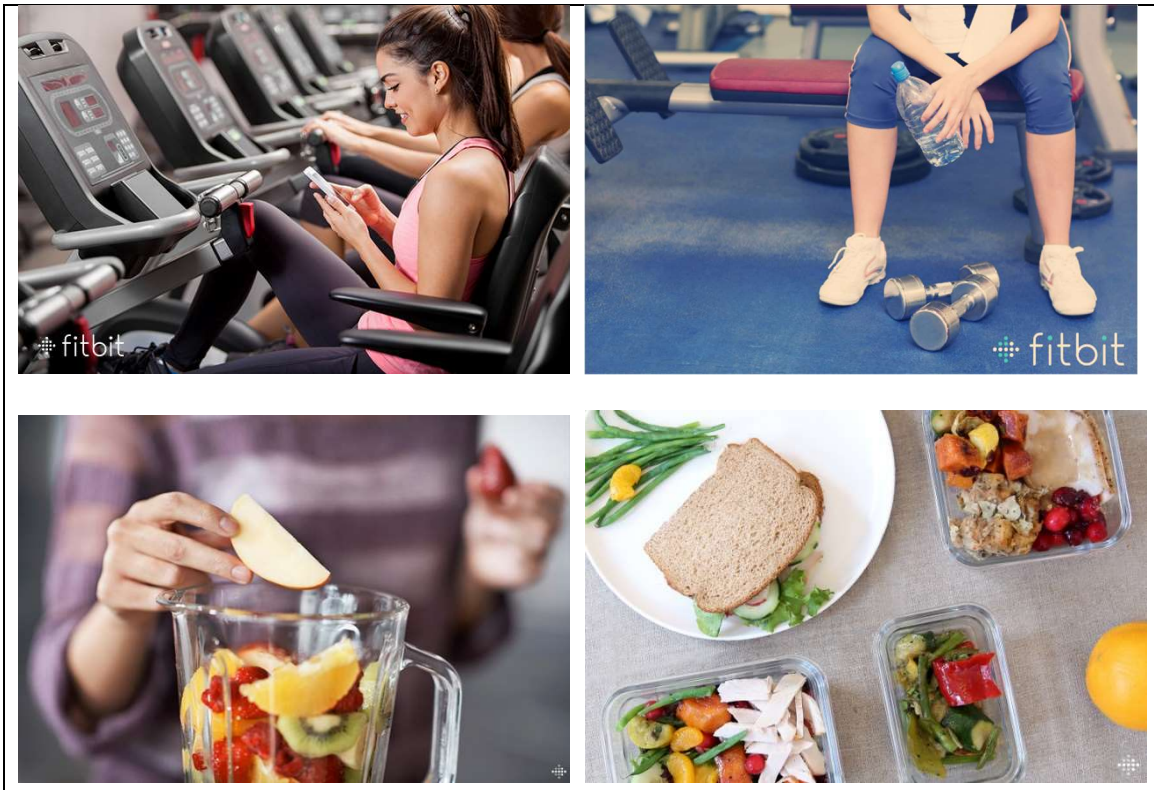

Figure 7. Photos from the Fitbit blog. https://blog.fitbit.com/. Accessed 14 September, 2018.

In these images, Fitbit advertises a healthy *lifestyle*. Stock images of people exercising or engaging in healthy behaviors, even if they are not wearing Fitbits, embed their product into images of a lifestyle in which self-regulation via data is natural and normalized. They seem to say: in order to live this lifestyle, you need to wear our product. Fitbit makes their products invisible by burying them within images of a healthy, fit lifestyle.

As part of their marketing and advertising campaigns, companies like Fitbit try to persuade their customers that self-tracking is a way to harness a new kind of selfhood. In order to improve one's health, one needs to embrace data collection as a pathway towards that new selfhood. These depictions create a striving towards an ideal—the person who uses data to improve their behavior. By inculcating a desire to be a certain way, these companies ensure that continued use of their products is enshrined not just in the technology but in the larger cultural practices surrounding it. This is particularly important since studies show that people tend to stop using their fitness trackers. User may get disinterested in collecting data, but if the cultural pull of the ideologies of self-tracking are strong enough, their products will continue to sell.

Quoted in a 2014 Adage article talking about their "Find Your Fit" advertising campaign, Fitbit's Chief Marketing Officer Tim Rosa said,

> The latest campaign is going to play off the duality of sweat and swagger," Mr. Rosa said. "Blaze is fitness first, but it's also very much about style. So when you are working out at the gym, we have an accessory for you. When you are at work, we have an accessory for you. And when you are out with the buddies or girlfriend, we have an accessory for you. (Slefo)

Jawbone, one of the first fitness tracker companies, which went out of business in 2017, adopted this strategy in some of their marketing. In their "Jawbone Stories" section of their blog,

Jawbone features links to many fashion, lifestyle, healthy-living, and fitness blogs. According to the many blog posts featured in Jawbone Stories, these blog authors received free Jawbone UP fitness trackers for review purposes. Not surprisingly, all of the bloggers give their Jawbone a glowing review.

Yet these reviews are not featured on technology blogs. “CaliVintage,” for example is a blog about “personal style, fashion inspiration, and street style photography, written by a California girl with a love for everything vintage” (“CaliVintage”). “Alice & Lois” is a blog about “DIY projects, ideas to celebrate family, curating inspiration and spotlighting goodness” (“Alice & Lois”) On October 15, 2014, Alice & Lois featured their Jawbone post, In between a Halloween recipe and several links to DIY craft projects. "Kath Eats Real Food" is a blog about food and motherhood.

Similar to Fitbit, Jawbone is using a rhetorical marketing strategy of burying their hardware within the context of healthy eating, of parenting, and of personal expression. Instead of showcasing their technological devices, they market the routines in which using one of their devices seems normal. These images market a *lifestyle,* and thus directly appeal to our desires about how to live our life. The actual technology is backgrounded, or absent entirely from the visuals of the story.

What these images lead to is an understanding that quantification is neutral—politically, ethically, materially. By backgrounding and even overtly omitting the device itself we are left with images of a quantification so clean and perfect that it’s almost like it’s not there at all. The missing devices from these images mirrors the effort to erase the actual effects of quantification. Katherine Hayles’ work on cybernetics provides insights into this phenomena, and offers a paradigm of why informational agency leaves users to ignore the fundamental corporeality of

both their bodies *and* information itself.

Normalization of Tracking

One corollary of the normalization of fitness tracking is the growth of other forms of tracking, for example within the insurance industry and police departments. Related to the same themes expressed above, tracking is viewed in these domains as more accurate, more reliable and more easily converted into specific outcomes than other forms of data collection. Michelle Alexander explores the growth of electronic monitoring, what she refers to as "e-carceration." ("The Newest Jim Crow"). Based on her work of systems of oppression that continue to keep communities of color relegated to lower social status, increase rates of incarceration and lower economic opportunities, she argues that the growth of electronic monitoring devices plants the "seeds of the next generation of racial and social control, a system of "e-carceration" that may prove more dangerous and more difficult to challenge than the one we hope to leave behind" ("Newest Jim Crow"). Based on risk-assessment algorithms that Alexander argues are not race-blind (as they purport to be) but are based on deeply ingrained assumptions and biases, people of color are disproportionally subject to electronic monitoring. While system of cash bail are folding all around the country, these new forms of control see people released from jail but subject to an expensive leg-worn monitoring device. She writes,

> Your permitted zones of movement may make it difficult or impossible to get or keep a job, attend school, care for your kids or visit family members. You're effectively sentenced to an open-air digital prison, one that may not extend beyond your house, your block or your neighborhood. One false step (or one malfunction of the GPS tracking device) will bring cops to your front door, your workplace, or wherever they find you and snatch you right back to jail. ("Newest Jim Crow")

Many smart phone apps track location, not simply those that serve a fitness-tracking function. A recent New York Times article on tracking reveals how easy it is to decipher actual people from the aggregate data that is sold (Valentino-Devries et al.; and "How The Times Analyzed Location Tracking Companies"). Tracking is now ubiquitous, and is seen as a cheap and effective alternative to previous modes of policing, risk management and consumer analytics. Information from tracking technologies is increasingly part of an economy of data. Nicholas Rose's work on biovalue dovetails with the growing use of data to generate capital and sustain behavioral analytics systems.

Trading and Selling Aggregated Health Data

In the Federal Trade Commission's 2014 Spring Privacy Series, Harvard Latanya Sweeney presented the following graphic:

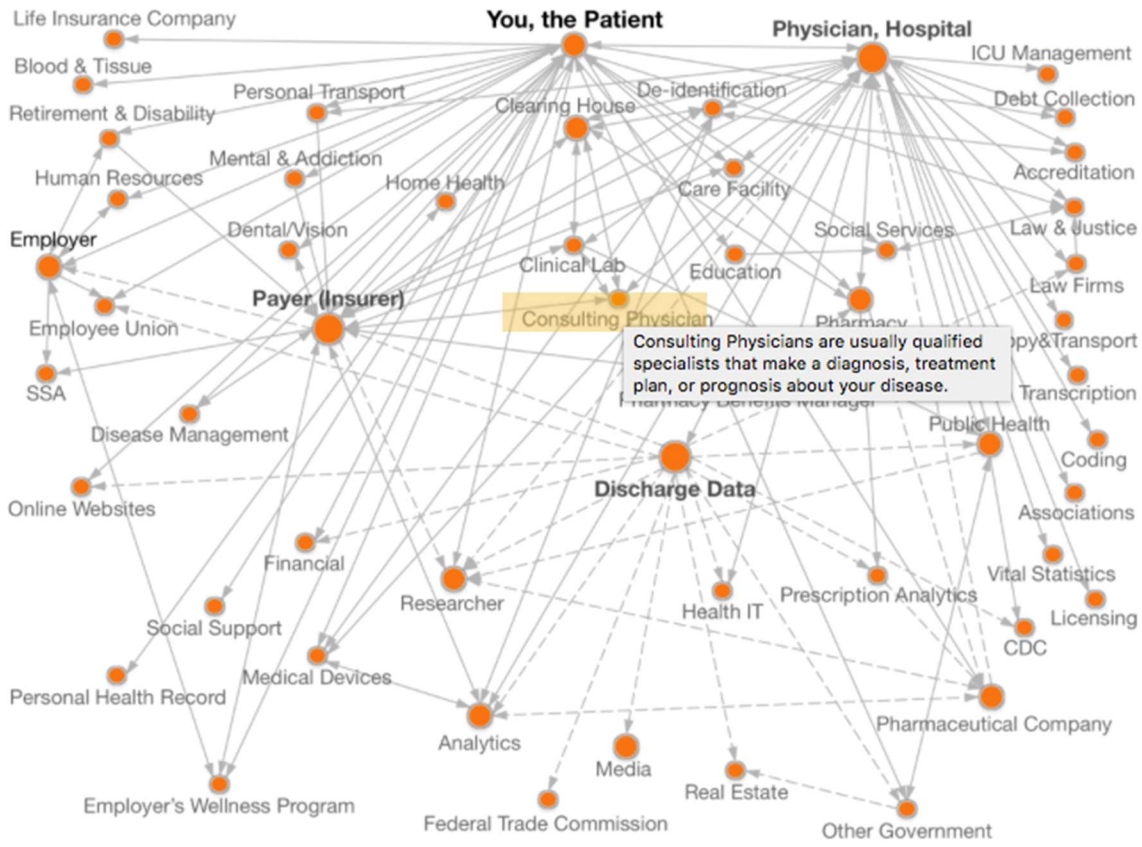

Figure 8. Source: thedatamap.org

This map is designed to indicate the flows of medical data once a person enters a hospital or doctor's office. She also presented the following image, showing all of the domains that different mobile applications transmitted data to. The largest set of connections that collected data from a wide-variety of apps were Facebook and Google.

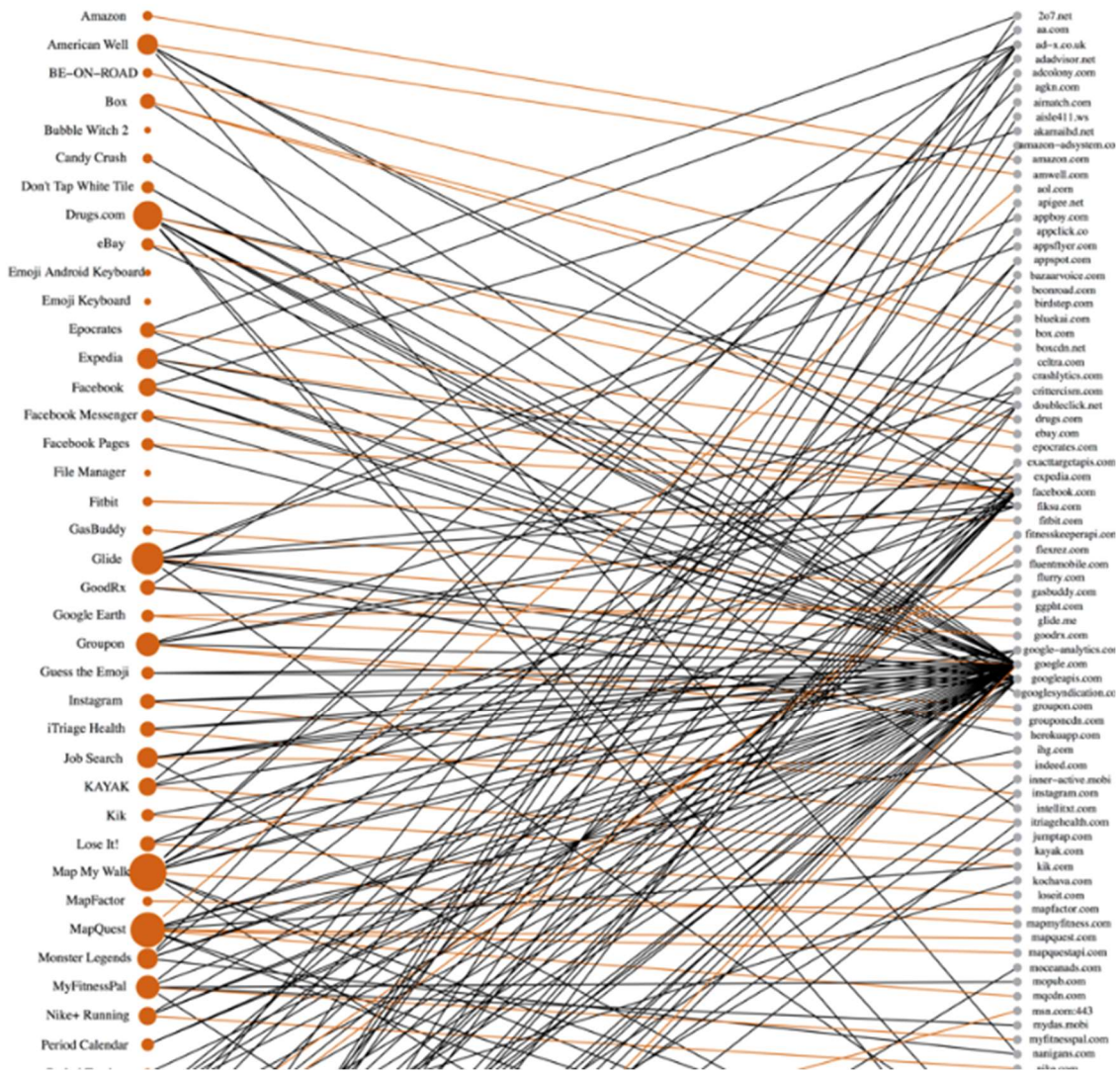

Figure 9. source: https://thedatamap.org/mobile2014/

Sweeney's research is about the security of data that, while it is anonymized, it is not covered by HIPPA regulations and can therefore be transferred among corporations and institutions in a relatively unsecure manner. Her work shows that in many cases, fitness-tracker companies are selling and trading data in a manner less secure than would be required by HIPPA. Her research indicated that "discharge data" made available by Washington State was able to be matched to a specific person in 43% of cases, despite the fact that the data was de-

identified and was supposedly "anonymous" data. Her team was able to do this using relatively simple methods of cross-database analysis, all taken from public records and news stories ("Only you, your doctor, and many others" 29).

Despite the success that Sweeney and other researchers have had in developing de-anonymization techniques, anonymization and de-identification continue to be advertised as legitimate means to justify the extraction of value from user data sets[24]. Fitbit, for example, includes the following in their privacy policy,

> We may share non-personal information that is aggregated or de-identified so that it cannot reasonably be used to identify an individual. We may disclose such information publicly and to third parties, for example, in public reports about exercise and activity, to partners under agreement with us, or as part of the community benchmarking information we provide to users of our subscription services.. ("Fitbit Privacy Policy").

Fitbit, like many other companies, collect the user's "personally identifiable information" as part of its regular service. For Fitbit, this includes "name, email or address, or data that could be reasonably linked back to you" ("Fitbit Privacy Policy"). Fitbit agrees not to sell or transfer this information, expect in cases where it is required by law and for services like credit card payment. Fitbit may also transfer personally identifiable information as part of a "sale, merger, bankruptcy, sale of assets or reorganization of our company." They continue, "We will notify you if a different company will receive your PII and the promises in this Privacy Policy will apply to your data as transferred to the new entity," indicating that your PII may be covered by a different privacy policy once it is transferred ("Fitbit Privacy Policy").

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[24] See Sweeney "Only you, your doctor, and many others may know" and "Sharing sensitive data with confidence." Narayanan and Shmatikov, "Robust de-anonymization of large datasets" and "De-anonymizing social networks."

Other fitness-trackers have similar privacy policies in terms of personal data and aggregate data. Jawbone agrees not to share your personally identifiable data except in the following cases

> We may disclose your personal information to (a) comply with relevant laws, regulatory requirements and to respond to lawful requests, court orders, and legal process; (b) to protect and defend the rights or property of us or third parties, including enforcing agreements, policies, and terms of use; (c) in an emergency, including to protect the safety of our employees or any person, or (d) in connection with investigating and preventing fraud. ("Jawbone Privacy Policy")

Like Fitbit, Jawbone shares "aggregated usage statistics that cannot be used to identify you individually."

The Whithings Pulse fitness-tracker also collects personally identifiable information, but agrees not to sell or trade this data except when required by law or with the user's permission. They do, like Jawbone and Fitbit, share aggregated user data:

> Withings shares anonymous and aggregated, not allowing to identify a personal person, with partners such as hospitals, researchers or companies, as well as to the public in blog posts and data studies. ("Whitings Privacy Policy").

As we can see, most of the top fitness-trackers collect personally identifiable data, but then usually sell, trade or transfer this data in an aggregate, anonymized way. This anonymization can be broken, as seen in the research above. But even if this data is not used for any personally identifiable purposes, most end users are not aware that their data winds up as a company asset that they can sell and share for any purpose they see fit.

IMS is a Connecticut-based company that buys data in bulk from pharmacies, electronic record systems like "Allscripts," and insurance claims from Health Insurers. The anonymized

records are analyzed and the results are sold to drug companies looking for insights into selling their products. In a 2016 article in *Fortune*, journalist Brian Tanner writes that IMS began purchasing medical records like prescription records form drug stores in the 1980s. By the 1990s, IMS "compiled profiles on the exact prescribing patterns of individual doctors to help pharmaceutical salespeople target their pitches." Today, companies like IMS can gather information from multiple sources and combine and analyze data to come up with novel insights, which are then sold. Often, patients do not know that their medical data is being sold, even in anonymized format.

In Tanner's book *Our Bodies, Our Data: How Companies Make Billions Selling Our Medical Records,* he describes how medical data can be used to build ever-more increasingly accurate profiles of people based on correlated data from multiple sources. Large drugstores like CVS and Kroger sell anonymized pharmacy data. Combined with an extensive frequent-buyers program in which shoppers' supermarket buying habits are also tracked, even these two companies alone amass significant multiple data points that are sold and traded. Tanner's research is directed towards the often hidden world of medical records that are sold as part of normal, everyday business for pharmacies, health insurers, and health providers.

One company, Audax, says that it does not sell info to 3rd party, but contradicts this in privacy policy:

> "We do not sell or resell personal health information to anyone," including marketing companies and data brokers, David Sclar, Audax's chief privacy officer, said through a spokesman. "We do not allow third parties to market to Zensey users." (Hancock).

But Audax's own fine print contradicts the second part of his statement, saying the vendor may direct marketing pitches from third parties to wellness members based on "attributes" it collects from those employees. Audax is majority-owned by insurer UnitedHealth Group ("Zensey Privacy Policy"). Other wellness vendors, including venture-capital backed Welltok, include similar language in their disclosures. Under the heading, "Information Collected by Third Parties," Welltok says its CaféWell portal might "target advertisements to you based on products and services you may be interested in" (Welltok Privacy Policy").

Conclusion

As fitness trackers become normalized as a way to maintain healthy habits, the ideologies of self that buttress their marketing strategies will continue to have a strong pull on our habits and wallets. Despite a lack of evidence as to their effectiveness, fitness trackers have come to be emblematic of a healthy lifestyle. As Hayles effectively demonstrates, cybernetic ideologies can override our trust in bodily presence and instead enforce a reliance on information as the marker of improvement. The healthist and solutionist language of fitness tracking marketers reveals the main outcome of this form of advertisement: the growing acceptance and inevitability of fitness tracking technologies. However, with the criticisms laid out by Hayles and others, what is left out of this form of agency becomes clear. The numerical equivalent of behavior is framed as more real than behavior itself. This framing creates lifestyle marketing that presents cybernetic agency as aspirational, even liberating.

We have already seen changes in health insurance practices, life insurance practices and now e-carceration and digital detainment. Under this regime of truth, our digital data trail,

gathered by fitness trackers and other wearable devices, becomes an indexical record of behavior and neutral with respect to power and interpretation. As our digital trace becomes normalized, we run the risk of finding ourselves in a world in which the only evidence that matters is the data. If we ignore the ideological commitments and assumptions that lead us to think of these devices as neutral, we will never see the ambiguities, obfuscations and outright falsehoods offered by the self-tracking industry.

Chapter 3: Prediction and Control

This chapter examines the use of self-tracking data as a means of prediction and control. Placing self-tracking data within a context of prediction markets more generally, I argue that self-tracking apps and devices are used by companies in the service of the ever-growing logic of "surveillance capitalism" (Zuboff). Combining Shoshana Zuboff's work with Mark BN Hansen's description of "feed-forward" mechanisms of 21st century media, self-tracking apps and devices emerge as a new and under theorized site of the prediction and control loops endemic to our contemporary technology landscape.

Zuboff and Hansen on Surveillance Capitalism and Prediction

Advertisers, workplaces, health insurers and life insurers all use data from self-tracking apps as a way to predict behavior, save costs and structure rates. Zuboff's 2019 book *The Age of Surveillance Capitalism* details the contemporary economic logic of Silicon Valley companies, particularly Google and Facebook. By extracting data from our searches and clicks, combined with "real-world" data like location, biometrics, self-tracking and social media posts, technology companies develop sophisticated models of prediction, and then sell these insights to their business customers. Zuboff details how Google's discovery of "behavioral surplus" ushered in a new era of targeted advertisements and a new revenue stream that is unprecedentedly lucrative. By turning our clicks, typos, and web histories (what was previously thought of as useless exhaust of Google's primary function as a search engine) into predictive products, Google

created a product that their business customers could use to predict and therefore control user behavior. This business model, argues Zubuff, is no more relegated to search and advertisement than the assembly line is relegated to car manufacturing. This economic logic continues to be ported to different industries and different business outcomes. Self-tracking apps and services, I argue, participate in this logic of accumulation and predictive markets.

Zuboff's work, naming and detailing the economic imperatives of prediction, dovetails with Mark BN Hansen's concept of "feed-forward. His framework describes how sensors embedded in our smart phones and wearable gadgets can detect sense data in domains and within time scales that are otherwise inaccessible to humans. Emblematic of what he calls "twenty-first century media," self-tracking apps and devices give users access to information about their bodies and behavior to which they would normally have no access (Hansen 6). However, this data is not solely for the individual but often flows to companies and data aggregators who repackage and process this data to create predictive behavioral models. Feed-forward is thus an important step in the surveillance economy loop: devices and apps harvest data that is used to predict behavior, which is then sold to companies who use these predictions to control aspects of our behavior or to structure and improve their own services.

Zuboff makes a strong case that our democratic institutions have failed to protect us against technology companies claiming the mantle of behavioral modification through predictive algorithms. By assuming that it is their right to transform human experience into data by collecting our behavior through web sites and applications, analyzing this behavior for patterns and then selling those insights, these technology companies create a new kind of market—a behavioral futures market. Other businesses buy these insights and use them to sell products through advertising. What started out at Google and Facebook as a way to sell their business

customers more accurate predictions of consumer behavior has moved into the realms of health and life insurance, and regulation of employee health.

Self-tracking services are advertised as ways to improve and gain control over one's body and behavior, as I explored in chapter two. They allow us to sense things that the un-aided body cannot. This form of digitally-derived sense data offers the user new access to bodily processes and patterns, such as heartrate, step count, exercise patterns, and hours slept. But these new abilities do not clearly lead to better decision making, increased choice or more empowered agents. Public policy researchers John Owens and Alan Crib argue that fitness trackers fail to increase personal autonomy for their users on their own, and that any benefits of increasing access to health information come at the cost of exacerbating anxiety and reproducing stigma (Owens and Crib). I argue that the claims to user empowerment and self-knowledge often found in fitness-trackers' rhetorical marketing fail to account for the way in which self-tracking companies, data brokers and other groups harness self-tracking data to structure services, extract value and control behavior. For instance, many workplaces and health insurers are able to structure their rates based on the predictive capabilities of self-tracking data. Health insurer UnitedHealthCare and Fitbit have even partnered to offer group rates to businesses in which premiums are tied to activity level[25]. Life insurance companies calculate their risk (and customers' premium) based on metrics gathered from fitness trackers and other sources[26]. Self-tracking data can give them more data and power to develop models and predict outcomes.

[25] See https://www.uhc.com/employer/programs-tools/unitedhealthcare-motion
[26] See https://venturebeat.com/2018/09/19/john-hancock-will-require-fitness-tracking-for-all-life-insurance-policies/

Prediction, as I explore it in this chapter, is a way for institutions (workplaces, corporations, insurers) to exert control. Self-tracking apps may give us data points about our body and behavior, but it comes along with our participation in surveillance capitalism. That is, we are generating capital for other entities by collecting self-tracking data that is in turn processed using machine learning algorithms in order to predict and control behavior. Therefore, the increased knowledge one has of one's body comes at the cost of fewer ways to act on that knowledge. The knowledge is not freeing, but limiting. As I have been arguing in this dissertation, the focus on "self" in self-tracking often obscures the institutional or collective rationale for tracking and the uses of data. Self-tracking data is not just a way for individuals to learn about their own body and behavior, but it is also a way for institutions to know about individuals and groups.

By predicting behavior, technology companies can intervene in ways that control and direct action. The most effective methods of control are those that happen without conscious attention of the user. The Facebook social contagion study was one of the first widely known examples of this new type of prediction/control loop. In their published results, Facebook researchers touted their experiment as a triumph of purely text-based communication to affect emotional "contagion," or the spreading of emotions between people. (Kramer et al.). Over the course of one week in January 2012, Facebook randomly selected about 155,000 users for each condition: positive and negative. Researchers designed algorithms to analyze the language in posts that would normally appear in those users' news feeds. Those in the *positive* group saw a relative increase in the number of posts that contained words with a positive valence, and those in the *negative* group saw a relative increase in the number of posts that contained words with a negative valence. The "contagion" hypothesis stated that if users saw a preponderance of posts

with positive valence, they would be more likely to write posts themselves that were positive and vice versa.

The contagion hypothesis was correct, they concluded. By manipulating what their users saw, Facebook was able to effectively change the emotional state of their users, as evidenced by those users' posts. The experimental conditions swayed users to write more positive posts or more negative posts depending on the group in which they were placed. Crucially, this was done without any knowledge of the users, and was fundamentally not observable by the user. This raises important questions about the ethics of informed consent in this study, in which users never explicitly agreed to participate. At the time of publication, the journal editor concluded that, since Facebook is a private company, informed consent rules to which a university or research institution would normally be subjected do not apply to Facebook. The publisher agreed with the author's rationale that the study fell under the data use policy to which all Facebook users agree when they sign up for the social media platform (Kramer at al 2014).

Journal Editor-in-Chief Inder M. Verma of the PNAS journal, which published the article, however expressed the following apprehension:

> It is nevertheless a matter of concern that the collection of the data by Facebook may have involved practices that were not fully consistent with the principles of obtaining informed consent and allowing participants to opt out. (Verma 10779)

That Facebook was able to manipulate users' news feeds on a sub-cognitive level without offering any chance of opting out of this experiment speaks to ways that companies exert control in ways that systematically keep users ignorant. The social contagion experiment was an extreme and pointed example of what Facebook does as part of everyday business—selling their unique ability to predict user behavior and interests to advertisers. Even faced with multiple scandals in

recent years, Facebook has taken lengths to block research into who is placing ads on their site and which groups are targeted (Merrill).

Advertisements based on fitness-tracking data are another example of the ways that data about bodily habits can be subsumed into prediction and control loops. “Lose it!” the popular weight-loss app, uses user data as a source for targeted advertisements. Their privacy policy states that they can “share information collected from you that does not identify you or an individual with third parties, including advertisers and potential business partners” (Loseit Privacy Policy). This data is used to deliver “ads on other apps or websites that are tailored to your interest.” MyPacer, another popular run-tracker application, shares non-identifiable user information with advertisers, and also allows those business partners to share data with their own business partners. This data is used to “provide you with advertisements and information for products and services in this app or on other apps or websites based on variables such as your location” (“Mypacer privacy policy”).

Mypacer and Loseit are two examples of the surveillance capitalism loop. Free services collect user data, combine this data with other data and analytics, sell or share it with third parties who then re-sell that data to additional companies. This loop results in an advertisement delivered to the end-user based on data that, while it does not personally identify the user, is nonetheless customized and tailored to their experience and preferences. The goal of the company is to predict user behavior and to deliver an ad at the exact moment and place where the user is most likely to click on it.

Greg Elmer's 2004 book, *Profiling Machines* was written during a time when these techniques of prediction were relatively new[27]. By 2004, companies had started to gather a wealth of data of consumer habits through credit card transactions and web-based tracking technology. Google's new model of harvesting predictive products based on behavioral surplus had started to turn immense profits. Elmer's insight is to argue that the collection and processing into consumer "profiles" is an inseparable part of what he calls "feedback technologies" (38). Elmer pushes against Foucault's panoptic model, in which behavior is molded through an individualizing effect and the internalization of social norms. Instead, he argues that contemporary means of surveillance do not punish transgressions against social norms so much as identify categories and reward adherence to those same categories. He writes,

> In the panoptic diagram, consumers are not exclusively disciplined – they are both rewarded, with a preset familiar world of images and commodities, and punished by having to work at finding different and unfamiliar commodities if they attempt to opt-out.. …Thus, as we watch and monitor others and ourselves monitored, our likes and dislikes are fed back to us, producing a familiar media and consumer environment. (50)

Writing before the widespread age of social media, Elmer's discussion of "likes" is prescient. The feedback mechanism he describes is part of the "diagram" of surveillance. Citing Deleuze's definition of the term, Elmer uses *diagram* to denote the mapping of power relations. His point here is that profiling leads to the limiting of choices because all information is fed back to us in ways that limit access to information. By participating in consumer transactions, we are necessarily giving over data about those transactions. This relationship describes a model of

[27] See also: Roger A Clark's Dataveillance (1988) and David Lyon's Surveillance Society (2001)

control in which people actively create those categories. There is a tremendous amount of secrecy surrounding these practices, thus making it difficult for users to be fully aware of the process. Even though privacy policies for apps like “Lose it!” and “MyPacer” allow for this kind of data transaction, most users do not read privacy policies (“Axios/SurveyMonkey”), and many privacy policies are incomprehensible to the average user (Litman-Navarro).

Today, behavioral prediction has been well documented as standard business practices for many of today’s tech giants.[28]. Targeted advertisements from companies like Facebook, Amazon and Google all rely on data gathered from billions of transactions per day to create predictive categories based around likely demographics. Tracking technologies, included but not limited to web cookies, advertising IDs, and unique device identifiers like MAC address and IMEI allow companies to track user behavior across the web. Increasingly, smart phone apps and wearable devices send information back to companies where this information is processed and repackaged with machine learning algorithms in order to predict behavior and glean customer insight.

As was discovered in the aftermath of the 2016 presidential election, personal data was taken from users who had taken an online personality test on Facebook and used for political purposes (see Bump for a concise summary). That data was sold to Cambridge Analytica, and was used by groups to sway voters, placing targeted ads that intentionally sewed discord and false information about the candidates. Cambridge Analytica used Facebook data from millions of people to develop sophisticated models of behavior and interests in order for groups to target individuals more accurately. The goal of this activity was to identify the people for whom the ad

[28] See Angwin, *Dragnet Nation;* “The Web’s New Gold Mine;” Couldry and Turow “Advertising, Big Data;” Turow *The Aisles Have Eyes;* Leetaru “What Does It Mean For Social Media Platforms To "Sell" Our Data?”

would be most effective, at the same time creating and enlarging those categories and affinity groups. The same methods were used to reach voters in the UK ahead of the "Brexit" vote, which ultimately passed. This method of targeting uses prediction as a means of control—it is intended to analyze data to predict future behavior, nudging that behavior into specific choices—or simply to overwhelm people with false information.

"Nudge" is a term popularized by behavioral economists Cass Sunstein and Richard Thaler in their 2009 book, *Nudge: Improving Decisions About Health, Wealth, and Happiness.* The idea of the "nudge" is that people can be guided to make better, healthier, more economically sound choices if given the right conditions that scaffold that choice. Rather than assuming that people make rational decisions that are good for their wellbeing, the "nudge" ideology extolls the benefits of manipulating the structures around choice such that people are guided, but not coerced, into making the good choice. They write:

> A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not. (6)

In order for big data companies to employ this kind of choice architecture, they need to create individualized profiles of users. Cambridge Analytica developed what they called "psychographic profiles" in order to target individuals more accurately. This kind of profiling is endemic to the data broker/big data world and is done by many companies. Self-tracking data is becoming one of the many data points that companies use to develop profiles of consumer behavior, particularly in predicting risk in life insurance and health insurance.

Self-tracking is a means of prediction when that data flows into behavioral profiles. Self-tracking data generates information about the present or the very recent past in a way that is always oriented towards the future. Utilizing Hansen's framework, I argue that self-tracking technologies give users information about their body and the world to which they would normally have no direct access. Hansen's feed-forward framework lets us see self-tracking in a new light—as a way to give people access to the timescales and modes of sensory awareness made available by sensory technologies but also as a way for companies to develop these profiles. In other words, they *create* sensory data that is used by multiple parties—personally and institutionally.

Fitness-tracking and social media

Many fitness-tracking apps and devices send information to social media platforms. Given that surveillance capitalism, as Zuboff writes, "unilaterally claims human experience as free raw material for translation into behavioral data" (8), it is no surprise that social media companies would be interested in self-tracking data. Technology writer Sam Schechner for the Wall Street Journal published a report in February 2019 detailing 11 popular tracking apps that were sending personal information to Facebook, with the ability to tie that information back to a specific user (Schechner). This includes circumstances in which the user is not logged into Facebook and even when that user has no Facebook account at all. Some of the apps include "Instant Heart Rate: HR Monitor," which was sending heart rate information to Facebook. "Flo Health Inc's Period and Ovulation tracker" sent information to Facebook detailing when a user was having her period and also when users indicated the intention to become pregnant. "BetterMe: Weight Loss Workouts" sent weight and height information to Facebook, along with

problem areas that users reported were areas of concern like “belly fat” or “saggy breasts.” “Weight LossFitness” by Verv was sending height, weight, and body-mass index to Facebook, as well as details on every exercise completed.

In response to these practices made public, the app companies had varying responses. Weight Loss Fitness by Verv continued to send information to Facebook with no change to their privacy policy. BetterMe continued to share information with Facebook, although it changed its privacy policy to indicate that it shares information, including height and weight, with 3rd parties, although it does not specifically mention Facebook. FLO Period and Ovulation Tracker stopped sending information to Facebook, as did HearRateHR.

Some of the companies that the Wall Street Journal found were sending sensitive information to Facebook have a privacy policy that would seem to forbid that transfer. “Weight Loss Fitness” by Verv, was sending personal information despite having the following clause in their privacy policy:

> We will not transmit any of your personal data to third parties, except if it is required to provide the service to you (e.g. technical service providers), unless we have asked for your explicit consent. (“Verv Privacy Policy”)

Although Facebook does not disclose exactly how it generates its consumer profiles, information gleaned from some of the apps above would certainly figure well into behavioral prediction models. And given the concerns about manipulation and sub-cognitive nudging brought forth in the social contagion study and the Cambridge Analytica scandal, self-tracking apps are ripe as a site of prediction and control.

Considering the ways in which self-tracking data can flow into social media platforms, we must once again question the strongest ideological claims of self-tracking marketers and the Quantified Self group. The ability of self-tracking devices to provide a new epistemic relationship towards one's own body and behavior does not, as Gary Wolf and others argue, give us a pathway to self-knowledge and an empowered individual agency (Wolf "The Data Driven Life"). Rather, as Hanson demonstrates, this should force us to reevaluate the very nature of self and agency. Agency in our current technological milieu is inseparable from the logic of surveillance capitalism. Although as Zuboff consistently reminds us in her book, there is nothing inevitable about surveillance capitalism: It was invented in a particular time and place and is capable of being overthrown as the dominate economic imperative in Silicon Valley. Collecting data about one's body is not solely for the user, but is used to generate capital in the service of shaping our behavior.

Zuboff argues that the secrecy surrounding surveillance capitalist practices, particularly at Google and Facebook, creates the conditions for users' ignorance in the face of the true inner-workings of these companies. Privacy policies, like Verv's above, consistently misdirect the user into thinking that their "personal information" is not shared with any outside entities. Even Google and Facebook maintain that they do not sell personal information. They are able to claim this because their product is not "personal information" per se, but the insights gleaned from that personal information. In other words, the product that they sell is access to potential customers. Whether it is a partisan political organization, a foreign government, or a company selling a product, Google and Facebook sell those entities access to the people who are most likely to be swayed into buying/voting/acting a particular way.

Frank Pasquale's *Black Box Society* details many of the same methods of surveillance capitalism and analyses them from the standpoint of informed choice, company secrecy and trade secrets that block the public from understanding what happens to data once it is collected and processed. Recognizing the ways in which our choices are constrained by our digital data trail is crucial for understanding why it is so important to better regulate all forms of data collection and algorithmic processing. If we are "nudged" in ways that we are structurally incapable of recognizing, the question becomes: who is in charge of determining in which directions we are nudged, and when and how these nudges occur.

Behavioral Prediction in Insurance

In recent years many life insurance and health insurance firms have started using data from fitness-trackers to learn more about their customer's behavior and to structure their services (Bernard). John Hancock Life Insurance offers rewards and reduced premiums based on healthy activity. Whereas traditional life insurance underwriting is based on medical records and questionnaires, this new model uses the continual stream of data offered by self-tracking apps and devices to calculate risk and structure pay scales. Based on *scales*—"gold," "silver," and "platinum," the user pays a different rate based on how many points they have amassed. A drop in activity level or a sudden illness can cause someone's point level to drop, thus raising their rate. Members in the "Vitality" program are offered free or low-cost fitness-trackers like Fitbit devices or an Apple Watch. Participants in the Vitality program earn points by maintaining certain measurements on tests, such as maintaining a BMI between 18.5–24.9 (1000 points), glucose levels of less than 100 mg/dL (1000 points), and cholesterol levels of less than 200 mg/dL 125 (1000 points). (See figure 10 "Earn Points for Health Living").

Physical activities

Physical Activity	Points	Maximum
Physical activity review	250	Once per year
WORKOUTS		
Light Workout • Using your Fitbit® device or other wearable device for 5,000–9,999 steps per day • Using Apple Watch®, A Light Workout is based on the Active Calories you burn in a day. See the John Hancock Vitality app for Active Calorie thresholds. • Using a heart rate monitor;[2] exercise within your target heart rate starting at an average of ≥ 60% of your maximum heart rate for 15–29 minutes • Using the MapMyFitness app (or other calorie counting app), you burn between 100 and 199 calories during a workout	10	You can earn points for one **verified** workout per day (30 point maximum). When multiple workouts are recorded for the same day, you'll be credited with the one that is worth the most points.
Standard Workout • Using your Fitbit device or other wearable device for 10,000–14,999 steps per day • Using Apple Watch, a Standard Workout is based on the Active Calories you burn in a day. See the John Hancock Vitality app for Active Calorie thresholds. • Working out at a health club for ≥ 30 minutes • Using the MapMyFitness app (or other calorie counting app), you burn between 200 and 299 calories during a workout	20	
Advanced Workout • Using your Fitbit device or other wearable device or ≥ 15,000 steps per day • Using Apple Watch, an Advanced Workout is based on the Active Calories you burn in a day. See the John Hancock Vitality app for Active Calorie thresholds. • Using a heart rate monitor;[2] exercise within your target heart rate starting at an average of ≥ 60% of your maximum heart rate for ≥ 45 minutes • Using the MapMyFitness app (or other calorie counting app), you burn 300 or more calories during a workout	30	

Figure 10. "Earn Points for Health Living." Source: https://advisor.johnhancockinsurance.com/content/dam/JHINS/documents/unsecured-documents/Life%20Products/vitality/LIFE-5915_earn_vitality_points_for_healthy_living.pdf

In the health care sector, companies are using the logic of surveillance and prediction to determine risks and price services. Castlight Health Care analyzes data from employee medical records to determine health risks associated with employees. Many large employers, including Wal-Mart, purchase prediction products from Castlight used to "identify, for example, which workers are at risk for diabetes, and target them with personalized messages nudging them toward a doctor or services such as weight-loss programs" (Silverman). Determining how many

employees may soon become pregnant, Castlight designed a system that scans insurance claims for pregnancy-related services as well as women who search pregnancy-related articles on Castlight's health app, and delivers those statistics in aggregate form to the company.

Carolinas Health Care System monitors patients with Fitbits and can intervene based on their individual metrics. Through their "MyCarolinas Tracker" app, Carolinas Health System can deliver precisely targeted interventions. The app collects data from about 70 consumer health and fitness devices then puts it into clinical context with data visualizations that show whether they are on goal or not. In this case, the health care provider was given access to specific patient information in real-time (Dolan).

> One man, and we noticed this from his Fitbit data, was not getting any steps," Landis said. "We contacted him and found out his wife had been admitted to the hospital. So he had been sitting at her bedside and wasn't really able to take care of himself. We got social work down there… got him walking around the hospital while he was with his wife. We also made sure he was getting nutritious food while he was there. (Dolan)

As highlighted by a Washington Post article in April 2019 (Harwell), the period- and pregnancy tracking app market is unique in the intimacy of the statistics tracked—and the value of this data to companies wishing to track their employee health. With over 11 million users, Ovia advertises itself as the "#1 health solution for women and families." What many users don't know is that their business model actively includes selling statistics to employers and partnering with health insurers to reduce costs ("Reduce Maternity Costs").

Through their "family benefits package," companies pay Ovia on a per-user basis to obtain aggregate statistics based on their employees using the Ovia app to track menstrual cycles, mood, and sex habits. The app asks about details of the birth and whether or not a pregnancy ended in a miscarriage or stillborn. Ovia also offers algorithm-based predictions to track fertility.

Companies can see aggregate statistics including "average age, number of children and current trimester; the average time it took them to get pregnant; the percentage who had high-risk pregnancies, conceived after a stretch of infertility, had C-sections or gave birth prematurely; and the new moms' return to work timing" (Harwell).

In response to this article Ovia published a post on their website offering a rebuttal of sorts to the claims of employer overreach highlighted in the article. Ovia writes

> "Nothing is more important to us than making sure the data users share with us is secure. Employers partnered with Ovia can never see the personal, intimate information an employee enters in the app, like her symptoms, sex drive or moods ("The Washington Post asks")

They reiterate their focus on data privacy by emphasizing "And, we never have — and never will —sell this data." As Zuboff highlights in her work, companies that claim never to sell personal data are technically correct, although disingenuous. As shown by the Washington Post article, Ovia indeed *does* sell a product to its business customers. This product is insights, trends, and statistics gleaned from personal data—although not the personal data itself. This is surveillance capitalism at work. Individual users receive a service, often for free, in exchange for supplying data to be processed, analyzed and re-packaged and sold as elements in a behavioral futures market. Ovia's privacy policy states that they may use this aggregate statistics not just as products to sell, but as research:

> Both we and our research partners, including academics, reproductive health specialists, or medical facilities may use your aggregate data from the Services to conduct and/or publish this research ("Ovia Health Privacy Policy").

And while Ovia claims that they never sell their users' personal data, this is directly contradicted in their privacy policy:

> We reserve the right to transfer your Personal Information in the event of a transfer of ownership of Ovia Health or the acquisition of substantially all of our assets related to the business that collected such information, such as acquisition by or merger with another company (including an acquisition of less than all of Ovia Health's assets) ("Ovia Health Privacy Policy").

Importantly, Ovia claims the right to transfer personal user data to a new company in the event that another company buys or merges with Ovia, or if Ovia sells a portion of its health assets (including, evidently, personal data of their users). So while Ovia claims that they never sell personal information, they also retain the right to do exactly that in a merger or sale.

Differential pricing based on pre-existing conditions is currently illegal under the Affordable Care Act, this was a practice that was routine before the ACA was passed in 2010. Today, it is still legal for health insurance companies to purchase prescription medicine histories from data brokers, who purchase this data from pharmacies (Carr "Your Prescriptions Are Not a Secret"). Before the ACA was passed, insurance companies would use these prescription histories to deny coverage or to set premium rates. While it is now illegal to deny or change coverage based on pre-existing conditions under current law, insurance companies use the techniques of surveillance capitalism to accomplish the same effect. LexisNexis Risk Solutions is one such company that uses "proxy data" to predict health care costs. Marshall Allen reported for NPR:

> The company said it uses 442 nonmedical personal attributes to predict a person's medical costs. Its cache includes more than 78 billion records from more than 10,000 public and proprietary sources, including people's cellphone numbers, criminal records,

> bankruptcies, property records, neighborhood safety and more. The information is used to predict patients' health risks and costs in eight areas, including how often they are likely to visit emergency rooms, their total cost, their pharmacy costs, their motivation to stay healthy and their stress levels. (Marshall)

LexisNexis Risk Solutions says that it uses "clinically validated social determinants of health attributes found within public records data to help healthcare organizations predict health risks.[29]" These public data records, including social media, rely on proxy statistics to make predictions on health status.

By selling data gathered by users, sometimes aggregated, sometimes not, self-tracking data is used by other companies to predict behavior. A review of popular self-tracking apps on the Apple App store reveals that many self-tracking apps share personal data with 3rd party companies. The "Sleep Tracker," app made by Full Power, states that they may "share personal information with third-party business partners, for instance, for the purpose of enhancing our products and services or so they can market their products or services to you" ("Full Power Privacy Policy"). This information includes

> This Personal Information may include: your contact information (such as your personal name, account name, and email address); information relating to your account or registration; information you have entered or that has been collected by your device (such as gender, height, weight, steps, and sleep); information relating to your device (such as device model and serial number); information relating to customer support requests (such as contact information and support ticket identifications); and other information that may be useful to such companies to understand your use of the device ("Full Power Privacy Policy").

Standard business practices for many self-tracking apps, especially free ones, will sell your data.

[29] https://risk.lexisnexis.com/healthcare/payer/health-risk-models

Lifesum is an app that tracks nutrition, weight loss and exercise. Their privacy policy explicitly states that they can use this data to create profiles of user behavior.

> Profiling means processing of your and other users' personal data to analyze or predict aspects of your use of the Services, behavior and, location in reaching your health goal.
>
> The profiling of your data can also be used as the basis for marketing towards other new potential customers on other platforms than the LIFESUM Services, such as other social media platforms ("Lifesum/Movesum Privacy Policy")

The value in data extracted from self-tracking apps and devices is gained not just through the data itself but by combining this data with other data. Generating profiles as a way to predict future behavior. As this data becomes more and more available, there is nothing to stop life-insurers and health-insurers from using this data.

Mark Hansen on 21st Century Media

Hansen's theoretical framework gives us a foothold into what 21st century media does to our bodies and the new kinds of agents that it creates. He theorizes media objects that give us information about our bodies and environments in timescales to which we normally lack access. Self-tracking apps and devices are therefore emblematic of 21st century media in that they transform self-management and even self-care into an institutional concern and not just personal practice, and they do it in ways that are not always human-addressable. Sensors in our wearable gadgets, for instance, generate data that talks to our smart phones and uploads information to distant servers all without any conscious perception of the user. Numbers, charts and graphs—these are the parts of self-tracking that we viscerally experience. Yet, it is important to remember

the structural or data elements of these services, which occur automatically, undetectable by the user.

Although Hansen is short on specific examples of the kinds of media he thinks represent "21st century media," his analysis of Alex "Sandy" Pentland's "sociometer" is instructive because it sets up a specific parallel with self-tracking technologies. Pentland helped create and direct the MIT Media Lab and currently directs the Connection Science and Human Dynamics lab at MIT. One of Pentland's research projects is what he calls "honest signals." Honest signals are an ancient form of communication mechanisms, such as "the amount of synchrony, mimicry, activity, and emphasis." (Pentland xi). Hansen writes,

> The goal of Pentland's research is simple: to use digital technologies to access, gather, and analyze what he conceives of as a behavioral form of communication—an "unconscious channel of communication between people—that dates back to our protohuman ancestry. (Hansen 180, citing Pentland 2010, "the next net…" lecture)

Pentland's "sociometer" measures non-verbal forms of bodily communication like posture, gait, movement, proximity, and bodily reactions like heart rate, galvanic skin response, perspiration and breathing patterns. The purpose of the sociometer, and the reason why Hansen latches onto it as exemplary of 21st century media, is that it enacts a "feed-forward" mechanism in which normally imperceptible data is collected and then presented to us in a format we can perceive. The sociometer detects data that would normally go unperceived because humans do not have the brain processing speed, nor the perceptual capabilities to process the nuance of sense data that the sociometer can detect. Hansen writes,

> Twenty-first century media are characterized first and foremost by the capacity for capturing information that directly concerns our behavior and tendencies but to which we ourselves lack *direct access* (187).

Contemporary sensor technologies and computational processing engage in "worldly sensibility," Hansen argues, by which he means sensory data that eludes human perception because it happens too quickly or is outside the reach of our perceptual capabilities. He bases his account on Alfred North Whitehead's process philosophy, which establishes a framework of becoming human that does not rest on binary oppositions between human and non-human (Whitehead *Process and Reality)*. Hansen's work bolsters my claim that self-tracking data is not obviously or solely *about* the user, and nor does it lead obviously or solely to self-improvement or empowerment. The concept of worldly sensibility implies that "sensation" has left the realm of purely human perception. The sensors and software in a fitness tracker detect movement and then feed this information forward in a format that the user can perceive. This information is then continually fed forward as a structural element in networks of prediction and control.

Pentland himself argues that his research into "honest signals," establishes a new form of predictive analysis. He likens the advances in the predictive capabilities of sensors technologies to the advancements in genetic engineering made possible by genetics research. Although not offering a solution, he recognizes the dangers posed by these developments. He writes,

> these new tools have the potential to make George Orwell's vision of an all-controlling society into a reality. What we do with this new power may turn out to be either our salvation or our destruction. (Pentland and Heibeck 74)

For Hansen, the data that 21st century media like the sociometer can now gather about our world represents a kind of "sensation" that is *not* "perception." His distinction between these two terms allows him to develop a theory of "non-perceptual sensibility" that is agnostic of whether "sense data" is human-centered or world-centered. We get a glimpse of worldly sensibility when

our contemporary sensor technologies can collect data that humans cannot perceive with our usual perceptual capabilities. This data is collected in quantifiable terms, displayed as numbers, charts or graphs and then fed-forward to a later moment (maybe only fractions of a second later) in a format that we can perceive using our normal perceptual capabilities (i.e. we can see numbers or graphs, hear a chime, or feel haptic feedback on our wrist).

Self-tracking devices gather data that is similar in kind to the data that the sociometer collects. Today's consumer wearable devices are an inexpensive and ubiquitous form of the rarified and experimental technology that Pentland develops. A wearable fitness-tracker or app may collect, for instance, detailed information about location, elevation, step-count, and heart rate. This information, while it is "produced" by the body in some sense, is not directly accessible to humans. Humans can, of course, perceive their own proprioceptive sensations, but these feelings are not yet data in the format that computational processes require. In order to accomplish this, we need digital sensors that detect this data, process it with algorithms, and deliver it to us in a format we can perceive. This process, then, is essentially oriented towards the future. Hansen writes,

> *Feed-forward* names the operation through which the technically accessed data of sensibility enters into futural moments of consciousness as radical intrusions from the outside: it is, I shall suggest the principal mode in which contemporary consciousness can experience…its own operationality (30).

The claim of experiencing one's own "operationality" is similar to the QS claim that one can learn about oneself from the "outside" using methods and devices of quantification. Yet Hansen's account of feed-forward offers a perspective on quantification missing from the QS account of self-knowledge. Hansen argues that the sub-perceptual sensing abilities of 21st

century media represent a spreading of human agency across technological devices and biological cognition and perception. This spreading of agency implies a dark side—the mechanisms of prediction and control at play in the surveillance economy. The kinds of agents Hansen describes cede some of their autonomy and decision-making to the technology companies that operate the systems of prediction/control.

Philosopher Bernard Stiegler argues across his work that our technologies can turn toxic when memory is "grammatized," or made external to the body, to the extent that memory transfers into machines so fully that we cannot form skills and knowledge. Stiegler writes, "grammatization is the history of the exteriorization of memory in all its forms…When technologically exteriorized, memory can become the object of sociopolitical and biopolitical controls through the economic investments of social organizations." (Stiegler 34). In other words, as memory becomes embedded in technology, memory can be manipulated to the point where biological memory itself disappears. When biological memory disappears we can no longer form skills, and are subject to the industries that now control these operations.

Applied to the technologies of self-tracking, the danger is that the technology so completely takes over our ability to monitor and regulate our body that we lose the ability to intuitively understand how this process works. Taken to its extreme position, this logic implies that, if the knowledge of what it means to be "healthy" is programmed into our machines, achieving healthy behavior could be as simple as following the instructions laid out by our machines. In this scenario, we may very well be healthier and more active. But, Stiegler warns, if we cannot understand why we behave in a particular way, we become alienated from our technology and de-skilled. We thus become "proletarianized." That is, we lack the ability to control or even comprehend the conditions of our livelihood and work. As we have seen, the

economic imperatives of surveillance capitalism dictate that the collection, analyzing and selling of data happens seamlessly in the background of user perception. The risk of becoming ignorant consumers is not just present, but actively encouraged by the dominate economic model of Silicon Valley.

Consumers are proletarianized because they are "deprived of memory and knowledge by the service industries and their apparatuses" (35), A crucial part of the power that service industries wield is that over "libidinal economy." Libidinal economy is, Stiegler writes, is "the exploitation and functionalization of a new energy, which is the not the energy of the proletarianized producer…nor the motor energy of a new industrial apparatus…but rather the energy of the proletarianized consumer." (25). The exploitation of libidinal economy, that is, the exploitation of desire and consumption, changes the economy as a whole, "to the point where the former is destroyed just like the latter, and the former by the latter" (25).

Stiegler's formulation of an economy of libidinal energy, harvested from the behavior of proletarianized consumers is reminiscent of Heidegger's conception of "standing reserve." In "The Question Concerning Technology," Heidegger writes, "the essence of Technology is by no means anything technological" (4). Rather, the essence of technology is "enframing." Although we normally think of technologies as means to an end, or as specific cases of human invention, Heidegger argues that technology should be thought of ontologically—as a ground of being. Technology, he argues, is first and foremost a way of ordering the world. Technology is a way of representing the world as "standing-reserve." In our technological age (true even for Heidegger in the 1960s when this essay was written), we entrust our technology to reveal the truth of the world to us. However, technology only reveals a kind of truth that interprets nature as "an object of research." (19). Enframing for Heidegger is a way of ordering the world, giving "nature the

unreasonable demand that it supply energy that can be extracted and stored as such" (14). Technology turns the river into a source for hydroelectric power. Technology turns the forest into "ordered cellulose" for the lumber industry, and turns agriculture into "the mechanized food industry" (15). Enframing is not a human activity, per se, but a force that guides our behavior and operates in a specific mode of truth-revealing. Heidegger writes, "man has already been claimed by a way of revealing that challenges him to approach nature as an object of research until even the object disappears into the objectlessness of standing-reserve" (19).

Self-tracking, as a technological mode of revealing truth, operates according to the logic of enframing. Fitness-tracker users want to learn more about their bodies and behavior for purposes of improvement and motivation. However, given the ability of technology as an ontological mode of truth to override other ways of revealing truth, and its capacity to turn us into proletarianized consumers, we see the ways in which self-tracking operates according to the logic of surveillance capitalism. Thus, self-tracking tools do not passively record the body, but actively turn the body into a site to be ordered and corrected. Self-tracking orders the body as information that in many cases fulfills the promise of surveillance capitalism—to generate capital for business customers, used to structure rates and services, and turning consumers/users into sources of data to be processed with machine learning algorithms. Technology reveals truth, but is so dominating in its form of revealing that it threatens to push out other forms of truth. Heidegger writes, "the coming to presence of technology threatens revealing, threatens it with the possibility that all revealing will be consumed in ordering and that everything will present itself only in the unconcealedness of standing-reserve" (33). Thus, one effect of the enframing essence of technology is that is conceals its own mode of revealing. By dominating and pushing out other forms of revealing, enframing purports that the *only* form of revealing is standing-

reserve. We see these dominating effects of technology today. Technology is not only seen as the savior and solution for economic woes in multiple industries, but is seen as applying a "smart" and personalized approach to a multitude of problems.

If we only think about the body through the technology of self-tracking, the body only appears to us as data to be collected and tracked. This is similar to a medicalization paradigm, in which all bodily processes are seen through the lens of the medical industry (Conrad). What Heidegger adds to an understanding of self-tracking is that turning bodily movements into data creates hooks for the technology industry to exert control. In our contemporary era, data has become the standing reserve—not physical energy, but a powerful kind of economic, political and social energy—to be manipulated and exploited by those with the means to do so.

In his essay, "Postscript on the Societies of Control," Gilles Deleuze argues that the disciplinary societies that occupied Foucault's work have given way to *control societies*. In the new configuration of social institutions beginning in the second half of the 20th century, behavior is not "disciplined," as Foucault argued in his analogies to the factory, school, hospital and prison, but is rather "controlled" through electronic forms of corporate and government surveillance. In this system, individuals are reduced to "dividuals," or unique patterns of data, which enter into algorithmic processing structured on the model of the corporation. Individuals have no identity outside of their bank account and their market profile. In a society of control, the "sites of enclosure" of disciplinary societies give way to computer-controlled tracking that makes continual monitoring possible. Behavior is modulated not just at the factory, or school, or family, but is modulated everywhere. Deleuze writes,

> In the *prison system*: the attempt to find penalties of "substitution," at least for petty crimes, and the use of electronic collars that force the convicted person to stay at home during certain hours. For the *school system*: continuous forms of control, and the effect on the school of

perpetual training, the corresponding abandonment of all university research, the introduction of the "corporation" at all levels of schooling. For the *hospital system*: the new medicine "without doctor or patient" that singles out potential sick people and subjects at risk, which in no way attests to individuation--as they say--but substitutes for the individual or numerical body the code of a "dividual" material to be controlled (7).

A key aspect of the new form of control is that people are dominated in so far as they are tracked, accessed and "continually trained" through computational systems.

Digital self-tracking is a cultural phenomena that trades on the desire to collect data about the body. People who collect data about their body do it because they want to gain this information. The trade off, which most consumers don't seem to mind, is that the companies profit off of this data. A proliterianized consumer lacks an autonomous libidinal energy, and is systematically ignorant. Like the map-user who has no need for biological memory of their city because they possess exteriorized memory, the proliterianized self-tracker is systematically ignorant of the ways in which their "self-knowledge" forms the basis of Stiegler's "sociopolitical and biopolitical controls." As users create massive amount of data about their own bodies, much of this data forms the demographic basis for marketing and advertising, directed back towards those same users.

To avoid a state of proletarianization, Stiegler urges for a "general organology"—

a strategy of critique that encompasses "a theory of the articulation of bodily organs,…artificial organs (tools, instruments, and technical supports of grammatization), and social organs" (Stiegler 34). What we would need, in order to resist the corporate marketing and control that accompanies self-tracking, is to describe the interrelated aspects of all the "organs" involved: bodily organs, technological organs and social (economic) organs. However, the rhetoric employed by industry leaders in the self-tracking world effectively manipulates the libidinal

economy to create a desire to self-track. This desire overtakes and obscures a broader knowledge of the role that data serves in the economy—and in our alienation towards that economy. Self-tracking, we are told, increases a personal sense of responsibility towards our own body, and increases the rational control we have over our own health.

Questions of agency and the spreading of agential boundaries over human and non-human actors was first rigorously developed by Bruno Latour's Actor Network Theory (Latour *Reassembling the Social*). Under this framework, the aim of the work of social scientists should not be to identify the "social" element of a phenomena, as if "society" was a kind of material that could be pulled apart and identified as an element within a larger complex. Rather, he argues, social scientists ought to work to *trace connections*. The social is constituted by the connections among things ("things" is intentionally ambiguous) that are not themselves social. The sociologist then, should "reassemble the social" as an act of tracing the connections among things. The "actor" in "actor network theory" is meant to indicate that all sort of things are actors within the social—such as books, laws, technology, architecture, and theories (Latour "On Actor Network Theory"). Rendering bare all of the connections between these things is a way to produce a map of the social.

When we trace the connections among behavior, data collection, machine-learning algorithms, prediction markets, and targeting advertising, we see agency not as emanating from a single source, but rather as a collection of actors. There is nothing wrong with this per se, but when we are systematically made ignorant of these forces, as Zuboff, Stiegler and Pasquale argue, we lose our ability to make the kinds of choices that free people in a democratic society should be able to make.

Hansen on Pharmacology

Hansen's feed-forward framework details how 21st century information technologies create new forms of agency in which perception is not strictly a human phenomenon. In this work, he argues that our relationship with technology becomes toxic when we lose our ability understand how technological systems influence behavior. While we may be gaining certain abilities, we may lose others. Google maps, for example, helps us navigate unknown environments. Yet, if we rely on Google maps too much, we lose the ability to navigate a familiar environment because the technology has turned toxic—it has eviscerated our ability to leave it behind and to use our natural abilities. Rather than complementing our sense of direction (say, the way that a traditional map might help us to do), google maps erodes our sense of direction and replaces it with a purely technological solution. This give-and-take structure of technology is theorized in the media studies literature as pharmacology. Stemming from Stiegler, pulling heavily from Derrida, especially his *Plato's Pharmacy*, Stiegler defines the pharmakon as that which both causes and cures a disease.

For Hansen, the pharmacological structure offered by today's media landscape is out of balance. The potential for 21st-century media to use its unique access to modes of sensation and timescales to which humans are naturally incapable of accessing is squandered when those who control those networks use our data to predict our behavior and sell advertisements. He writes,

> With the smart devices and microsensors now populating our lifeworlds, we have an unprecedented capacity to access aspects of our experience—aspects ranging from properly environmental elements to dimensions of bodily experience—that would otherwise remain beyond the grasp of our modes of perceptual awareness. This potential has, however, remain largely untapped or, rather, has been left to capitalist culture industries to exploit with their generalized imperative to gather and analyze data in order to create highly specific, closed-loop circuits between past behavior of consumers and

> their probable future activity, today's culture industries have largely coopted the open potential of twenty-first media. (Hansen 70)

Social media is a prime example of this co-opting of networks in the service of prediction and control. The level at which users interact with Facebook is "experiential," meaning that they use Facebook to send messages, share content, connect with other users. The other level at which Facebook operates—the level through which Facebook makes money—is the data or the "operational" level. Facebook currently has 2.45 billion users, as of January 2020 (Statistica). Hansen writes,

> "For the majority of Facebook's ever-expanding user base,…what is gained is the capacity to publicize activities efficiently, to centralize communications, and to acquire information about a vast network of other people, both in the present and from the past. What is lost is control over one's (digital) memory since, as some dramatic recent stories have been made altogether clear, digital traces are just as permanent as the networks hosting them. The capacity to preserve and disseminate information, once it is posted, is a function of the network, not of the user. .. What Facebook's executives gain from the effectively closed-circuit integration of communication functions is a massively expanded capacity to gather data about its users, a capacity that includes access to traces of *all of their (online) activity.* (Hansen 70).

The experiential level of Facebook cannot possibly compensate for the operational level of Facebook because "there is no direct experiential connection between them" (73). We simply do not have any access to the operational level level, which is incidental to the ways in which we use Facebook. In other words, the system does not really care what we use Facebook for, as long as we are generating data that correctly predicts our behavior. In this light, Facebook's policies regarding fact-checking are evidence that the only thing Facebook is driven by is likes and clicks. The accuracy of content matters little to how they make their money.

Hansen's solution to bring the pharmacology of Facebook in line is to somehow open up the operational level in such a way that users have access to the data, the means of acquiring insights from this data, and the freedom to put this data to different uses. He calls this project "data neutrality," which represents the political dimension of the information technology revolution (74).

Hansen on Agency

Hansen provides an account of agency that is missing from the discourse on Quantified Self and self-tracking. In today's media landscape, argues Hansen, we need to rethink human agency as just one kind of agency among others. He writes,

> To grasp the place of the human within today's media networks, and to appreciate how these networks actualize a properly elemental conception of the human, we must adopt a *radically environmental perspective* encompassing human activity as one element among others. (2).

His use of the term *element* is meant to stress the idea that 21st century media, just like human consciousness, is both part of a larger network of agency. Human agency is a "configuration of the elemental" and is not the sole source of agency in the world, or even necessarily a privileged one. Rather, humans are caught in the same web of connections, information flows, and sensing equipment (both biological and artificial) that also includes our 21st century media.

In some ways, Hansen's feed-forward mechanism echoes the Quantified-Self claim that our sensor technologies should give us "new senses." Kevin Kelly, founding executive editor of *WIRED,* and co-founder of Quantified Self and said in a 2014 interview,

> I think that in the long term, we will probably want to bury the quantification, the numbers. We're just not evolved to deal with numbers….we're not really a number animal. But what I think the long-term direction of this is that we want to use these sensors to give us new senses, to equip us with new ways to hear or see our body. What we're trying to do is listen to our body, but we don't have the tools ourselves to do that; we can't really hear or see our glucose level, you can't really measure our heart rhythm; we're imperceptible to those. Where this is going is giving us a way to generate data. Right now we have to see the data as charts or curves, but I think in the long term where we're going to is that we want to be able to see or feel or hear them." ("Better Healthcare Monitoring: The Toenail Growth Tracker")

Kelly here is describing the same type of hidden, imperceptible data that 21st century media gives us access to and effectively gives us new senses. Rather than describe 21st century media in terms of new human senses, Hansen wants to revamp our notions of human agency and put human agency within its proper context—the nudges, data-mining and micro control in some ways predicted by Delueze's *Societies of Control*. New sensor technologies do not so much make humans more powerful, as spread human agency across networks of media and biology. And indeed, wearable technologies promise a new kind of sensation and ways to categorize, track and act on this form of sensation. Apple's watch, for instance, claims to be a new kind of "personal" device, one that is intimately connected to our own body. It is an extended form of personhood.

Research in brain plasticity and body image shows that the human body is readily capable of incorporating non-human elements into our perceptual system and proprioceptive system. The so-called "rubber hand illusion" is an easily repeatable perceptual trick first described in Botvinick and Cohen, 1998. The experimental setup is conducted as such:

> Each of ten subjects was seated with their left arm resting upon a small table. A standing screen was positioned beside the arm to hide it from the subject's view and a life-sized

> rubber model of a left hand and arm was placed on the table directly in front of the subject. The subject sat with eyes fixed on the artificial hand while we used two small paintbrushes to stroke the rubber hand and the subject's hidden hand, synchronizing the timing of the brushing as closely as possible (756).

After about 10 minutes of this, subjects reported that they could *feel* the sensation of the brush in the fake hand. The illusion of *seeing* the rubber hand being brushed and *feeling* their own hand being brushed was so powerful that they transferred the feeling into the fake hand.

A similar effect can be seen in self tracking gadgets. Data about the body can be such a powerful tool for visualizing the body that users incorporate it as part of their perceptual system. In the same manner that the rubber hand becomes a part of the body, the fitness tracker becomes part of the perceptual system. Don Ihde "hermeneutic relation" describes a similar process- wherein the interpretation of information (text or numbers, for instance) is "transparent" in the sense that the user sees through the data into the meaning of the data. If this data is about step-count, heart rate, calorie intake or other metrics gathered by self-tracking devices, users are then incorporating the tracking data itself into their perceptual capabilities about the own body.

This can have significant downsides, especially connected to eating disorders and compulsive behavior. Tracking activity, calorie intake and weight are the most popular metrics to track (Fox and Duggan). Researchers have raised concern that these apps and devices can exacerbate eating disorders (Gregory, Mahdawi). The ease at which we can incorporate self-tracking data into our body's own perceptual schema should give us pause. The sensory data gleaned from these sensors is below the threshold of our perception and is thus ripe for exploitation.

In Hansen's view of 21st century media, we must rethink consciousness because our technologies can sense things that humans cannot, and our computers can operate at timescales that outperform humans. The term "worldly sensibility" captures the move from a "perception-oriented account of experience to a broader understanding of sensibility as the concrete texture of experience across the board" (Hansen 48). If humans are knocked off of their pedestal of privileged access to the world by sensors and microcomputers that open up a new "texture of experience," they take their place among "the larger environmental networks of sensibility that generate experience" (65).

Combating Control: Pharmacology of Digital Networks

Crucial to its connection to self-tracking, Hansen claims that "experience" is not just the domain of humans anymore, since today's media devices can sense a much broader range of our world that humans can. This "expansion in the scope of experience…entails, among other things, an expanded agency on the part of human beings" (77). Far from saying that human agency is *diminished* by our embeddedness in networks of worldly sensation, we should re-conceptualize agency such that our technologies add to our sense of agency. However, this view of human agency that incorporates a wider world of sensors and microprocessors that feed-forward their sensations into human consciousness can only fully claim to improve and intensify experience, and to give humans more power, if certain conditions of data-collection are met. Hansen writes,

> The "surplus of sensibility" introduced by digital networks…can provide human beings with a "power" of experience…only because and to the extent that it can make use of—can facilitate alternate use—*of the very same technical systems of data collection and analysis* that produce it in the first place, and that produce it, importantly, as an incidental

> by-product of an effort to lock human behavior into ever-shorter circuits with data networks (77).

Hansen's plea for an increase in the power of experience relies on the same networks of digital data that would exploit us. Because of the *technical* access afforded by digital sensors to the time frames prior to consciousness, contemporary forms of capitalism use these networks to extract value from our digital data trail. Technical access to the data of worldly sensibility gives capitalist industries the opportunity to predict behavior and therefore control it. He writes,

> It is crucial to point out that contemporary capitalist industries are able to bypass consciousness—and thus to control individual behavior—precisely (and solely) because of their capacity to exploit the massive acceleration in the operationality of culture caused by massive-scale data-gathering and predictive analysis. (190)

To counteract the potential control by those networks, Hansen writes,

> it is imperative that we welcome—on this score, in concert with the very predictive industries that are at issue here—the technical interface to the data of sensibility making up the potential for our future experience. For it is only by recognizing the immense power of the data networks to which contemporary technologies afford access—and also by accepting the accompanying demotion of historically human modes of experience (sense perception, conscious awareness, etc.)—that we can make good on Whitehead's fundamental contribution toward theorizing our predictive condition. (Hansen 126-127)

Hansen argues that if we do not want capitalist institutions controlling our behavior through prediction, we need access to the same networks of information that these companies use. In some ways, the DIY ethos of the Quantified Self movement would seem to echo the same demands—such as calls for open data and data interoperability. However, as more and more off-the-shelf tools become available, data is increasingly *not* in the hands of individuals, but in the

control of large companies. And even in cases where individuals do have access to their "raw" data, they do not have access to the aggregated data or the computing power or algorithms necessary to make the kinds of predictions that the large companies can. This point is echoed by sociologist Mark Andrejevic. In his works *Infoglut: How Too Much Information Is Changing the Way We think* and *iSky: Surveillance and Power in the Interactive Era*, he argues that as we become more and more of a "sensor" society, we must pay attention to the material control of the sensors and the networks of computation that process our information. These institutions hold power over what happens to our data. Consumers are trading "self-knowledge" in exchange for contributing their data to the massive flows of data back to the company.

The "self-representational" capabilities of self-tracking data cannot possibly make up for the biopolitical and predictive function of self-tracking data because they exist on wholly separate levels of analysis. The individual user generally has no knowledge of how their data is used. Not only are they forced into providing data that is collectively aggregated and shared with data intermediaries, but they lack access to the knowledge gained from this mass collection and processing. If we somehow could take advantage of this, Hansen argues, we would equal out the pharmacological tradeoff between a loss of control and the (currently inadequate) individual benefits of self-tracking.

To reclaim some of the power of technology companies, some politicians and technology leaders have argued that people have a right to some of the capital generated through their use of their data. Technologist and artificial reality pioneer Jaron Lanier argues that technology companies should pay people for their data (Aiello). The governor of California Gavin Newsom has argued that its citizens should be paid a "data dividend" based on the money earned on the backs of their data (Au-Yeung). However, there is a strong argument to be made that unless

ordinary people have access to the data and the means of processing it (AI and machine learning), paying people for their data only further entrenches the manipulation and behavioral prediction markets already in place. Hansen argues that ordinary people may take advantage of the sensory data, but they need the means to do so. Evgeny Morozov argues for a similar position in his article "The Left Needs to get Radical on Big Tech." He sees frequent lines of criticism against technology companies' data use in two forms: economic and technocratic. The economic critique treats data as inherently valuable and therefore users should be paid for their data. The technocratic critique assumes that we need to regulate the tech companies break up monopolies. A third possibility is that we start to invent ways that our data can revitalize our democratic institutions. Recognizing the massive power of the data held by private corporations, if the people are to reclaim this power in the service of democracy, new solutions need to be invented that place democratic use of that data as a high priority.

Big data correlation and prediction: Proxy data and its problems

In a widely cited 2008 article in *Wired*, business writer Chris Anderson announced the "end of theory" in the age of big data. He argues that because of massively abundant data, companies like Google do not have to produce models or hypotheses of behavior in order to predict consumer behavior. They can simply mine their troves of data to discover trends and patterns. "With enough data, the numbers speak for themselves," he writes (Anderson). In short, Anderson argues that using statistical correlation is a good enough way to draw conclusions based on a set of data—good enough such that companies no longer need to create models of behavior. Creating a falsifiable hypothesis, which has long been a hallmark of the scientific method, is too time-consuming and ultimately unnecessary when organizations have access to

massive amounts of data. Instead of creating models, Anderson argues, organizations can simply run the data they have through pattern recognition algorithms to find correlations. In the years since his article, prediction based on proxy data has become widespread and lucrative business.

In their 2014 book about big data, Kenneth Cukier and Viktor Mayer-Schöenberger likewise identify correlation as the central statistical phenomena used in big data analysis. Crucial to correlation in big data is finding the correct proxy for behavior. By identifying the correct proxy, big data analyses can predict what is happening "now," and what will happen in the near future. Cukier and Mayer- Schöenberger write,

> Predictions based on correlation lie at the heart of big data. Correlation analyses are now used are now used to frequently that we sometimes fail to appreciate the inroads they have made. And the uses will only increase. (55-56)

Big data analytics firms use proxy metrics to predict many forms of behavior. The Fair Isaac Corporation, or FICO, produces a "medication adherence score," that predicts whether or not people will take their medication. Their proxy information includes "how long people have lived at the same address, if they are married, how long they've been at the same job, and whether they own a car," in addition to the customer's credit score (Cukier and Mayer-Schönberger 56). These proxies elude the logic of causation—there is nothing about these metrics that *cause* a patient to take, or fail to take, their medication. Despite the lack of causation, these proxies are highly correlated with medication adherence and can therefore predict whether they will take their medicine or not. Importantly, those metrics are relatively easy to collect via publicly accessible databases. Similarly, retailer Target uses big data analytics to produce a "pregnancy prediction score." This score is based on products that, if purchased in a given amount of time, can predict whether or not a customer is pregnant. The data for this

analysis comes from credit card and store loyalty cards, which collect information about buying habits (Duhigg 2012, Hill 2012).

Health Insurance companies use big data analytics to predict when their customers may get sick. For companies that offer health insurance, prediction can be a key to keeping group rates down because it leads to better prevention. Analytics firms like Castlight Healthcare, Welltok, and Deloitte LLP's Center for Health Solutions analyze data on behalf of employers to predict the health status of their employees. Their proxy data often has nothing to do with health, but instead is based on shopping habits and daily activity. Surprising metrics like whether an employee votes in a midterm election can accurately predict the health status of that employee (Silverman 2016).

Researchers have shown that self-tracking data can be used to predict markers of health (Lim et al). Researchers from the Duke-NUS Institute of Precision Medicine in Singapore showed that data from a FitBit HR wearable fitness tracker can accurately predict certain risks for heart disease.

> The researchers provided wearable fitness trackers to 233 volunteers to wear over a five-day period to collect data on their daily steps, heart rates, and sleeping sessions. The researchers combined these data with lifestyle questionnaires, cardiac imaging, and other clinical measurements of heart and metabolic health. The volunteers' wearable activity data were used to identify levels of lipids known as ceramides in the blood, which can predict cardiovascular ailments such as obesity, diabetes, and heart disease (Vickers).

Researchers at Stanford (Li at al) showed that data from fitness trackers can detect early warning signs of a Lyme disease, and can detect the physiological difference between insulin-sensitivity and insulin-resistance. This and other research shows the medical interest in self-tracking devices for precisely the reason outlined above—self-tracking data can be used as a

means of prediction, and can be done so without generating a specific hypothesis, but rather by collecting data and identifying patterns.

Life insurers in New York state can use social media data as actuarial data in determining life insurance premium rates (Scism). In a major step forward for equitable use of algorithms and data, life insurers are required to prove that the data and algorithms are "free of bias against racial minorities and other groups protected by law" (Scism). The author recommends that with new rules in place, social media posts that reference or include images of visits to the gym, health food purchases, and using a fitness tracker could reduce premium rates. Unhealthy behaviors that appear in social media posts like smoking, visiting a bar, or risky sports like skydiving could be detrimental.

Workplace Wellness programs, which I cover more in-depth in chapter four, incentivize workers to collect self-tracking data. This data is then given to health insurers and other entities, often in a de-identified format. Still, even in this format, valuable trends emerge that workplaces and health-insurers can use to change policies. In response to privacy concerns that employers can monitor health habits of their employees, many firms try to assuage fears of Orwellian surveillance by pointing out that these statistics are often collected in aggregate, without the employer knowing much about an individual worker (Hofherr). Yet as we have seen in Latanya Sweeney's research, aggregate data can still reveal a lot about individuals, and the anonymization tactics can sometimes be easily broken.

Predicative Policing and Oppressive Algorithms

Another area that utilizes prediction, correlation and proxy statistics is policing. Police

departments across the United States use a predictive policing system called *PredPol*. On their website, PredPol indicates,

> Using only three data points – past type, place and time of crime and a unique algorithm based on criminal behavior patterns, PredPol's powerful software provides each law enforcement agency with customized crime predictions for the places and times that crimes are most likely to occur. PredPol pinpoints small areas, depicted in 500 feet by 500 feet boxes on maps – that are automatically generated for each shift of each day. ("Hot Spot Policing")

Policing is a useful comparison for self-tracking data, considering that the information collected by fitness trackers is useful in court to prove or disprove contested facts about someone's location and activity level. In 2014, police in Lancaster, Pennsylvania used Fitbit data to charge a suspect with making a false police report and tampering with evidence when it was shown that her Fitbit data disproved her statements to police (Hill "Fitbit data just undermined"). Another case in Canada used Fitbit data as evidence in a personal injury case to show decreased levels of exercise and activity resulting from a workplace injury (Olson).

The use of proxy statistics has been shown to be inaccurate in many instances and can often lead to dangerous consequences. Google thought that it had created a groundbreaking research tool with its Google Flu Trends project (GFT). The idea was simple—google identified a set of search terms that could act as a proxy for the spread of the flu. Using the statistics reported weekly by the US Centers for Disease Control, GFT identified a set of search terms that correlated strongly with an increase in reported flu cases in a given region of the country. By looking at the one-week old data, Google could retroactively determine which search terms saw an increase in those areas in which flu cases rose. As a predictive measure, these same search terms could predict, in real time, which regions of the country were experiencing an increase in

flu cases. Their prediction was probabilistic (and could be verified and corrected a week later when the CDC released their official data). As a real-time indicator of flu cases, it was potentially highly useful for urgent care and distribution of resources.

Unfortunately, the system was highly inaccurate, as articles in *Science* and *Nature* both pointed out (Lazer et al, Butler). Lazer et al call GFT a prime example of "big data hubris." Big data companies commit a fallacy, they argue, when they assume that "big data are a substitute for, rather than a supplement to, traditional data collection and analysis...[the] quantity of data does not mean that one can ignore foundational issues of measurement and construct validity and reliability and dependencies among data" (Lazer er al). In the first several years of the GFT, which ran from 2008-2014, the model mostly used search terms that also correlated with winter. Because of this, the model failed to predict the 2009 non-seasonal outbreak of the Flu. After that point, the model consistently predicted high for "100 out of 108 weeks starting with August 2011" (Lazer).

Not to be forgotten, research on predicting flu outbreaks has moved into the fitness tracking world, where a research study published in 2020 detailed the use of de-identified Fitbit data to predict flu outbreaks on a state-level (Radin "Harnessing wearable device data to improve state-level real-time surveillance of influenza"). Importantly, this data is exempt from institutional review. Participants in this study consented to their data being used in this study by agreeing to the terms of service for their Fitbit project. The author's write:

> De-identified Fitbit data were used for this study, which was determined by the Scripps institutional review board to be exempt from institutional review board review. All Fitbit users, including those whose data are used in this study, are notified that their de-identified data could potentially be used for research in the Fitbit Privacy Policy (Radin).

Where as the google Flu study was shown to be misleading and inaccurate, using Fitbit data is seemingly much more accurate, and could lead to more efforts to use this type of data to identify illness in real-time. The study looked at data from 47,000 Fitbit users in five states, and determined that metrics like activity level, heart rate, and sleep levels correlated with changed in reported flu outbreaks (Radin).

The issue of big data hubris was first rigorously defined by dana boyd and Kate Crawford in their "Critical Questions for Big Data" paper, which sought to set the terms for critical discussion of big data research. They write, "Big Data offers the humanistic disciplines a new way to claim the status of quantitative science and objective method. It makes many more social spaces quantifiable. In reality, working with Big Data is still subjective, and what it quantifies does not necessarily have a closer claim on objective truth – particularly when considering messages from social media sites" (boyd and Crawford 667). The problem, they argue, stems from assuming that data does not need to be interpreted; that data has only one meaning, which is obvious and "objective." Another example of the use of proxy statistics that had potentially dangerous or misleading results occurred when Strava, the fitness tracking app, released "2017 Heat Map," which purported to show popular running routes. It also inadvertently showed the locations of secret US military bases (Robb).

In 2017, ProPublica and Consumer Reports released their results from research into price discrimination based on algorithmic price-setting. The headline reads, "Minority Neighborhoods Pay Higher Car Insurance Premiums Than White Areas With the Same Risk." (Angwin et al). Their research showed that car insurance companies used data that served as a proxy for race, although gathered from data points that were themselves not determinate of race. The higher

rates paid by customer in minority neighborhoods could not be explained by higher risk of driving in those neighborhoods. In fact, they showed that in white-majority neighborhoods the cost of accident repairs was actually higher than those in minority neighborhoods.

Examples of bias and discrimination against minority groups abound when decisions are made by machine learning algorithms. In Zook, et al's "Ten simple rules for responsible big data research," thirteen researchers from a wide-range of academic fields contributed to a useful guide to the ethical harms of big data/AI and how to redress them. First on the list was the recognition that data can be harmful due to the fact that bias and inequitable treatment can be coded into data that may appear to be objective. Bias in these systems leads to harsher sentencing for Black and Latino suspects (Angwin et al "Machine Bias" and Wykstra). These algorithms are often proprietary, so the public has no knowledge of how they work and researchers therefore cannot critique them. The "COMPAS" system, used by several states for criminal justice sentencing uses unknown factors that predict recidivism rates. COMPAS is a "black box" (Pasquale) because its techniques and sources are blocked from public view, citing trade secret protections.

The problem that many statisticians see with using algorithms to determine sentencing, even though the algorithms themselves are hidden from scrutiny, is that the data is biased to begin with. Kristian Lum, the lead statistician at The Human Rights Data Analysis Group[30], critiques the use of algorithms to determine bail and sentencing (Lum). Judges have traditionally used their discretion and guidelines to determine amount of bail and other sentencing decisions. Because of fears of unconscious bias, algorithms and machine learning have begun to replace these decision-making processes with risk assessment factors like age, charges, location, etc.

[30] See https://hrdag.org/usa/

These AI-based systems are trained using historical data. However, due to inequities in how communities of color have been policed (more police presence, high arrest rates, more harsh sentencing), the data is already full of bias. Lum writes,

> If we continue to increase our reliance on these tools without first addressing the disparate policing of poor and minority communities and other root causes of statistical bias in the training data, we risk automating the type of human bias that these tools were developed to eliminate. (Lum 1).

Power imbalance in Data: Institutional uses of personal data

Self-tracking data from fitness trackers and wellness programs have the ability to be used to control and constrain choices. Fitbit partners with over one thousand health insurers, wellness programs and other companies to provide wearable fitness trackers to their customers (Ho). UnitedHealthCare is notable for its widely publicized partnership with Fitbit to provide fitness trackers to its customers, and then pay them for their use of the devices when they reached their fitness goals. In 2018, UnitedHealthCare started using Apple Watches instead of FitBit trackers. Customers enrolled in their "motion" plan can get paid up to $1000 per year by tracking their activity with an Apple Watch and giving that data to UnitedHealthCare ("Apple Watch now part"). The customer receives the Apple Watch for free initially. In order to pay off the cost of the watch, they can earn up to $4 per day by reaching one of three goals:

- **Frequency:** Complete 500 steps in 7 minutes an hour apart, at least six times per day.
- **Intensity:** Complete 3,000 steps in 30 minutes, at least once per day.
- **Tenacity:** Complete at least 10,000 steps per day. (Farr)

The predictive capabilities of big data statistical analysis can reveal the power imbalance between those collecting the data and those sharing the data. Companies that use data for predictive analytics have the power to use data in ways that it is impossible for end-users to agree to, even if they agree to terms of service. Claiming that users know the risks and are aware of tradeoffs they accept by agreeing to data-sharing practices belies users' understanding of how those data policies may affect them personally. For instance, genetic testing companies frequently share data with law enforcement agencies like the FBI (Brown). Due to the nature of genetic data and how law enforcement can use some genetic data to find not just individuals with genetic data in the system, but relatives of a person of interest, only 2% of the population needs to upload their genetic data into the system in order to nearly everyone's data to be represented (Brown).

This is a clear of example of what David Golumbia calls "Crowdforcing." He writes,

> Crowdforcing in the sense I am using it refers to practices in which one or more persons decides for one or more others whether he or she will share his or her resources, without the other person's consent or even, perhaps more worryingly, *knowledge.* (Golumbia)

Golumbia cites the example from DeCode Genetics, an Iceland-based company, that claims to hold the complete genetic data for 320,000 citizens of Iceland (nearly the entire country), despite having received samples from only 10,000 people. While they received consent from those 10,000 people, the vast majority of the genetic information they can extrapolate means that those participants forced non-participants to be a part of the data set. Aggregate data is a form of crowdforcing due to the same kinds of algorithmic extrapolation at play in genetic studies. Data from one source can create categories that are then used to predict behavior for other people.

Crowdforcing enacts a power imbalance at the heart of data sharing. While users may feel in control of their own data (even if they're not), the "owners" of that data are able to use the data in ways that affect entire populations. The *use* of the data, outside of the personal realm, is so much more powerful than most users realize. By creating categories based on aggregate fitness tracking data, health insurers, life insurers and workplaces, can use those categories to make predictive analysis of other users. By combining that data with other data, including social media data, companies can gain a more complete picture of behavior. The logic of surveillance capitalism dictates that these behavioral prediction markets can intervene in order to shape behavior. As Cambridge Analytica and the Facebook Emotional Contagion study have revealed, these nudges work at a subliminal level. We do not know that we are being manipulated, and despite the fact that some of the data is useful for us, say in order to maintain a consistent calorie intake or exercise regiment, the data is the lifeblood of the business model for producing capital in the surveillance economy.

Aggregate data from fitness trackers forms what Cohen calls a "biopolitical public domain." Data (both aggregate and not) facilitates the ever-expanding need for companies to assess risk and predict future behavior with large data sets, some of which is determined by statistical means and not directly from users (thereby preventing them from explicit consent). Health insurers, life insurers, and workplace wellness programs can use this data to determine policies and pricing. As self-tracking data finds its way into more and more employers and health insurers hands, the power to predict is also the power to discriminate and control behavior.

"Predictim" is a predictive analytics engine for vetting babysitters based on social media use. The company behind the product claims to "[help] parents conduct an evaluation of a sitter, using publicly available data in the same way that a parent might do an online search to check for

red flags" (Predictim.com). Using AI algorithms, the company will rate a potential babysitter on such categories as "Bullying," "Harassment," Explicit Content," and Drug Abuse," ranging from "very low risk" to "very high risk."

After a Washington Post article about Predictim stoked fears that a social media scraping tool was being used to evaluate low-income wage earners using black-box techniques, there was a backlash on social media to the ways in which this process might be biased or racist. AI researcher Kate Crawford wrote on twitter,

> "Well yes, this AI sitter screening is error-prone, based on broken assumptions, and privacy invading. What's worse - it's a horrifying symptom of the growing power asymmetry between employers and job seekers. And low wage workers don't get to opt out. (Crawford)

The problem that Crawford raises is that the workers who are being evaluated ultimately have no say in whether or not this tool is used against them, and have no recourse to justice if the algorithms are unfair. Job seekers for these types of positions are at the mercy of a system that uses dubious data and secret algorithms to determine their future. Like many other machine learning algorithms, if the data feeding the system is biased, the outcomes will be biased as well. These same fears led Amazon to abandon a job application screening tool that used machine learning algorithms to help sort through applications. The tool was determined to be biased against women, because the data sets used to train the algorithms used the resumés of current Amazon engineers (who are mostly men) (Goodman).

The same fears apply to self-tracking. As data is sold from self-tracking apps to data brokers, insurers, workplaces and other entities, we should see this data as forming the basis of

predictive analytics. While *users* see their own data as representational of their own bodily movement, companies use this data to predict behavior and train machine learning algorithms.

Conclusion:

Seen through the lenses of Zuboff's concept of surveillance capitalism and Hansen's concept of feed-forward, fitness-tracking reveals itself to be much more than a healthy life-style trend. Fitness-tracking devices are used by researchers, health and life insurers, social media services, and data brokers to gain insights into behavior. Surveillance capitalism opens a critique of fitness-trackers based on prediction—data about behavior is consistently used to predict behavior. Those behavioral futures are packaged and sold to business customers and other parties in order to target individuals with an intervention at precisely the right moment. Mark Hansen's analysis of 21st century media opens up fitness-trackers to a critique based on control. The operational level of 21st century media is contrasted with the experiential level. The pharmacology of fitness trackers is out of alignment when the ways that we use them diminish our agential capacities. Fitness tracker data is collected and transferred at timescales below our conscious perception, which is leading us down a road towards alienation from the institutions that control this behavior.

By critiquing fitness-trackers along these lines, I show that data based on bodily movements is not free of political or economic motives. In fact, as our bodies get turned into data and our actions are guided by institutions, our sense of autonomy gets mired in the churn of data processing, predictive analytics, nudges, and pricing schemes. Theorizing these changes and

contextualizing the growth of these devices is crucial to understanding where this technological apparatus is heading and how to regulate it.

Chapter 4: Ethical and Legal perspectives on Self-Tracking and Workplace Wellness Programs

This chapter presents an analysis of workplace wellness programs through the lens of philosopher Judith Butler's work on moral responsibility and the self. Butler argues that the conditions of the self do not come from within us, but from our culture and history. We cannot fully tell a story in which "I" am the central protagonist without telling other people's stories as well. The self is a relation, not an individual who exists prior to culture and language. Ethics, then, has no recourse to a solitary actor who can take responsibility for their own actions. Individual responsibility, argues Butler, is somewhat of an illusory concept if one defines responsibility by assuming a static and stable individual. Rather, the continual process of becoming an "I" is radically intertwined with *others'* experience.

Butler argues that the interconnectedness of self/other makes ethics a political and social activity. Since *individual* responsibility is inherently *social,* we cannot practice ethics, pass judgement or give reasons for our actions that are solely our own. This chapter argues that the responsible use of data is also a social and political activity in the sense that our data and others' data is combined in ways that give institutions leverage and a degree of control over our decisions and choices.

Workplace wellness programs regulate workers' bodies through incentivized and sometimes compulsory behavioral tracking. Data flows from regulated bodies into institutions like health insurers and 3rd party companies who handle and process data on behalf of companies. Self-tracking data informs policy decisions, making individual fitness-tracking data inherently social.

Workplace Wellness Programs

Workplace wellness programs are aimed at individuals striving to meet health goals within a formalized program at their place of work, sometimes involving monetary incentives. The Affordable Care Act (ACA) of 2010 created the legal framework for workplace wellness programs, giving employers the ability to incentivize participation up to 30% of the cost of health insurance coverage. The ACA established the Prevention and Public Health Fund which encourages employers to offer a workplace wellness program (Anderko, et al). Wellness programs are also offered through Medicaid programs in 18 states (Saunders, et al).

Self-tracking often plays a large role in quantifying user's participation in these programs. As part of the University of Pennsylvania's wellness program, for example, participants undergo a "biometric screening," in which cholesterol levels and blood pressure are collected by the company Areufit[31], a health services provider that manages the program.

Participants are then asked to track other aspects of health behavior, including exercise and food habits. Penn operates the "StayWell" web portal, which users log into to document their self-reported actions like flu shots and gym memberships. The web portal also serves as an aggregator for all self-tracking applications and devices such as step counters, heart rate monitors, sleep trackers, and smart phone apps that track various metrics of behavior. Participants are offered additional incentives for submitting different forms of data, which can earn them up to $300 per year ("Be in the Know").

[31] http://www.areufithealthservices.com

Despite evidence that incentive-based workplace wellness programs do not improve health outcomes for participants, workplaces have embraced these programs as part of cost-savings measures (Jones et al). Although paradoxically, some evidence exists that workplace wellness programs can actually cause increased health care expenditures for those participating in the program vs a control group (Levy et al). Wellness programs embrace the healthist and neoliberal assumptions outlined in previous chapters. Individual responsibility not only towards one's own health but to the health care system in which employers are embedded speaks to the ways in which neoliberal assumptions are built into our institutions and practices.

Workplace wellness programs have embraced self-tracking as a way to build hooks into their portal or management system. Self-tracking is an easy and user-oriented way to track participation. The integration of self-tracking into workplace wellness programs is unquestionably accepted as an effective means for employers to gather information and "know" their employees in a more personal and intimate way. This pursuit of knowledge raises ethical concerns that are wrapped up in conceptions of the self which I discussed earlier. Judith Butler's work detailing the moral responsibility between interrelated parties and whether or not we can truly claim individual self-responsibility is relevant because of the way Butler ties together moral responsibility and a critique of western assumptions about the individual nature of personhood.

Research on the effectiveness of workplace wellness programs, like digital self-tracking in general, is inconclusive[32]. Setting aside any health benefits (or lack thereof) for the moment, other outcomes of self-tracking outlined earlier in this work come out clearly in workplace wellness programs: quantification, the creation of an economy of bio-data, and using data to

[32] See Jones et al; Cawley et al

structure services and guide pricing schemes. The workplace wellness program at University of Pennsylvania, for instance, shares aggregated data with other business entities:

> We may combine your Information with Information collected from other participants to create anonymous aggregated data reports that may be disclosed to your Plan, your Employer and other third parties ("StayWell Privacy Policy").

They also use personal data and share this data with other entities:

> We may also disclose your Personal Information and/or Personal Health Information, to the companies, agents, contractors, service providers, or others engaged to perform functions on our behalf (such as processing of payments, provision of data storage, hosting of our website, conducting audits, and performing web analytics). These third parties' use of your Information may be subject to, and controlled by, the third party's own privacy policy as well as the third party's service contract with StayWell (if any). Click here for more information. ("StayWell Privacy Policy").

Alas, there is no hyperlink associated with the text "click here for more information." As is evident here, personal and aggregated data does not stay within the bounds of a single company, but is routinely shared and thus under the provision of other company's privacy policies, to which the user never consented to. The privacy policy adds:

> We may also disclose your Personal Information to third parties when we believe, in good faith and in our sole discretion, that such disclosure is reasonably necessary to … protect the rights, property or safety of us, our users or other third parties. ("StayWell Privacy Policy").

Here we see the privacy policy reserving the right to share personal user data when they believe that doing so will protect their rights. And like many privacy policies, the StayWell portal transfers all personal data to a new company in the event of a sale or merger. Personal user data would then be covered by the new company's privacy policy. Thinking through the ethics of

these programs raises the question of whether companies and institutions should be using and profiting from data that is gathered from such a personal form of data—data derived from the user's bodily movements and measurements—without the user's clear knowledge.

Judith Butler's Ethical Framework

Butler's ethical framework details how responsibility emerges from our interdependence on one another. In her view, the self serves as the locus of responsibility not because the self is an *actor* (rational or otherwise), but because knowledge of the self is fundamentally incomplete and is intertwined with other people's actions and life histories. An ethical evaluation of self-tracking under the umbrella of workplace wellness programs depends for large part on how we define the self/other relationship. Butler's framework offers a perch from which to analyze how individuals' relationships to institutional structures can be seen as worthy of ethical considerations. Butler analyzes typical western notions of self as too reliant on a juridical framework in which the self is made to account for its action, devoid of any social causes or shared responsibility. Butler's account, therefore, can help describe the boundaries of the self/other distinction as it relates to ethics. Her framework offers a way to critique the focus on "self' within workplace wellness programs.

Butler's *Giving an Account of Oneself* details a view of responsibility and ethics that starts from the basis of ignorance of the conditions of the self. She argues that in order to tell one's own story (i.e. to provide a complete narrative about one's own behavior, actions, reasons and motives), one must necessarily reach outside of the self and start telling the stories of *others.* To tell a complete narrative that explains everything that went into a particular decision or action

would include a history of one's family, a biological and genetic history, and a history of childhood and other experiences. These factors shape who we are, and in some way act together to produce a subject who acts in a certain way and is capable of providing specific reasons for their actions. Because a complete description of the self reaches outside of the self *proper*, there are aspects of one's own life that one cannot be fully aware of because they are not truly personal experiences—they are others' experiences.

Butler argues that what it means to be a self is *not* the same as being able to tell a story in which "I" am the central protagonist. Indeed, any first-person narrative account of selfhood quickly breaks down, in her view, because the self "has no story of its own that is not also the story of a relation" (*Account* 8). In her view, the self is related to other people and to social norms in such a profound way that we are dis-possessed of our self. We cannot possibly claim ownership or authority over our self, because the "I" is always connected to other people and to "the social conditions of its emergence" (*Account* 8). For Butler, the self is not a possession, but rather a web of communal relations that we cannot help but lay claim to. And most importantly for my purposes, the self is never fully knowable *as a self.* When we give an account of our self, we always reach outside of the self.

In her arguments about selfhood, Butler strongly allies herself with Foucault, who similarly argues that the struggle to craft and define oneself always takes place against the background of social norms that one has to contend with: to reject or accept, but never to disregard. Social norms exist beyond our control. The self is always a relation, and our personal narratives reflect that sense of embeddedness.

Butler describes this condition as being "divided, ungrounded, or incoherent" (Butler *Account* 19). We must accept responsibility for our self precisely because we must always deal

with the unchosen conditions of our life. We do not choose when or where we were born, or the social milieu in which we were raised. We do not choose our own genetics, our first language(s), nor our nationality or ethnicity. Importantly for Butler, we also lack an ability to fully comprehend the conditions under which we develop and live. Even if we could, in principle, decide which conditions contribute most profoundly to who we are, we would necessarily have to reach outside of our conscious experience in order to understand those conditions. And as soon as we do this (say, with the help of a therapist, or a family member, or a stack or old family photographs), we include other people's language, memories, and media into our self-conception. Thus, the self remains ungrounded because we need a non-self-perspective in order to fill in the gaps.

For Butler, as Foucault, social norms establish frameworks by which we recognize other people *as* people. We recognize and read another person as having a gender, a sexuality, a social or class status, an ethnicity or race because of regimes of truth that exist independently of us. The "truth" of someone else's self is read at the "scene of address," and follows lines of social norms (Butler *Account* 22). This recognition extends to self-recognition, in which we see the truth of ourselves in light of established social norms. Again, this is not to say that social norms outright determine who we are, but they set up a regime of truth, a framework, against which we evaluate and interpret our own and others' behavior.

Butler writes,

> "my account of myself is partial, haunted by that for which I can devise no definitive story…there is that in me and of me for which I can give no account" (Butler *Account* 40).

For Butler, we always adopt a point of address in telling our own story. We always tell our story

from a particular perspective and addressed to an audience, even if that audience is imagined. Yet this narration always fails to provide a full account of myself. The self is always partially opaque to itself, precisely because there are memories and history that are irretrievable and outside of conscious memory. And since any storytelling in language operates by norms of social performance, the full telling of my story must include how these norms came about. As a social phenomenon outside of the self, per se, social norms nonetheless set up the framework against which my personal story came to make any sense whatsoever. Thus, in giving an account of myself, I find myself immediately reaching beyond "self" and incorporating the web of relations, history, other people, and social norms.

In a more technology-focused argument, philosopher Andy Clark describes the self as a collection of tools without a central *user.* He writes,

> There is no self, if by self we mean some central cognitive essence that makes me who and what I am. In its place there is just the "soft self": a rough-and-tumble control-sharing coalition of processes – some neural, some bodily, some technological – and an ongoing drive to tell a story, to paint a picture in which "I" am the central player. (Clark 138).

Clark's argument rests on a definition of "mind" in which we should consider much of our cognitive toolkit as residing outside of the bounds of our brain. The pen and paper are just as much as part of the process of writing as our brain. The *location* of cognitive processes is not as important as the transfer of information and the feeling of unity and coherent action. Like Butler, Clark eschews the transcendental coherence of the self in favor of defining the self as an emergent property. Importantly, this sense of self does not fit neatly within traditional western notions of moral authority, ownership and responsibility. Even knowledge, for Clark, escapes the bounds of the brain.

The paradigmatic standard of knowledge in Quantified Self circles is concrete, objective knowledge of one's past behavior based on data collection and analysis. As covered in chapter one, this practice is seen as reclaiming power and knowledge from dominating social forces because through this practice we break free from the search for inner truth and concentrate on "outer" knowledge, gathered through technical means. Yet there is little acknowledgment that striving for improvement and searching for uniqueness is exactly the kind of self that neoliberal governments desire in their citizens. As Foucault theorized, techniques of self-mastery are not separate from techniques of state-control. And as Butler argues, we cannot break free of the forms of address that capture and define us as selves.

When fitness-tracking becomes embedded in workplace wellness programs, it becomes institutionalized and therefore easier for big institutions to leverage their power over people to coerce participation. Most wellness programs are voluntary. Yet, because participants get paid, non-participants receive a penalty in the form of lost compensation. In Butler's ethics, we can not evaluate decisions or assign praise or blame based on individual actions. The self is not a story of the "I," but a story of relations. The same is true of data collection. The actions of others affect me because when data is collected in mass, the results of that data alter the course of institutions. My policy rates may go up or down, or decisions about coverage may affect me because of the data freely given to the employer/plan by other people.

Butler's account of the self rejects the liberal humanist view also critiqued by CB Macpherson in *The Political Theory of Possessive Individualism*, which I discuss in chapter one. Macpherson's work criticizes the liberal humanist assumption that the self as a thing that we *own*. If the self is a posession, we can therefore bring our skills and unique talents as commodities for sale on the free market. Macpherson argues that this concept of the self cannot

hold true because it is the very situation of being in a free market economy that produces this kind of "possessive individualism" as a coherent theory. In other words, capitalism did not emerge as a natural by-product of the fact that humans are naturally bound by exchanges of capital for labor. Rather, it is capitalism itself which forces us into this poorly fitting conception about what the self is. We are not free rational actors who owe nothing from society for our skills and traits.

Butler's critique adds the concepts of performativity and juridical power to explain the ideological adherence to the self as an entity that exists somehow "before" its invocation in the realms of politics and ethics. Rather, she argues, "juridical power inevitably "produces" what it claims to merely represent" (*Gender Trouble* 5). Thus, the task for feminist politics is not just to understand how women might be better represented politically, but to understand how the function of politics and language creates the category of "women," thus legitimizing the "law's own regulatory hegemony" (5). There is no subject "before" the law, since the law is one of the functions of power that creates the belief in the subject in the first place.

Butler's work focuses on the ethical paradox of denying the possessive self. If one is not fully aware of the self, one cannot be fully responsible for one's actions. However, Butler's goal is not to persuade us that responsibility is an illusion, but rather that responsibility does not stem from or belong to singular autonomous subjects acting in a world of their own making. We are not aware of all the conditions of our experience because our very sense of "I"-ness is necessarily shaped or outright determined by *other people*. So, in telling one's own story, one must tell others' stories as well. This means that responsibility *comes from* our interconnectedness with other people. What produces us as a distinct "I" is the same thing that connects us in radical ways, and in ways in which we find ourselves responsible for other people.

In her essay, "Subjection, Resistance, Resignification,"[33] Butler discusses Foucault's concepts of power and resistance against the background of the interplay of power, the body, and the soul in *Discipline and Punish* and *The History of Sexuality Vol. I.* Foucault and Butler both see power as inextricably tied to the creation of knowledge and to the formation of subjects, what Foucault calls "subjectivation." Butler's essay finds resistance to domination not in defying the forms of domination perpetuated upon us, but in recognizing that the subject is never final and is always in the process of formation. Being recognized as a subject is a process that plays out continually along lines of power relations.

Crucial to understanding the Foucault/Butler view of subjects is the recognition that power relations are not (only) external to individuals. To be recognized as a subject means to be caught in the matrix of power relations that produce subjects *as* subjects. In *The Psychic Life of Power,* speaking about Foucault's study of prisons and prisoners, she writes,

> The prisoner is not regulated by exterior relations of power, whereby an institution takes a pre-given individual as the target of its subordinating aims. On the contrary, the individual is formed, or rather formulated, through his discursively constituted "identity" as a prisoner. Subjection is, literally, the making of a subject, the principle of regulation according to which a subject is formulated or produced. Such subjection is a kind of power that not only unilaterally acts on a given individual as a form of domination, but also activates or forms the subject (84).

This is what is meant by *productive* power. Power is a dominating force, but it is also a productive force.

Butler finds the moment of resistance against dominating norms within this sense of productive power. Because subjectivation is not a process that occurs one time only, but is rather

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[33] In *The Psychic Life of Power*, Stanford, 1997

a continual process, one can use this iterative nature to overcome dominating effects. Applied to data collection, the power wielded by organizations through data-power does not lie outside of resistance. Resistance (here we can think of the Quantified Self sense of "resistance") is part of a system of domination in which some forms of resistance are accepted and even encouraged. The subjectivation process creates the seeds of its own resistance, and is part of the productive force that creates subjects. Thus, data-subjects are created through the "resistance" of self-tracking, of the personal, knowledge and health-focused effort of collecting one's own data.

Butler's account is a compelling antidote to the trends in self-tracking towards ever-expanding knowledge of one's own personal behavior. As I have been arguing in these chapters, the individually-focused behavior of self-tracking produces a touch-stone, a "surface" by which institutions and capitalist entities categorize and manage people. Even as personal self-tracking data can be valuable to the person collecting it, it is also valuable to the organization collecting it. Indeed, it is the massive *amount* of data that makes it useful as a means to categorize people. With Butler's conception of responsibility and the radical interconnectedness of all people, the practice of self-tracking can be seen as futile, or at least raises serious doubts as to whether self-tracking is really anti-normative in the way that the Quantified Self group describes it as. One can never collect *all* of their own data. And they can't possibly compete with the kinds of data that organizations have about users because as more and more people self-track, organizations have all users' data, while each user only has their own data. This allows organizations to know their users in a way that users themselves have no access to.

The best way to avoid the kinds of data-based organizational management of which wellness programs are a part is to stop seeing voluntary participation in a wellness program as an individual act. Self-tracking is not just about individuals engaging in self-improvement. Rather,

self-tracking embeds information about our bodies and behavior into institutional processes. In economist Zuboff's 2019 Op-Ed for the New York Times, she writes that powerful institutions no longer own the means of production, but are driven by "ownership of the production of meaning" (Zuboff "You are Now Remotely Controlled"). Facebook, Google and other large companies make money by selling access to predictions about user behavior control. Their business model is about controlling knowledge. They seek to control the flow of information in order to dominate the epistemic realms of authority and power. The three central questions here, Zufboff writes, are "Who knows? Who decides who knows? [and] Who decides who decides who knows." ("You are Now Remotely Controlled"). In the realm of surveillance capitalists, the answer to all three questions is increasingly: Google, Amazon and Facebook.

Knowledge about the self is following the same trends that Zuboff describes. Self-tracking is not solely about the individual, just as telling one's own story is not solely inward-focused. Both activities have in common the inclusion of entities that are not-self. Self-tracking creates data that informs policy decisions and divides people into categories, giving institutions a locus of control over populations of people. Self-tracking is not solely about the self, just as ethics (per Butler) is not solely about the self. Individual responsibility, argues Butler, is somewhat of an illusory concept if one defines responsibility by assuming a static and stable individual. Rather, the continual process of becoming an "I" is radically intertwined with *others'* experience. Self-tracking is also wrapped up in others' experiences in light of the iterative process of which personal self-tracking is only a part. Self-tracking is embedded within a larger matrix of data collection. To tell the full story about data, one must describe where that data goes and what it does. This fuller story is often opaque and impossible to describe in complete detail.

Butler argues that the interconnectedness of self/other makes ethics an inherently political and social activity. Since *individual* responsibility is inherently *social,* we cannot practice ethics, pass judgement or give reasons for our actions that are solely our own. The responsible use of data is also a social and political activity in the sense that our data and others' data is combined in ways that give institutions leverage and a degree of control over our decisions and choices. The political critique of data collection in this view has to do with how our data is not just our own, but is one small piece of the massive amounts of data collected by the organization in question. An individual worker may gather their own data through a self-tracking device, and give this data to the workplace wellness program. This and other data, often facilitated directly by the workplace wellness program through biometric screenings, form the basis of the categorization and analysis done by the organization.

Workplace Wellness Programs: Privacy and Data Collection

Wellness programs promote the use of fitness trackers by offering monetary incentives for uploading data to the company portal. The StayWell portal for the University of Pennsylvania Wellness Program allows participants to connect a variety of self-tracking application and devices to the online portal. These include trackers by Hauwei, Moves (owned by Facebook), Fitbit (owned by Google), Mitfit wearables, and dozens more.

Huawei's privacy states that their data gathering includes information from your interaction with their services products, sites), but also information available from other sources (such as offline records or publicly available information). We will treat the combined

information as personally identifiable information ("Huawei Privacy Policy"). Using this data, they build pfofiles of users that are used for advertising and other purposes.

> To learn about you and your interests, we monitor and analyze your overall interactions with our brand using various kinds of information, such as your age, your location, your demographics and interests, your orders on the Sites and your product reviews, your social media accounts, and how you use the Sites, Products and Services and information regarding your browsing and viewing preferences on the Sites. We use this information to develop, deliver, and improve the Sites, Products, Services and our advertising. ("Huawei Privacy Policy")

This information is then sold to other parties:

> Additionally, we may take personally identifiable information and de-identify it and share it in a de-identified or aggregated form with third parties, advertisers and/or business partners to analyze the Sites' usage or demographics, or improve our products or services, improve our user experience, or for similar purposes. We will not re-identify such data and we will ask our contracting parties to agree to keep the data in its de-identified form. ("Huawei Privacy Policy")

They use non-personally identifiable information for a multitude of purposes including targeted advertisements. They write,

> Your non-personally identifiable information also may be used by HUAWEI in conjunction with retargeting technologies which allow us to show advertisements or targeted content to you on the Sites, Products or Services or on our partners' websites or apps. Retargeting technologies analyze your cookies and other Collection Technology, and display advertisements based on your past surfing behavior, past ads that you have viewed and non-personally identifiable information collected over time by us and third parties. ("Huawei Privacy Policy")

While their privacy policy is in effect regardless of whether the user tracks their behavior as part of a wellness program or not, the wellness program promotes these devices and therefore

bears some responsibility for increasing the popularity of these devices. Using a fitness-tracker independently or in conjunction with a wellness program creates a stream of data for institutions, which they sell or make available (sometimes de-identified and aggregated, sometimes not). Huawei's policy states that they can use non-personally identifiable data for "any legal purpose." This includes the use of "retargeting technologies" that use cookies to deliver targeted advertisements on a multitude of websites. These ads are not strictly on the Hauwei website, but could be on social media sites or any site that uses cookie technology to deliver targeted ads. This type of targeted marketing is reminiscent of the kinds of "swaying" technology embraced by firms like Cambridge Analytica. Knowing a user's preferences, likes, and now their physical attributes (heart rate, step count, exercise patterns, etc) can influence how they make decisions about products and services to buy, even candidates to vote for.

"Misfit," maker of fitness-trackers, shares personal data with entities that are part of the same corporate umbrella (the watch company "Fossil"). Fossil has access to the personal information gathered through a user's Misfit tracker including "first and last name, email address, date of birth, gender, photo, height and weight." Personal information also includes activity and sleep data including: "the calculated number of steps you have taken, calories burned, your mode of movement (e.g. running or walking), rounds per minutes (if you use the Misfit Cycling App), travelled distance (but no correlated location data), time zone, your goals for the day (if any) and whether you achieved them ("Misfit Privacy Policy").

"Moves," another popular fitness tracking application that is owned by Facebook, tracks movement using GPS and accelerometer sensors. Personal information is gathered through the device and app, including location readings garnered from GPS and Wi-Fi, gender, height, weight and birth year. The Moves privacy policy states "We may share information, including

personally identifying information, with our Affiliates (companies that are part of our corporate groups of companies, including but not limited to Facebook) to help provide, understand, and improve our Services" ("Moves Privacy Policy"). Moves also reserves the right to disclose non-personally identifiable information in an aggregate way.

Connecting any device to the portal allows the Stay Well website to access data from that device or service. For instance, adding a Fitbit device to the StayWell portal prompts the user to submit certain information related to their Fitbit profile. The approval window includes the following data fields checked "yes" by default (see figure 11).

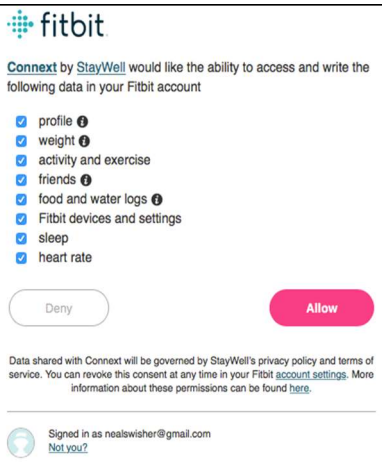

Figure 11: Message requesting approval to upload Fitbit data to the StayWell Portal. Screen shot from iOS device.

When agreeing to the terms of the biometric screening, participants are required to sign a consent form[34]. This form states that "StayWell," gives the data gathered from the screening to "Health Advocates." The participants agree that this data can be used in a de-identified aggregate data report.

Data submitted to the online portal can be shared in aggregate form with the employer (University of Pennsylvania), and other third parties ("StayWell Privacy Policy"). This includes information from fitness tracker devices and services. The StayWell portal also includes a sleep tracker section, in which participants enter sleep data as part of a module designed to inculcate better sleep habits. Although the program limits the use of data that can identify the individual, group and aggregate data can be used for research and analysis. Thus we see the "protection" of individual privacy, at the expense of the institutional use of data on the mass of individuals at the aggregate level. Aggregate data allows the institution to know enough about users in order to adjust policies.

In addition to the University of Pennsylvania wellness program, individual schools within the University offer fitness programs. The University of Pennsylvania Law School's "Sansom St Strutters" program is a walking program that creates a competition among workers to walk a certain amount of steps. Participants choose their "pace," thereby setting a goal to meet every day. Participants enroll in a specific competition on a voluntary basis (six thousand, nine thousand and twelve thousand steps per day), and see their progress compared to others in this same group. "Walker Tracker" maintains the portal through which users see their steps, and through which the app or device syncs to collect their data.

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[34] See https://www.hr.upenn.edu/docs/default-source/work-and-life-support/biometricscreeningconsentform.pdf?sfvrsn=dd6e8a56_16)

Even the 10,000-step marker, which many fitness trackers espouse as the recommended number of steps that people should walk in a given day is not based on science but rather on a marketing strategy for a pre-digital pedometer in the 1960s. A 2019 Atlantic interview with I-Min Lee, an epidemiology researcher at Harvard University School of Public Health, reveals, "In 1965, a Japanese company was selling pedometers, and they gave it a name that, in Japanese, means 'the 10,000-step meter'" (Mull).

> Based on conversations she's had with Japanese researchers, Lee believes that name was chosen for the product because the character for "10,000" looks sort of like a man walking. As far as she knows, the actual health merits of that number have never been validated by research. (Mull)

Figure 12: Japanese Kanji character for "10000."

Source: http:// http://www.kanjidamage.com/

Lee's research indicates that the link between walking and health benefits is much more nuanced than a one-sized-fits-all number. For elderly American women, the subjects of Lee research, for example, those who walked 4500 steps per day had significantly decreased mortality rates than those who walked fewer steps. Her research indicates that for those who walk relatively little, increasing their step count by 2,000 steps per day can have significant increases in mortality rates (Lee).

Despite the varying benefits of walking to different age groups and the complications of other health factors, companies continue to promote universal metrics for step count as a way to

increase health outcomes. Walker Tracker is a Portland, OR-based company whose services include “Walking and activity challenges for corporations and organizations” (“Walker Tracker”). They provide the online portal for participants in the program to enter their step data. Their smart phone app integrates with a variety of fitness trackers including Apple’s Health app on an iPhone and wearable fitness trackers. Like other fitness-tracker advertisements, Walker Tracker’s marketing features images of individual people taking control of their own health through measuring their own bodily behavior. The introduction page on their website reads “We believe in Pearson’s Law. That which is measured, improves” (“Walker Tracker”). Their “mission,” as stated on their website reads:

> We're doing it one step at a time. Get up, stand up, and walk. We believe in the democracy of walking. We believe that just about everyone could be happier, healthier, saner, smarter, faster, tougher and better looking by just adding a few extra minutes per day of walking. (“Walker Tracker”)

As we have seen before with other fitness-tracker companies, Walker Tracker touts improvement as the motivating factor in tracking one’s steps. There’s also an element of the “take control” narrative seen elsewhere in stating that walking is a democratic endeavor. “Democracy” here seems to mean the ability of anyone—aka “the people,” to use walking as a means of improvement. However, this narrative is quickly dismantled in the face of their privacy policy, which clearly lays out the transmission of personal data to “brokers, health insurance carriers or plans, or resellers” (“Walker Tracker Terms of Service”). Specifically, Walker Tracker states that it can share the following data with those entities:

- Name (if required in registration)
- Username
- Email address

- Registration date
- Last login date
- Step Data
- Activity data (from activity converter)
- Location data
- Participant answers to pop up questions posted on this site
- Type of device linked (if any) and last sync time/date from device
- Challenges that the participant does
- Team(s) participant is on

("Walker Tracker Terms of Service").

To be clear, this is *not* aggregate data, but personal identifiable data including name and location, that Walker Tracker is making available (presumably by selling) to data brokers, health insurers and other entities. "Program administrators" also have access to this same information for every user on a per-user basis and *not* de-identified. In the case of Sansom St Strutters, the program administrators are presumably the University of Pennsylvania Law School employees who setup and maintain the program. When participants of the program log into the online portal, they are able to see the daily step count of every other user. Walker Tracker states,

> Activity and step entries are considered "public" information and are used to tally individual and team results in challenge events and competitions. In this case, "public" means other participants and administrator(s) logged into the private program, not the internet at large. This is similar to athletic events or contests where information about participant performance is available to other participants and interested parties. ("Walker Tracker About")

In the privacy policy, we see them compare the relative publicness of this data to a sporting event. The conceptual understanding here espoused by Walker Tracker is that daily

walking habits are now a sporting event; one's daily movements are on display as if they were competing in a competition. The walking program is, of course, specifically designed as a competition. The company softball game is now a never-ending competition that is "public".

Fitbit itself also has "Fitbit Health Solutions," which delivers a similar service to Walker Tracker. Fitbit health solutions can work with companies to deliver customize wellness programs, all utilizing Fitbit activity trackers ("Fitbit Health Solutions). Fitbit, like most self-tracking companies, shares or sells data in a de-identified format. Fitbit's 2018 acquisition of *Twine,* a healthcare coaching platform. Fitbit's press statement confirmed that this acquisition positions them to integrate more fully into health care systems and workplace wellness programs. The statement reads, "With this acquisition, Fitbit further extends its reach into healthcare and lays the foundation to expand its offerings to health plans, health systems and self-insured employers, while creating opportunities to increase subscription-based revenue"("Fitbit, Inc. to Acquire Twine Health").

According to a 2018 report by the Kaiser foundation, 20% of all large employers gather some kind of health and fitness data from their employees using smart phone applications. In 2013, CVS announced that it would require their employees to collect "body fat, blood sugar, blood pressure, and cholesterol—or pay $600 a year" (Kwoh). Lastly, another health care provider, United Healthcare, offers its customers money in exchange for tracking their steps[35].

Workplace Wellness Programs represent the growing acceptance of data as way to track and organize "improvement" that is managed and rewarded by large institutions. What started in fringe groups like Quantified Self has morphed into standard and accepted ways to engage with

[35] See https://www.unitedhealthcaremotion.com/

established institutional structures. Whereas Quantified Self stresses its "resistance" to institutional and cultural norms, these very same tactics of data collection are used in Workplace Wellness Programs but without the *resistance* narrative. These programs create the means for institutions to categorize people and for those categories to serve as valuable "biodata," when that data is sold. These program create knowledge about individuals—this knowledge can be a way for the individual to improve, and just as easily create the means for institutions to wield control over those populations of which it has data[36].

Fitness Trackers and Data Harms

What is wrong companies collecting and selling data from fitness-trackers? First, as legal scholar Frank Pasquale lays out in *Black Box Society,* there is secrecy in these practices that makes it impossible for consumers to make informed decisions about where their data is going and what is being done with it. Our laws often protect businesses and institutions' use of data and block individuals from knowing how their data is being used (and used against them). For Pasquale, the "black box" of information secrecy is a threat to our democracy because data analysis affects people on a daily basis, but we may never know how or why the data was collected or used. Data and algorithmic secrecy can obscure the reasons why someone was denied a job, denied a loan, or detained by the police. Pasquale's argument provides a framework for how the secrecy behind data collection and algorithmic decision-making produces identifiable harms.

[36] See Wieczner; Hitts et al; Martínez-Pérez et al; Wicklund.

Frequent studies have shown that de-identified data can be successfully re-identified through sophisticated data analyses and multiple data sets (Barbaro; Narayanan and Shmatikov). Companies like IMS and data clearinghouses like LiveRamp (previously known as Acxiom Marketing Solutions) gather data from multiple data sources, which can be combined to create models of behavior that can be used for targeted advertisements and have the ability to sway behavior. For the health of our democratic institutions, citizens need to be protected from uses of their data that can ultimately harm them.

Dr Lina Dencik, Dr Arne Hintz, and Dr Joanna Redden compile the Data Harm Record as part of the Data Justice Lab at Cardiff University's School of Journalism, Media and Cultural Studies. "One way to understand data harms," they write, "is as the adverse effects caused by uses of data that may impair, injure, or set back a person, entity or society's interests." In the age of Big Data, "it is now possible to combine sizes and types of data previously unimaginable, and to then analyze these staggering datasets in new ways to find patterns and make predictions." While this new type of analysis stands to reveal patterns of behavior and useful predictions that may benefit us, it also stands to "sort, profile, exclude, exploit, and discriminate" ("Data Harm Record.")

The Data Harm record is a running collection of specific harms caused by Big Data. One set of specific harms they highlight was reported by researcher Cathy O'Neil in her 2016 article "How algorithms rule our working lives." Kyle Behm was rejected from countless low-paying jobs based on the results of a personality test he was given as part of multiple job applications. Behm's case is still pending, and whether or not Behm was discriminated from a job because of mental health status (and whether this violates the Americans with Disabilities Act of 1990) is still pending. The larger point, and why this example serves a particular data harm is that Behm

was harmed due to data that he was never given access to and was not given a chance to explain, contest or investigate himself.

ProPublica's "Algorithmic Justice" series covers harms and potential harms caused by data. In 2017, Julie Angwin, Noam Scheiber, and Ariana Tobin published results from an inquiry into Facebook's targeted ads directed towards specific age groups. The practice, they argue discriminates against older workers, and is therefore in violation of the Age Discrimination in Employment Act of 1967, which prohibits bias against job applicants against people age 40 and above. ProPublica has also discovered bias in auto insurance prices that used race as a criteria, and how a host of factors—including your location--determine what prices you see for good online (Angwin "Minority Neighborhoods Pay Higher Car Insurance Premiums and "When Algorithms Decide").

Discrimination can creep into algorithmic decision making of all kinds—including in consumer pricing, policing, job applications, and loan decisions. A 2015 ProPublica report by Julie Angwin and Jeff Larson demonstrated that Asian customers were twice as likely as other groups to receive higher prices for SAT prep courses from the test prep company Princeton Review when searching online for service (Angwin "Tiger mom"). In this and other work,[37] Angwin has shown that the effects of constant data collection means that true privacy is increasingly impossible to attain. Data brokers collect data from many sources (including the kind of aggregate statistics sold by self-tracking companies), in order to create detailed categories of people. Often these categories are not explicitly tied to names or other "personal information," but are tied to ways in which we are tracked online through cookies, browser

[37] See Angwin, *Dragnet Nation*

history and social media. Angwin argues throughout her work that this type of ceaseless surveillance makes us less free because we are boxed-in in ways that we often do not notice.

The company Cambridge Analytica boasted of its capacity to form "psychometric profiles" of Facebook users by analyzing their likes. This data was used to sway voters in the 2016 presidential elections in the US and abroad by targeting specific users with political ads favoring one candidate ("Cambridge Analytica Files"). Much of the data gathered by Cambridge Analytica came from a personality survey that gathered a user's likes and other information not just of that user, but of the user's friends as well. With just 270,000 users consenting to the terms of the data collection, the survey and app was able to harvest 50 million Facebook profiles (Cadwalladr). The Cambridge Analytica scandal revealed what many researchers knew already: Facebook data can be used to manipulate behavior and public opinion when applied on a massive scale. It also revealed that the data necessary to manipulate people can be drawn out through legal and Facebooked-approved methods. Facebook, after all, allowed the kinds of data-scaping that Cambridge Analytica used to gather its data. It has, since the scandal, disallowed that kind of data gathering.

Ifeoma Ajunwa, Kate Crawford, and Joel S. Ford's article "Health and Big Data: An Ethical Framework for Health Information Collection by Corporate Wellness Programs," addresses the ethics of wellness programs that use data collection to track and measure workers' health. Now a $6 billion industry, workplace wellness programs take many forms but are generally designed to focus on prevention of so-called "lifestyle diseases" like heart disease, obesity and complications from smoking. Increasingly, these programs rely on big data and practices that combine data from different sources to arrive at conclusions about workers'

health[38]. The authors cite the example of Walmart's partnership with Castlight Healthcare. They write,

> Companies like Castlight are also now able to discover, for the benefit of a corporate client, which, and how many, female employees might be pregnant. Castlight's method is to mine the Big Data on insurance claims to find women who have stopped using birth control. Castlight is also able to discover which women have made fertility-related searches on Castlight's health app, a resource the worker has downloaded as part of the wellness program. That data is matched with the woman's age, and if applicable, the ages of her children to compute the likelihood of an impending pregnancy, says Jonathan Rende, Castlight's chief research and development officer. The targeted employee would then start receiving emails or in-app messages with tips for choosing an obstetrician or other prenatal care (Anjunwa et al).

Ajunwa et al argue that workplace wellness programs should engage in greater efforts to collect informed consent for engagement in programs that collect workers' data. While informed consent originated in procedures that may entail medical risk, the risk to patients that give their data over to institutions should be treated as a risk as well. When wrongfully disclosed, or made public via a data breach, health data has the potential to cause harm to workers. And indeed, health data is some of the most valuable data that hackers can attain (Sulleyman, Humer). They argue that workers should be made aware of all risks when joining a workplace wellness program. HIPAA, the federal law that protects health data and privacy, does not always apply to data gathered for a workplace wellness program. Many workers may wrongly assume that health data gathered for their workplace wellness is treated with the same privacy measures as health data collected by their doctor or a hospital.

They further argue that workers should be made aware that there is often no oversight of workplace wellness programs by doctors or those certified to offer sound medical advice about

[38] See Silverman

the main areas of concern of workplace wellness programs—weight loss, nutrition, and smoking cessation. Arjunwa et al also raise concern that the devices often used by participants in these programs—like fitness trackers—do not have the same scientific validity and accuracy as devices sanctioned by medical establishment. The biggest risk that the authors discuss is the almost limitless amount of data that a workplace wellness programs can collect and what this data can be used for. They write,

> The personal health information (PHI) that has been collected by wellness programs represents lucrative data. This information may be sold to pharmaceutical companies interested in developing drugs, or to data brokers to be used in creating various types of lists, including ones reflecting credit risk. Thus, an important part of an ethical workplace wellness program is transparency concerning data collection, storage, and also data ownership. Would-be participant employees should be apprised of issues of data management and should also be informed about steps taken to safeguard the data (Arjuna et al 478).

Data can be sold or shared in aggregate to other entities and can live on long after the worker has left the company. It is also not clear who owns the data, especially if the company owns the device used to collect data (e.g. a Fitbit). Indeed, wellness vendors have been shown to sell and share data collected through apps and services (Blenner). Arjuna et al argue develop a set of "core promises," that workplace wellness programs should adhere to. Among these include committing to "accountability in data collection and use…adopt gold standard practices for data security…Provide awareness of discriminatory potential of data [and] provide clear information about the irregularities and unreliability of data from wearable electronic devices" (Arjuna et al).

Many of their recommendations for data security, for disclosing of risk, for protection of data, and the ability to correct misinformation are the same topics taken up by Pasquale as problems for how we treat data under the law. As the Cambridge Analytica scandal reveals,

democratic options and freedom to choose can easily be constrained and manipulated by entities that are abusing data that was collected using completely legal means.

One potential privacy harm that has been raised in courts is whether voluntary workplace wellness programs are truly voluntary, given the monetary incentives associated with participation. In a 2017 lawsuit, the AARP successfully argued that recent ruling allowing companies to charge workers penalties for not participating in a workplace wellness program was illegal, as it violated the Under the Americans win the Disabilities Act and the Genetic Information Nondiscrimination Act (Frank). In 2019, AARP also sued Yale University on similar grounds, claiming that Yale's attempt to charge employees who choose not to participate in the university wellness program up to $1800 per year violated those same federal laws (Terell, Leonard).

The fact that workplace wellness programs are testing the boundaries of voluntary participation speaks to the growing importance of personal health data for the administration of health insurance. Health insurance companies here act as a juridical force that creates the categories that it pretends to represent. Tracking one's steps or undergoing a cholesterol or glucose check is no longer simply about self-knowledge, but builds categories and ways to manage populations of employees. Health and behavioral data cannot therefore be said to be representational, but assumes the weight of a performative act, the effects of which reverberate in the life of the employee and the functioning of institutional practices, pricing schemes and worker regulation. Workers are expected to readily give this information to their employer, thus enacting Butler's dispossession of the self. The story of my body and behavior (in the form of data) is no longer "mine" if that story is collected and analyzed by institutions outside of my control.

HIPAA and Workplace Wellness Programs

The Health Insurance Portability and Accountability Act (HIPAA) is the federal law that requires certain protections to be made concerning health data. This law applies to health care providers and health insurance companies. HIPAA regulations include a Privacy Rule, which governs how "covered entities," i.e. the health care provider, can use "protected health information," or PHI. Covered entities are also subject to the Security Rule, which governs the safeguards places on PHI. The Breach Notification Rule requires that "individuals, the Department of Health and Human Services (HHS), and, in some cases, the media (and business associates to notify covered entities)" be notified if there is a breach of PHI ("HIPAA Privacy and Security").

Whether or not HIPAA applies to workplace wellness programs depends on how the program is structured. If the program is administered by the health insurance provider, then HIPAA covers the program's use of data including all of the safeguards listed above. If the employer offers the program directly (and the program is available to all employees regardless of their enrollment in the group health plan), then HIPAA does not apply. The US Department of Health and Human services describes the difference:

> Where a workplace wellness program is offered as part of a group health plan, the individually identifiable health information collected from or created about participants in the wellness program **is PHI and protected by the HIPAA Rules.** (emphasis added)
>
> Where a workplace wellness program is offered by an employer directly and not as part of a group health plan, the health information that is collected from employees by the employer **is not protected by the HIPAA Rules.** (emphasis added) ("HIPAA Privacy and Security").

The University of Pennsylvania wellness program, for example, is *not* covered by the HIPAA rules since it is offered by the university itself regardless of participation in a university health plan. Navigating HIPAA compliance with mobile apps and online services is a tricky process. The FTC has an online tool that helps app makers determine what laws (if any) cover their use of their mobile health application ("Mobile Health Apps Interactive Tool").

Do wellness programs even work?

The ethics of health data collection are a significant issue for the future of data collection in general. As machine learning algorithms get more powerful, the predictive capabilities of data-rich companies will only increase. Companies are in the early stages of figuring out what to do with all of the data they are collecting, but it is clear they operate under the assumption that more data is better. However, it is not clear who benefits from this data collection. Individual users, as is documented in several recent studies, do not always see health benefits to workplace wellness programs. This raises the question of why, if users do not see any benefits to handing their data over to institutions, why they would agree to this practice.

The Illinois Workplace Wellness Study is the first large-scale study of the effectiveness of a Workplace Wellness Program. The researchers concluded that their results showed limited evidence to support the advertised claim of wellness programs to "reduce medical spending, increase productivity, and improve well-being" (Jones et al). This study examined many aspects of workplace wellness programs and was designed as a large randomized control trial. Their results after one year indicate that the wellness program they studied did not usually alter health

outcomes very much. They found a limited impact of monetary incentives on participation, and no effect on healthcare costs for employees. Most importantly, the study found no effect on measurable health behaviors for employees who participated in a program. One particularly interesting finding was that among those who did participate in a workplace wellness program, this group already had lower health care costs and was in better health than those who did not choose to participate—meaning that workplace wellness programs attract healthier people to begin with.

Previous studies on the effectiveness of workplace wellness programs found more promising results. However, as journalist Carey Goldberg notes, these studies are often observational in nature and are not designed to measure the effectiveness of the program per se, but only measure the health behaviors of people in the program. Workplace wellness programs attract healthy people already, so there is no measurable effect caused by the program itself (Goldberg).

A report by the California Health Benefits Review Program determined that corporate wellness programs did not meet expectations for increased health results. The programs they looked at failed to decrease average blood pressure, blood sugar, cholesterol of participants. Wight loss was also an inconclusive metric to judge wellness programs—most of the people who lost weight gained it back. Research by Jill Horwitz et al determined that even areas in which wellness programs often work—in getting workers to quit smoking, for instance, did not actually result in cost-savings for employers. Many of the complications from smoking or obesity occur later in life, after the employee no longer works for the company. The cost savings ushered in by wellness programs instead comes from shifting costs to those workers of lower economic status (Horwitz et al).

A 2019 Study from the University of Chicago and Harvard University observed 32,974 employees at a BJs Wholesale club. The researchers randomly assigning workplace wellness programs to 20 store locations and compared those sites to 140 locations without wellness programs. Employees participating in the wellness program were led through different modules focusing on different aspects of health including "nutrition, physical activity, stress reduction, and prevention" (Song 1492). Participants were awarded gift cards upon completion of modules, with a maximum incentive of $250. Researchers tested participants' cholesterol, BMI, blood pressure, nutrition, health spending, drinking and eating habits and other markers or health. While those who participated in the program reported higher levels of activity than those not participating in the program, this increase level of activity did not correlate to any measurable increase in heath or health savings. According to their results:

> Employees exposed to a workplace wellness program reported significantly greater rates of some positive health behaviors compared with those who were not exposed, but there were no significant effects on clinical measures of health, health care spending and utilization, or employment outcomes after 18 months (Song).

Previous research on the effectiveness of workplace wellness programs has shown the programs to be promising, including the same researchers' 2010 survey (Baiker; Goetzel). With this study, with rigorous controls and methods over an 18-month period, the results indicate that wellness programs do not produce necessarily make employees healthier. In fact, the lack of measurable change could be due to the fact that those employees who participate in the programs are already healthy, but the program simply encourages them to report what they are already doing.

Making People Up

Even if workplace wellness programs are ineffective at increasing health benefits for users, is there anything wrong with exchanging data for money, particularly if the users knowing sign up for the service? Given the strong evidence that self-tracking and workplace wellness programs have no effect on health outcomes, the question then is about the data—what does the data do? One effect of data collection is that it allows researchers to categorize and classify people. Philosopher of Science Ian Hacking describes this practice as one of "making people up." By this he means that any investigation into behavior will create ways to classify and categorize people. The research into multiple personality disorder in the 1980s, led to the "discovery" of a new type of person. Multiple Personality disorder became a popular cultural concept. Patients displaying these symptoms were encouraged to develop each of their personalities into a unique voice and behavior pattern. This research was later found to be specious in that it was often the work of the psychologist or medical doctor (or talk show host) to develop and bring out these multiple personalities. Hacking writes that are two ways to understand this "discovery" of this disorder:

> A. There were no multiple personalities in 1955; there were many in 1985.
>
> B. In 1955 this was not a way to be a person, people did not experience themselves in this way, they did not interact with their friends, their families, their employers, their counsellors, in this way; but in 1985 this was a way to be a person, to experience oneself, to live in society. (Hacking 24)

Both statements, Hacking argues, are true for multiple personalities disorder. The disease morphed into what we now call dissociative identity disorder. Hacking compares this research to

the discovery of high-functioning autism, or Asperger's Syndrome in the 1950s. He compares these two statements:

> A. There were no high-functioning autists in 1950; there were many in 2000.
>
> B. In 1950 this was not a way to be a person, people did not experience themselves in this way, they did not interact with their friends, their families, their employers, their counsellors, in this way; but in 2000 this was a way to be a person, to experience oneself, to live in society (Hacking 24).

Unlike the multiple personalities disorders example, he thinks that A is clearly false in the case of high-functioning autistics. There *were* high-functioning autists in 1950, we just did not call them by that name. B, however, is true in the case of high-functioning autism. After the research developed the symptoms of this disorder, it became a "way to be a person," to think about oneself and others. Just like in the first example, medical research and practice can drive the creation of a new type of person, even that diagnosis is continually evolving and morphing.

In both examples, "B" is a case of the looping effect, whereby scientific research creates classifications and sets of symptoms that change the cultural landscape of the range of possible kinds of people in the world. Popular understanding of those new classifications leads people to identify and categorize themselves and others in a new way. The research then builds upon this looping effect, discovering more and more qualities about a type of person. Hacking lists the "engines" that drive this practice of looping:

> 1.Count!
> 2. Quantify!
> 3. Create Norms!
> 4. Correlate!
> 5. Medicalise!

6. Biologise!
7. Geneticise!
8. Normalise!
9. Bureaucratise!
10. Reclaim our identity! (Hacking 25)

Self-tracking devices, combined with workplace wellness programs, demonstrate many of these same "engines." The engines of discovery (steps 1-7) are the first steps towards create the categories associated with specific symptoms and patterns of behavior. Counting is often the first step. With autism, the first major survey of autistic behavior was a major driver in the early research towards identifying the disorder. "Quantify" refers to the practice of developing ways to generate numerical values based on symptoms. BMI, for example, is a way to categorize obesity based on weight and height. Long thought to be correlated to health, BMI is now seen as a false way to categorize obesity simply because it is not correlated to any particular kind of poor health.

Workplace Wellness Programs and self-tracking more generally stand out as examples of data-gathering and analysis that could be creating "types of people." As Butler and Foucault's work into the creation of subjectivities shows, the creation of a sense of "I"-ness is not just drawn from our own internal resource, so to speak. Who "I" am comes just as much from the outside—from other people, from advertisements, and from institutional scientific research. In short, it can come from the ways in which data is *used.* Adding the economic element into this process means that this process of subjectivation is enmeshed in capitalistic motivations. Advertising and marketing of fitness trackers and wellness programs depict individual gaining knowledge improving their health. Becoming the "kind of person" who self-tracks is rapidly becoming a new way to categorize people.

Conclusions

As self-tracking moves out of the rarified confines of Quantified Self groups and into workplaces, the ethical perspective of data collection and sharing must be considered. Rather then view the "self" as something that pre-exists our social relations, Butler's framework shifts our perspective. In her view, behavioral norms determine what it means to be a self. When we perform our gender, we reify gender identity. When we are asked to account for our self, we must tell our story in ways that align with regimes of power and truth. What "counts" as truth is a shifting sociocultural matrix, not a pre-determined set of natural or biological categories.

Butler's statement that there is no "doer behind the deed" strikes me as particularly relevant in this discussion. The truth that institutions want out of their customers is data that can be tracked, categorized, and used to structure services and to make (or save) money. The "doer" in this sense has no independent identity from the deed. This is Deleuze's "dividual" in action. And yet, we are also told that this is the way that we should align our behavior within workplace wellness programs. We should track our behavior because this is the best way to achieve a healthy lifestyle. Given the inconclusive effectiveness of workplace wellness programs, we should question this assumption. We should not view self-tracking data as representations of behavior, but as a powerful tool for redefining what it means to belong to an institution.

Conclusion

Fitness-tracking as a lived abstraction

This dissertation has argued that personal analytics is an undertheorized form of surveillance that affects how the self is practiced and seen in contemporary society. By collecting data about one's own body and behavior, users of fitness-trackers practice a cybernetic view of the self, defined through flows of information. "Improvement" is defined as enhancing one's metrics. Despite claims to the contrary by the quantified-self camp, self-management through data further embeds the self into institutional policies and procedures. Self-tracking turns free-flowing behavior into behavioral futures products that are traded, aggregated and sold to business customers for purposes of predicting behavior. Given the power of companies to use data to predict behavior, we should not see behavioral data as representational, but rather as a building block of services that construct the self.

By way of conclusion to this dissertation, I will present here an argument for the non-representational view of fitness-tracker data based on philosopher Brian Massumi's concept of lived abstraction. For Massumi, representation is an *event,* because all perception takes place over time and capacitates the body for action. Even a 2-dimensional perspective drawing is an event because perceiving depth and volume on a flat surface is a kind of virtual movement that remains forever in potential. Perceiving depth means that we *could* move around to the other side of the object, if it were not depicted on a flat surface. The power of perspective drawing lies precisely in its power to capture something that will never happen. Calling this process an "object" misses the point. He argues that all perception is like this. We are constantly perceiving things based on their affective qualities—how they prime the body to move. Drawing on this conceptual framework, I argue that fitness-tracker data is not representational precisely because

there are all kinds of action and potential action bound up within that data, set forth in the privacy policies and institutional use of the data. This data increasingly forms the structural basis of prediction within technology-driven approaches to healthcare.

Data in the form of charts, graphs and numbers are not a perceptual object, but an event with movement. This event is a lived abstraction in Massumi's parlance because the movement is often virtual: we do not experience our data moving from our devices to data brokers, to advertisers and medical companies and social media platforms. Yet, we feel the effects of that movement in how we are defined by and through those institutions. When we look at the data gathered by a fitness-tracker, we should not see our "self" in that data, but rather the potential for action and the ways that *other* entities (the not-self) use that data. Seeing data in this way requires practice, which is actively forestalled by the fitness-tracking industry. The use of "self" and related terms in fitness-tracking marketing nudge users towards a simple explanation of fitness-tracking data: it is objective, true, and represents "me." Seeing beyond this conception starts with recognizing the overwhelming power of data, but also the cultural assumptions and biases built into data collection technologies.

All Data is Health Data

In November 2019, Google announced that it was purchasing Fitbit for $2.1 billion ("Fitbit to be Acquired by Google"). Given Google's place in the world of surveillance capitalism, the reasons for purchasing Fitbit are self-evident. As Google moves into the health care space, they will continue to do what has made them one of the world's wealthiest companies: organizing, creating and selling information. Fitness-tracker information holds

enormous potential for Google as a means of prediction. How they will use that data remains to be seen, although some clues are seen in their healthcare and life sciences initiative, which promises to change the healthcare industry through "AI-powered decision making tools," "smarter" care, and insights into "the health of entire patient populations" ("Google Cloud for healthcare").

The kinds of data that Google needs for those broad outcomes start with body monitoring devices and health information records. In November 2019, the Wall St Journal reported on Google's "Project Nightingale," the previously secret initiative to collect medical records (Copeland). After that report, Google confirmed the program, announcing that it had already collected the health records of millions of Americans in 21 states through its partnership with Ascension health services. Google confirmed that their agreement with Ascension included access to all medical records from all Ascension patients. Ascension owns 150 hospitals across the country (Singer "Google to Store and Analyze Millions of Health Records").

In November 2019 Facebook also released their own healthcare-focused initiative, their "Preventative Health" service. The service allows users to enter basic demographic information like age and gender. The app then recommends and keeps track of preventative procedures like flu shots, mammograms and cancer screenings. Critics were quick to point out that this information is not covered by HIPAA (Mullin "Facebook Wants Your Medical Data"). Facebook joins the long list of technology companies trading in medical data who do not fall under the narrow definition of health data that is covered by HIPAA (Warzel, Sobhani and Saxon). One enduring result of this infiltration of the technology sector into health care is that the sharing of personal information has become so ubiquitous on social media that porting those practices to

health care is made to seem obvious and natural. This led technology writer Sidney Fussell to describe Facebook's initiative as "making mission creep feel like convenience" (Fussell).

These services from Google and Facebook, and many more, are changing the way that we relate to our own healthcare. By focusing on the "self" in this dissertation, I have tried to show that data about the body and behavior does not simply represent something that is already there, but is actively creating a certain kind of self. Therefore, we think of fitness-tracker data wrongly when we consider it as representational. The true characteristic of this data, and why is it so valuable, is as a resource for predicting behavior and structuring services. Fitness-tracker data is ontological in the sense that is creates new ways of being and new ways to define subjectivity.

Recent research in algorithmic accountability suggests that questions of self and identity and representation are central to a full analysis of how automated decision-making and AI can be biased. In Ruha Benjamin's 2019 *Race After Technology: Abolitionist Tools for the New Jim Code*, she analyzes the systems and technologies that "reflect and reproduce existing inequities but that are promoted and perceived as more objective or progressive than the discriminatory systems of a previous era" (Benjamin 11). Webcams and automated soap dispensers that do not register dark skin, predictive policing algorithms that over-sample crime statistics from neighborhoods of color, algorithms that use zip codes as proxy for race—these are all examples of the ways that new technologies embed racism into automated and technological processes. The politics of representation are front and center for Benjamin. To be "visible" in society can be a trap. As data becomes the way to make people visible, it has the effect of creating those categories that it claims to represent. As fitness-trackers claim to capture data that is objectively true, yet is used by institutions for purposes beyond the user's control, the politics of representation become a central issue.

To take one example, Fitbit (and most commercial heart-rate trackers) uses green lasers to measure heart rate, which has been shown to not penetrate the skin of people of color because of increased amounts of melanin (Hailu "Fitbits and other wearables may not accurately track heart rates in people of color"). Similar results were detected in Xiaomi's fitness tracker ("Xiaomi's budget fitness tracker tagged with 'racist' problem"). The failure of green lasers to produce accurate results is a major problem, especially considering that studies have consistently shown this to be true well before inexpensive fitness trackers adopted the technology. Kollias and Baqer's 1985 study produced these results, as well as the more recent 2017 paper looking specifically at fitness trackers (Shcherbina et al).

Non-representational approaches to data

Sociologist Deborah Lupton describes self-tracking data as "lively" (Lupton "Lively Data). Although I mostly agree with Lupton's analysis of the multiple uses of data and the ways that self-tracking data can inform and change new ways of life, her characterization of data as "lively" does not quite capture how and why data could be said to approximate "life." Rather, I argue that data is lively because it has a material presence that transcends its representational capabilities. Self-tracking data extracts bodily movement, moves outward from the user, has different meaning for different entities, and helps to structure further services precisely because it takes a material form and exists within a *dispositif* that defines the limits of its motility (Cote).

Mark Coté's concept of "data motility" unpacks the ways in which data increasingly moves outside of our autonomous control ("Big Social Data" 123). Coté describes data's motility as a *dispositif.* Taken from Foucault, a dispositif is the material constraints that emerge

surrounding biopower. As biopolitical measures began to take shape in neoliberal governments, the way in which governments learned about their citizens combined economic investment and population management. Citing Foucault, he writes, "the biological traits of population become relevant elements of economic management, and it is thus necessary to organize them around a dispositif which assures not only their subjugation, but the constant increase of their utility" (Foucault cited in Coté 125). What is missing in Foucault's analysis today, argues Coté, is the intimate relationship between the body and data-producing technologies.

In his analysis, Big Social Data moves semi-autonomously throughout the computational systems produce to support it. By looking at the physical instantiation of this data—it's location on servers in the "cloud," and the effects of Big Data analytics with Google's File System, Map Reduce and open-source alternative Hadoop—Coté builds a picture of the dispositif of Big Social Data. Much of his argument can also be applied to the realm of fitness-tracking data. Like Big Social Data, fitness-tracking data moves through a system designed to draw "Big Data" correlations from this data. As mentioned earlier, companies are eagerly purchasing this de-identified data as a way to draw conclusions about populations, to segment the market, and make predictions that structure their services.

Philosopher and media theorist Tobias Matzner develops a theory of data as performative based on Judith Butler's work. For Butler, gender is not a transcendental quality of individuals, but is part of a process of gendering that begins long before individuals are born into a world that places them in categories. Gender is "performed" through speech acts and interpellations—when we call someone a "woman," for example, or treat them in a way as to enact gender through repeated and often quotidian and repetitive actions.

Data, for Matzner, is not representational because there is no pre-defined subject that is represented by data. Rather, the subject *qua Butler* is created through that act of power wherein the data produces subjectivity. Data is performative in this way when it interpolates an individual. He writes, "Somebody who is stopped at a border, denied a visa, or excluded from boarding a plane based on Big Data becomes a subject for the respective authorities in the very moment these verdicts happen" (207). In this way, the "subject" of the criminal refugee did not exist until the moment that they were created *as a subject* by that act of data processing. Butler's analysis of gender leads us to see subjectivity as a process by which we are interpellated as having a gender by "citing" the past performance of gender in iterative acts (Butler *Gender Trouble).* As a form of subject-creation, Matzner argues, data institutions hold just enough data to interpellate us as subjects created through an act of data processing and deployment.

Rita Raley, in her "Dataveillance and Counterveillance" essay, argues similarly that our "data bodies" are produced at the moment when data come together to form a story; the "re-grounding of abstract data in the targeting of an actual life" (Raley 128). Instead of merely representing that life, the data as the effect of "producing that life" (Raley 128). Raley argues that data are performative because the effects of that data reify and construct a self, often along the lines of power relations. In her analysis of terrorism subjects, surveillance data is not a representation but the building blocks of creating the identity of a suspect.

Massumi's Lived Abstraction

Building off Matzner and Raley's idea of data as performative, data can also have affective power in creating subjectivities through the concept of a "lived abstraction" (Massumi). One important material characteristic of self-tracking data is that it moves. Meaning has directionality or *aboutness*, but there is also movement away from the user, back to corporate

entities and data brokers. This movement is much more difficult to see than the movement back to the user. When we view data as self-representational we see the intentionality of data as referring back to the person. However, if we view data not as an object but as a process of abstraction, data becomes both self-representational *and* an occasion for movement into the biopolitical realm.

Massumi's work on artistic form and perception sets up an analogy that I think equally applies to art as it does to data. He writes,

> We see what's before us directly and immediately as an object. We see the "backedness" of it without actually seeing around to the other side. That's precisely what makes it a perception of an object, rather than a deduction about a surface. We are really but implicitly—abstractly—seeing the object's voluminousness. The perceived shape of an object is this abstract experience of volume…When we see an object's shape we are not seeing around to the other side, but what we are seeing, in a real way, is our capacity to see the other side. We're seeing, in the form of the object, the potential our body holds to walk around, take another look, extend a hand and touch. The form of the object is the way a whole set of active, embodied potentials appears in present experience. (Massumi 42)

Form, therefore, for Massumi is not just what we see. We in fact "see" lots of things that are not there. All perception involves this kind of abstracting. Massumi explains this by arguing that what we actually "see" is our ability to walk around to the other side of the object. The recognition of form is a way that our body is capacitated as having a potential for movement. We call the cylinder an *object*, but Massumi would call this an "event" because of the way that

movement (both potential and actual movement) factors into our recognition. Massumi locates the power of art in holding onto those abstract elements of perception. He writes,

> What perspective painting does is tap into the abstraction already at the basis of object perception, and carry it to a higher power, where the object itself, and not only touching of it and movings-around it, are abstracted, that is to say, really appear virtually, in pure appearance (Massumi 55).

When we see a drawing of a cylinder, Massumi says that our body is similarly capacitated as when we see a real cylinder, except that with a drawing, the potentials for movement are completely virtual.

My suggestion is that we can also view fitness-tracking data in this way. The form of data, expressed in numbers, charts and graphs, is a suspension of free-flowing bodily movement. The movement held in suspension has directionality inherent to it, set forth in the company's privacy policies and relevant technology embedded in the device. Aside from the personal use of this data as a self-representation, the data also moves outward into institutions and data brokers. As it does so, it takes on a new life—used for prediction and analysis as data, not as personal experience per se.

This double movement is hidden when we see self-tracking data as being *about* the user. Fitness-tracking data does not simply represent some "real" object (in this case, the user's body). Rather, data is already filled with assumptions about what this data will be used for, where it will go and what kind of new actions can be undertaken with its use. Fitness-tracking data is what Massumi calls a "lived abstraction." It structures further experience and allows for new things—new categories, new ways to segment the population and new ways that people will relate to

their position within a sociotechnical matrix. It is a material entity, and the political critique is heightened when we attempt to analyze data along these lines of direction, meaning and movement.

As I am deploying Massumi here, we can also see data as having stored up a kind of potential energy. Stemming from our bodily movements, this data feeds back into life insurance, health insurance, advertising and industries whose business model relies on predicting future behavior. This use of data is not representation, but is material and instrumental data. It defines us in the moment when the data is used by some entity to "know" us.

Via Butler and Massumi, we see that the ways that data is not representational, but is an occasion to produce subjectivity. Fitness-tracker data does not represent some pre-existing entity. Rather, the act of collecting that data is constitutive of producing the kind of cybernetic agency embraced by fitness tracker advertising. Fitness tracker data travels back to institutions and companies who gather this data, combine it with other data in order to make predictions, structure services and nudge behavior. These interpellations are an iterative process in which data that users generate acts upon them in sometimes surprising ways. If we see data as creating the kinds of material that structures biopolitical frameworks of control and interpellation, we may not be so quick to voluntarily contribute to this system.

Postscript

The Spring 2020 COVID-19 pandemic raises new questions about personal autonomy and privacy. This dissertation argues that fitness tracking is part of new practices of the self that use data as a management tool. Appeals to self-improvement and a health-conscious lifestyle are dubious in light of the other effects of fitness tracking: Fitness trackers create an economy of bio-data that embeds users in the cycle of surveillance capitalism. In the midst of the COVID-19 pandemic, governments and private corporations are rapidly developing contact tracing and symptom tracking applications. This short postscript will discuss implications for my dissertation and possible new directions given the recent events.

In April 2020, Google and Apple announced their contact tracing protocol ("Privacy-Preserving Contact Tracing"). Their system is designed to keep user privacy in tact while facilitating notification of users of possible exposure to the virus. Once enabled on a system, the user's Apple or Google device exchanges a random identifier that changes every 10-20 minutes (a "temporary exposure key) with any device that comes within six feet. The temporary exposure keys are stored on the device and not on a central server. If a user tests positive for COVID-19, they can self-report this diagnosis. Once they do this, their device uploads a "diagnosis key," which contains the subset of temporary exposure keys. At least once per day, each device will download a list of identifiers that belong to people who confirmed their positive diagnosis. If an identifier in this list matches ones that a user has stored on their phone, then they will receive a notification stating that they came in contact with someone with a positive diagnosis ("Exposure Notification").

Governments in other countries have released similar systems. In China, people's movements are tracked and accessed using a color-coded QR-code system called Alipay Health

Code. Green for healthy, Yellow for possible exposure, and Red for positive exposure (Mozur et al). The Alipay Health Code system was first developed for the city of Hangzhou and is now in use in over 200 cities in China (as of April 2020). People are required to scan their code at certain checkpoints such as when entering public transportation systems. Every time a person scans their code, their location data is sent to the system's servers and is reportedly shared with the police and government agencies. Reporting has revealed that people's status can turn from Green to Red with no warning or explanation (Mozur et al). South Korea, Singapore, Germany have developed contact tracing systems as well, and list is sure to grow (Thompson).

Its not hard to see the harmful effects of such a system. With calls to create an immunity "passport" system, there are major privacy violations close at hand (Mathew). If people must prove that they are immune or healthy in order to travel, work or see loved ones, this system could be abused, exploited or outright cheated. If data is not stored properly, there is an immense potential for hackers to gain access to this data. And once implemented, it may be difficult for such a system to disappear. There are already major studies initiated by UC San Francisco and Stanford that use fitness trackers to detect early symptoms of the virus ("Tempredict"; Armitage). More research is needed into the potential abuses of this system for social sorting.

As I write this in early May, 2020, the contact tracing systems have yet to be implemented. Most states remain "closed," but there are increasingly more calls to re-open businesses. School remain closed, and the Fall 2020 semester at Colleges and Universities remains in doubt. If the trends that I have outlines in this dissertation continue, we will see the technological systems fall into predictable patterns. Technology company will tout the use of data and tracking as a solution to the problems presented by this virus. The contact tracing systems may have unintended consequences. Just as China's system gives users a color-coded

system by which authorities can allow or deny access to certain areas, the technological solutions that are developed in the United States may become a proxy for infection status. With the lack of readily available testing, businesses could rely on unreliable and faulty apps and services to stand-in for test results. Worse, these results could become part of surveillance capitalism loop, and become monetized by health care and other entities. This technology may help us recover from the pandemic, or it may prove to be a distracting nuisance. Or worse, it could exacerbate social inequities by sorting the population into groups of who can avoid exposure and who can not—by virtue of where they work, who they live with and other factors beyond their control.

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Vita

Neal R Swisher was born in Philadelphia, Pennsylvania and raised in Wayne, PA. An early interest in computers and media production led Neal to teach himself video editing and computer support. Neal graduated in 2005 with a BA from Franklin & Marshall College with dual majors in Philosophy and Cognitive Science. His undergraduate summer research projects were based in the robotics lab. For his "Artificial Life Learning in Mobile Robotics" project, he programed a custom-built robot with a learning neural network. For his senior thesis, "The Embodied Turing Test," he tested whether human subjects could determine whether Sony's robotic dog, "Aibo," was controlled by a human or machine (they could not). After graduation, Neal taught courses at John Hopkins' CTY summer programs for high schoolers including "Philosophy of Mind" and "Human Nature and Technology." Neal completed his Masters of Liberal Arts degree from The University of Pennsylvania in 2010, while working full time doing media production and IT support at Penn. His Masters' thesis, "Gibagadinamaagoom: A Case Study Using Digital Technology for Recovery of Indigenous Knowledge Systems" was an examination of the affordances (good and bad) of digital technology in humanities research. In 2011, Neal moved to Richmond, Virginia with his wife Rachael Cohen. He enrolled in Virginia Commonwealth University's Media, Art & Text program in 2012 to continue to study the subjects closest to his heart: technology, philosophy, and theories of subjectivity. It was there he was introduced to the burgeoning field of critical data studies by his advisor, Dr. David Golumbia. Seeing a technological object that was ripe for humanistic critique, Neal focused on digital self-tracking as an investigation of the self. While a student, Neal taught undergraduate courses in critical data studies and philosophy. In 2016, two years after the birth of his first daughter, Sadie, Neal moved

with his family back to Philadelphia to take a full-time position as the IT Director for Instructional and Media Services at the University of Pennsylvania Law School. His second daughter, Esme, was born in 2017. In Spring 2020, Neal completed his dissertation, "Internalizing Data Collection: Personal Analytics as an Investigation of the Self." In additional to his IT Director position, Neal also teaches undergraduate courses on media theory and data studies.