The Dr. Pawel Norway Dream Machine

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WHAT IS

the

DR

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PAWEL NORWAY

DREAM

MACHINE

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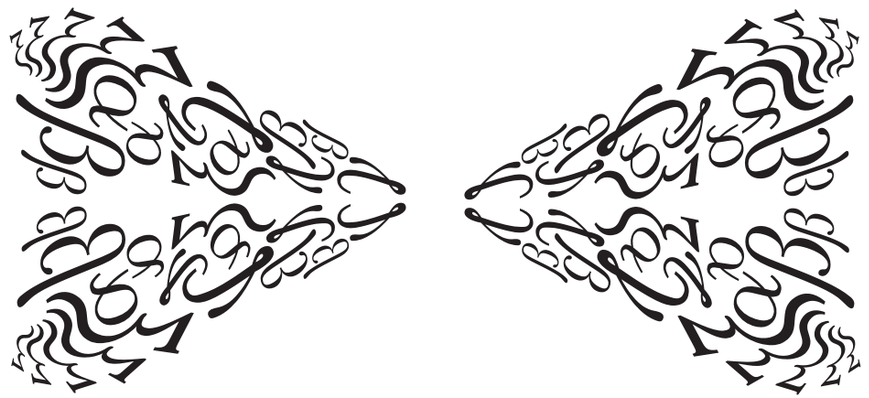
In the mid-19th century, Dr. Pawel Norway experimented with illustrating the dream content of his subjects using physiological data. These experiments are reconstructed today, adapted for both the technological advances available in this era as well as the gallery setting. The reconstruction exists as a site-specific installation and interactive performance. It is called *The Dr. Pawel Norway Dream Machine*.

The Dr. Pawel Norway Dream Machine is a critique of the Quantified Self movement – a movement born out of the ability and desire to quantify and track various aspects of life, from steps taken and calories burned, to other physiological data like body temperature, galvanic skin response, and the electrical activity of the brain. By using the measurements gained from the latter three data sets in our installation, we propose that we can quantity and visualize dream content from the previous night.

The Quantified Self movement is not a simple consumer-driven trend, aimed to deliver observations and insights about the self. Rather, it is a movement that furtively threatens privacy rights (rights that are necessary for the successful implementation of democracy), further replicates systemic social inequalities (as decisions about what data and how to quantify them are made by those already in power), and privileges a quantitative understanding of the world, thereby diminishing aspects of life that cannot be quantified.

Finally, by transforming Dr. Pawel Norway from fable into reality, the project reconstructs the boundary between science and pseudo-science, fact and fiction, foreshadowing a future where veracity becomes subject to digital popularity, including a range of dissemination and, of course, quantity of likes.



01

PROJECT STATEMENT

The Quantified Self (QS) offers users a sense of control and the promise of bodily knowledge and earthly understanding. It transforms us into compartmentalized numbers, comparative statistics, and relative quantifiable norms. Submission of this data to the algorithmic deities — the outstretched fingers of corporations and governments — promises a salvation: a deliverance from human error through objectivity and reason by numbers.

Dr. Pawel Norway's brief 1841 treatise, *Computable Transformation of Human Qualities to Those of a Visible Dream Memory*, is an obscure but intriguing thesis on the possibility of inferring dream content from the behavior of a subject after he or she has awakened.

Developed over 100 years before the discovery of REM sleep, *Computable Transformation* argues that human bodies produce residual energy—a type of corpuscular molecule Norway named the Cartesian Dream Molecule—that is emitted all day.

Norway believed it was possible to collect and measure the attributes of this energy and thereby reconstruct the subject's earlier dreams.

Despite ridicule and exile by his colleagues, Norway devoted the final two decades of his life to studying the patterns created by Cartesian Dream Molecule emissions.

Reworking outdated orthodontic gear, he found he could track the emissions' temperature, velocity coming off the body, swelling, and moisture levels, and assigned them the Greek letters *alpha*, *beta*, *gamma*, and *xi*. Experimenting on himself proved difficult, so he recruited subjects. As there wasn't a lot of enthusiasm for his work, he often resorted to enticing a prostitute or drifter with a small bribe.

He would measure his subjects' values before and after a brief nap. Then he would ask them to leave and he would put a pinch of laudanum, a popular opiate in Victorian times, into his glass of sherry and get to drawing.

Norway and his experiments act as a fable of sorts—an amalgam of individuals who, for the past 150 years, have been using statistical "laws" to understand the body. Today, the Quantified Self (QS) movement continues this tradition, seeking to infer a macro-level understanding of the self by measuring its micro-qualities.

As a movement to quantify the self gains momentum with the popularity of 21st-century devices, from the iPhone to the FitBit, individuals can engage in self-tracking and analysis through the collection of data about everyday activities, including walking and sleeping as well as more specific physiological datasets such as blood pressure, glucose levels, and even DNA.

The QS movement offers a quantitative understanding of the world, eliminating from consideration those aspects of life that cannot be quantified or that companies choose not to quantify. We argue that this rationalist proposition is absurd, reductive, and ultimately dangerous for the human condition. By quantifying the final frontier of physiological data – the dream – *The Dr. Pawel Norway Dream Machine* aims to underscore the absurdity of the QS movement as well as the pseudoscience of many of the technologies its adherents use.

02

The

COMPUTABLE

TRANSFORMATION

of

HUMAN QUALITIES

TO THOSE OF A

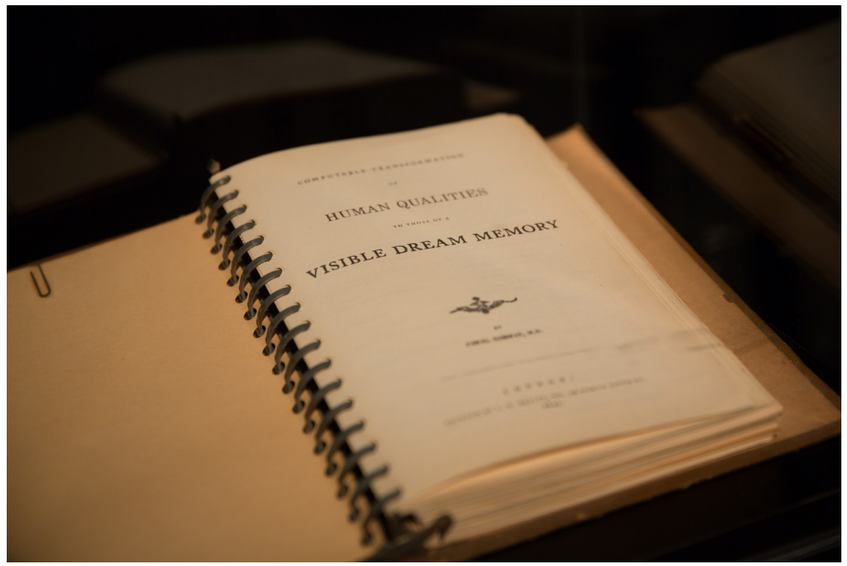
VISIBLE DREAM MEMORY

BY

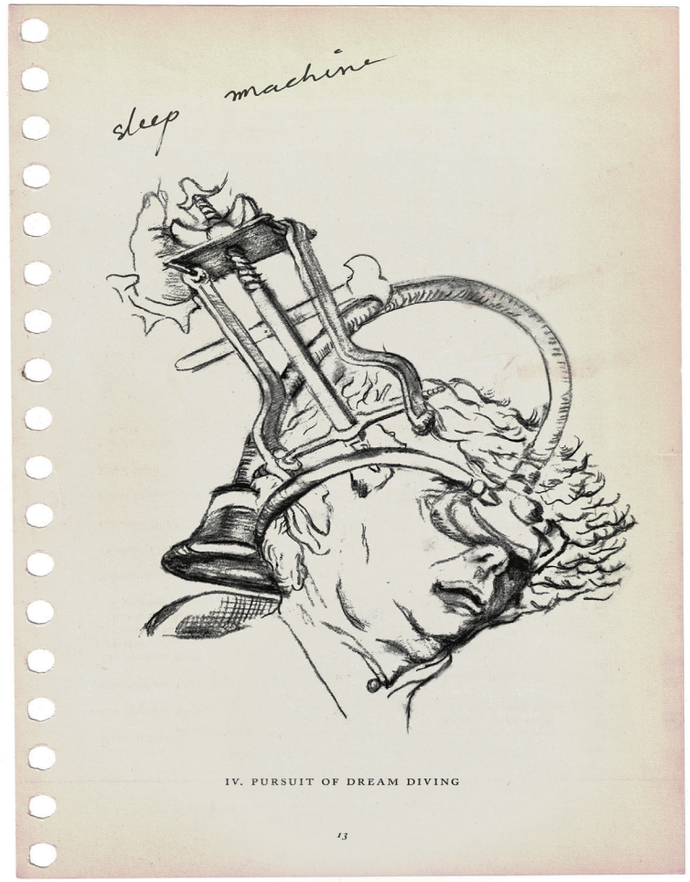
PAWEL NORWAY

MD

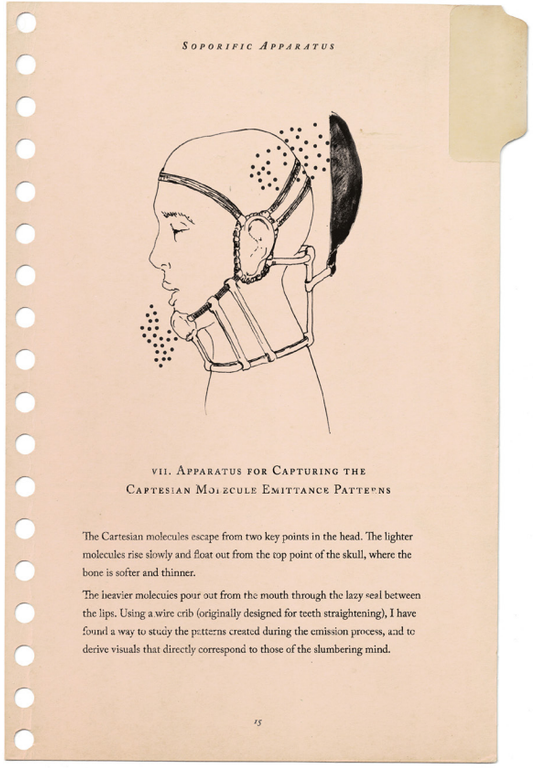
It was in a tiny town on the southern Romanian seaside that we were first introduced to the work of Dr. Pawel Norway. His research, focused primarily on illustrating dream content from his slumbering subjects, and his character – he was an expressive and emotional man, devoted equally to work and drink – caught our attention. We've gone through extensive efforts to reassemble what we can from his brief treatise, named above. Though there is little known record of the scientist beyond what we've discovered in Romania and included in this publication[1], we know that he primarily conducted his research in London and that he was ostracized by the medical community at large. After his death in 1843, we believe, his writings were transported by an aristocratic Romanian collector interested in reading about alternative theories of dreaming, divination, and the occult while summering with his family by the healing balneotherapy spas of the Black Sea.



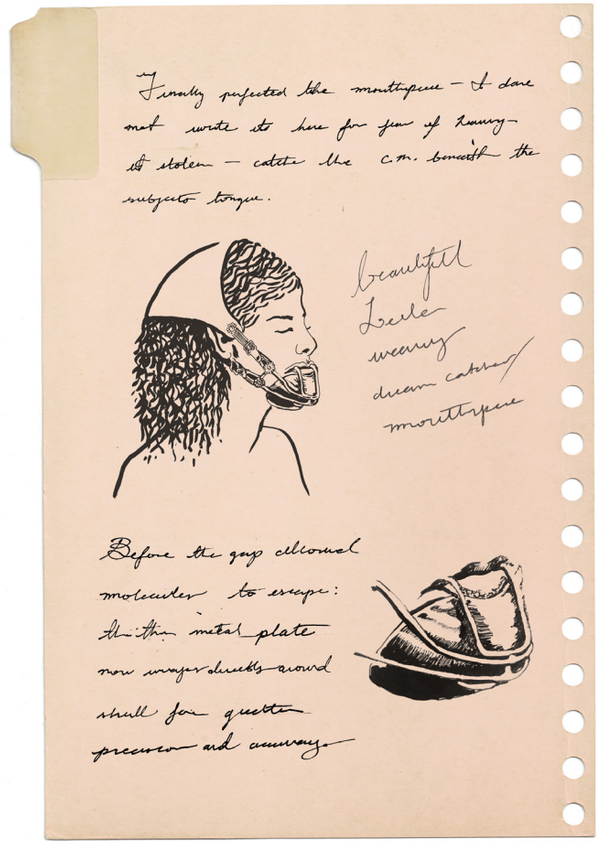
1 We've been able to find two short pieces of writing authored by Norway beyond the original treatise. One is a bit of prose detailing his love for Rene Descartes' 1664 Treatise of Man, in which Descartes introduced two seminal ideas for Norway: (1) that the functioning of the body can be paralleled to that of a well-oiled machine, and (2) that pain is a physical or mechanical sensation, as opposed to a spiritual one attributed to the heart. This meant that pain could be treated by physical intervention — by doctors — and foreshadowed the discovery of nerve pathways. In the second paper, Norway, clearly inspired by Descartes innovative thinking about pain, attempted to apply the same logic to the idea of dreaming. He detailed his discovery of the Cartesian molecule — a daring and unsavoury journey that involves 19th-century bar hopping, "ladies of easy virtue," and not one, but two brutal homicides. Unfortunately, we've been unable to secure copies of this paper for this particular publication, but we are trying to publish them online.



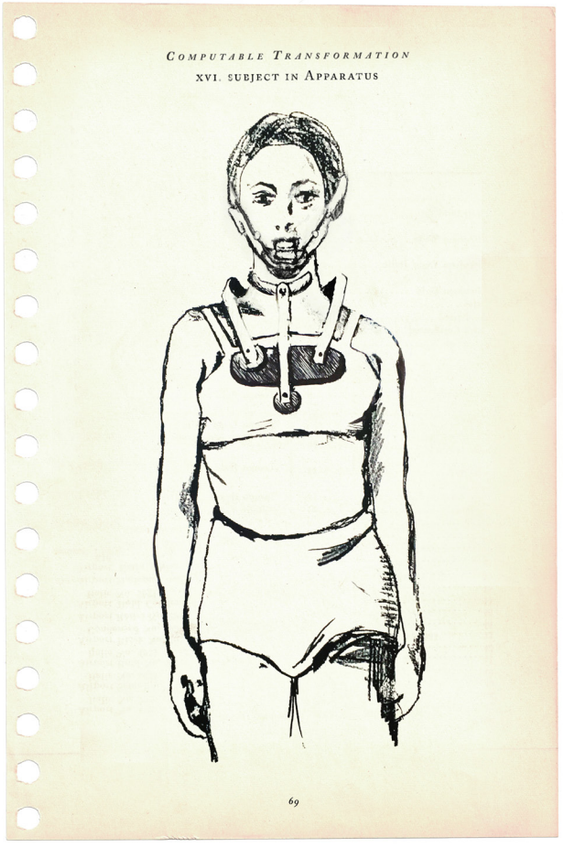
Norway's experiments into dream visualizations were triggered by a lifetime of particularly troublesome dreams. At a certain point, he began to wonder if he could use the technology provided by his modern science training to identify and measure a corpuscular molecule, dubbed the Cartesian Dream Molecule, which he believed was responsible for dream content.



Dr. Pawel Norway's initial ideas about the Cartesian Dream Molecules' relationship to dreamt visuals revolved around the patterns the molecules created as they left the head, either during or just after sleeping. Eventually he settled on tracking a combination of temperature, movement, swelling, and moisture levels, and assigned them the Greek letters *alpha*, *beta*, *gamma*, *xi*. In order to conduct his studies, he began by adapting devices originally designed for orthodontic work. His early experiments with braces gave him access to both major points of emission: the "top point of skull, where the bone is softer and thinner" and "the lazy seal between the lips."



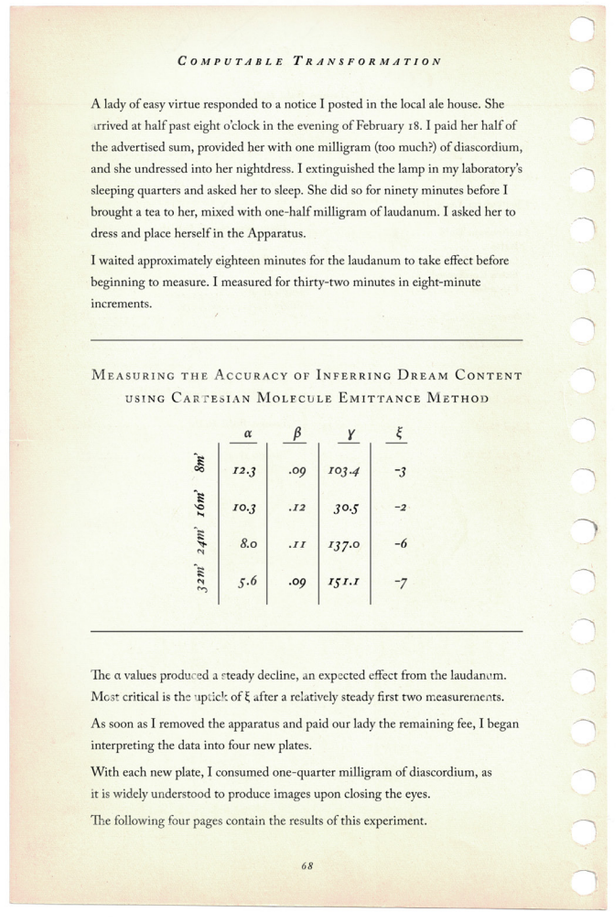
For the purpose of this exhibition it was important to include Dr, Norway's handwritten notes and bring his voice to the present day. He writes: *Finally perfected mouth piece – I dare not write it here for fear of having someone steal the components – [it] catches the Cartesian Molecules beneath the subject's tongue. / Beautiful Leila wearing dream catcher/ mouthpiece. / Before the gap [between the "catcher" and head] allowed for the molecules to escape: the thin metal plate now wraps directly around [the] skull for greater precision and accuracy.*



Computable Transformation
XVI. subject in Apparatus

69

Experimenting on himself proved extremely difficult for assorted reasons, so he started recruiting subjects for the project. here wasn't a lot of enthusiasm for his work, so he was usually able to convince a prostitute or drifter with a small bribe. Here is Norway's sketch of a subject wearing one of the final designs for the Cartesian molecule tracking device, the "Apparatus." This version includes a "vital reader," worn around the subject's chest, to track variations in heart rate and body temperature.



Computable Transformation

A lady of easy virtue responded to a notice I posted in the local ale house. She arrived at half past eight o'clock in the evening of February 18. I paid her half of the advertised sum, provided her with one milligram (too much?) of diascordium, and she undressed into her nightdress. I extinguished the lamp in my laboratory's sleeping quarters and asked her to sleep. She did so for ninety minutes before I brought a tea to her, mixed with one-half milligram of laudanum. I asked her to dress and place herself in the Apparatus.

I waited approximately eighteen minutes for the laudanum to take effect before beginning to measure. I measured for thirty-two minutes in eight-minute increments.

Measuring the Accuracy of Inferring Dream Content using Cartesian Molecule Emittance Method

	α	β	γ	ξ
8m'	12.3	.09	103.4	-3
16m'	10.3	.12	30.5	-2
24m'	8.0	.11	137.0	-6
32m'	5.6	.09	151.1	-7

The α values produced a steady decline, an expected effect from the laudanum. Most critical is the uptick of ξ after a relatively steady first two measurements.

As soon as I removed the apparatus and paid our lady the remaining fee, I began interpreting the data into four new plates.

With each new plate, I consumed one-quarter milligram of diascordium, as it is widely understood to produce images upon closing the eyes.

The following four pages contain the results of this experiment.

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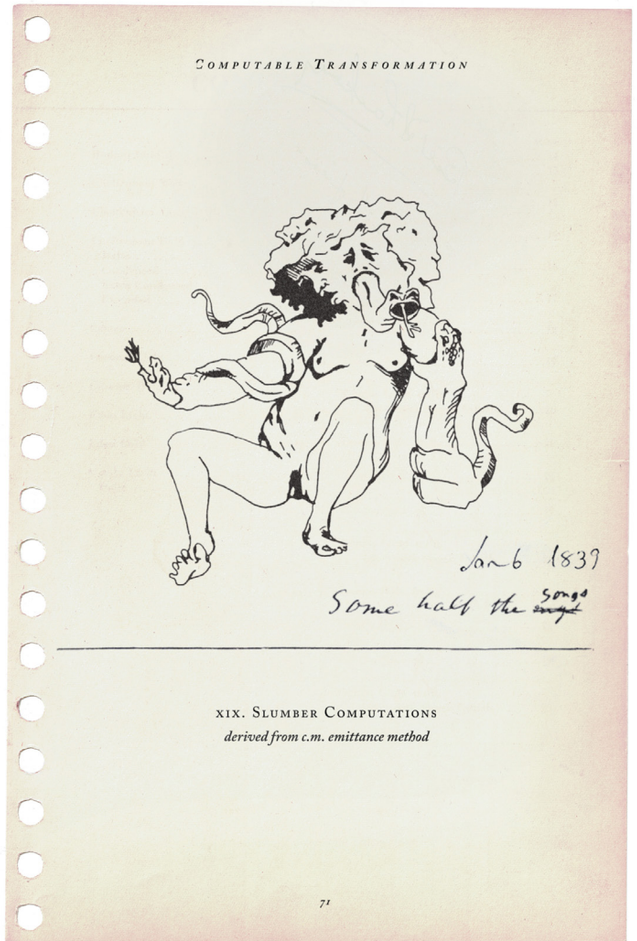
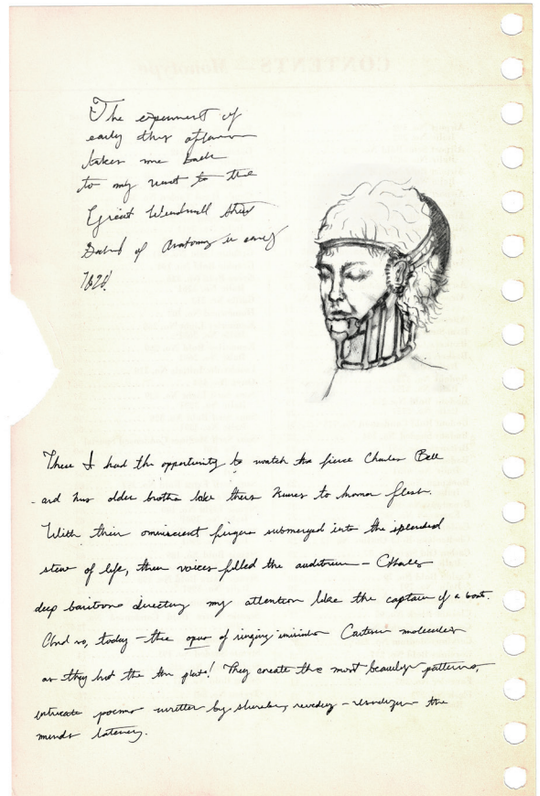
He would measure his subjects values before and after a brief nap. Then he would ask them to leave and he would put a pinch of laudanum, a popular opiate in Victorian times, into a glass of sherry and get to drawing.



This is the type of image that came out – lovely quasi-abstract representations of whatever he had calculated and then envisioned from his test.



The experiments of early this afternoon take me back to my visit to the Great Windmill School of Anatomy in early 1820. There I had the opportunity to watch the fierce Bell brothers take their knives to human flesh. With their omniscient fingers submerged into the splendid stew of life, their voices filled the auditorium – Charlie's deep baritone directing my attention like the captain of a boat. / And so, today - the opus of ringing invisible / Cartesian Molecules as they hit the thin plate! They create the most beautiful patterns, intricate poems written by slumber, revealing – visualizing – the mind's latency.

03

RESOLVING INCOMMENSURABILITY OF EUGENICS & THE QUANTIFIED SELF

(abridged)

BY GABI SCHAFFZIN

Statistical laws show us that natural selection does not act by carving out each new generation, according to a definite pattern on a Procrustean bed, irrespective of waste. They also explain how small a contribution is made to future generations by those who deviate widely from the mean, either in excess or deficiency, and they enabled us to discover the precise sources when the deficiencies in the produce of exceptional types are supplied, and their relative contributions.

—Francis Galton, 1877

In the past 18 months, three new long-form works have been published on self-tracking and the quantified-self (interchangeably, QS) movement: Deborah Lupton's *The Quantified Self: A Sociology of Self-Tracking*, Gina Neff and Dawn Nufus's *Self Tracking*, and the Nufus-edited *Quantified: Biosensing Technologies in Everyday Life*. These aptly-named volumes provide a range of theoretical and ethnographic explorations into the relatively young industry encompassing the use of technology in tracking one's daily activity or environment. None, however, provide much history for the phenomenon beyond the anecdotal. Analogously, it is not difficult to connect the quantified-self with the eugenical projects of Francis Galton and his turn-of-the-century cohort—both movements embody the normalizing power of large-data-set statistics through anthropomoetrics in hopes of improving the human body and mind. This analogy breaks down, however, when considering that eugenics was, at its root, a project of evolution whereas the quantified-self relies on a neo-Lamarckian understanding of how we, as humans, change over time. What follows is an attempt to resolve this chasm through a genealogical project between eugenics and the quantified-self. After tracing backwards from the quantified-self through its roots in self-experimentation and behaviorism, and then forwards from eugenics through its influence on psychometrics and personality testing, it becomes apparent that an incommensurability between the two phenomenon can, in fact, be traversed when reading it through the lens of Foucauldian biopolitics.

Francis Galton had already been interested in heredity and statistics before he read Charles Darwin's *On the Origin of the Species* upon its publication in 1859. The work, written by his half-cousin, acted as a major inspiration in Galton's thinking on the way that genius was passed through generations—so much so, that Galton spent the remainder of his life working on a theory of hereditary intelligence. His first publication on the topic, "Hereditary Talent and Character" (1865), traced the genealogy of nearly 1,700 men whom he deemed worthy of accolades—a small sample of "the chief men of genius whom the world is known to have produced" (Bullmer 159)—eventually concluding that "Everywhere is the enormous power of hereditary influence forced on our attention" (Galton 1865, 163). Four years later, the essay inspired a full volume, *Hereditary Genius*, in which Galton utilized Adolphe Quetelet's statistical law detailing a predictive uniformity in deviation from a normally distributed set of data points—the law of errors.

Much like Darwin's seminal work, Quetelet's advancements in statistics played a critical part in the development of Galton's theories on the hereditary nature of human

greatness. Quetelet, a Belgian astronomer, was taken by his predecessors' work to normalize the variation in error that occurred when the position of celestial bodies were measured multiple times. Around the same time—that is, in the first half of the nineteenth century—French intellectuals and bureaucrats alike had taken a cue from Marquis de Condorcet, who had proposed a way to treat moral—or, social—inquiries in a similar manner to the way the physical sciences were approached. Quetelet, combining the moral sciences with normal distributions, began to apply statistical laws of error in distribution to the results of anthropometric measurements across large groups of people: e.g., the chest size of soldiers, the height of school boys. The result, which effectively treated the variation between individual subjects' measurements in the same manner as a variation in a set of measurements of a single astronomical object, was *homme type*—the typical man (Hacking 111–12).

In 1889, Galton wrote, "I know of scarcely anything so apt to impress the imagination as the wonderful form of cosmic order expressed by the 'Law of Frequency of Error'" (66). Six years earlier, in *Inquiries Into Human Faculty*, he declared that he was interested in topics "more or less connected with that of the *cultivation* of race" (17, emphasis added)—that is, eugenics—than simply the *observation* of it. Galton's argument was rather simple, albeit vague: society should encourage the early marriage and reproduction of men of high stature. Per Michael Bulmer, "He suggested that a scheme of marks for family merit should be devised, so that ancestral qualities as well as personal qualities could be taken into account" (82). Once these scores were evaluated, the individuals with top marks would be encouraged to and rewarded for breeding; at one point, he recommended a £5,000 "wedding gift" for the top ten couples in Britain each year, accompanied by a ceremony in Westminster Abbey officiated by the Queen of England (Bulmer 82). This type of selective breeding would eventually be referred to as "positive eugenics".

The statistical technologies developed by Quetelet and the like were utilized by Galton for more than just the evaluation of which individuals were worthy of reproduction, they also allowed for the prediction of how improvements would permeate through a population. Specifically, he argued that if a normally distributed population (being measured upon whichever metric—or combination of which—he had chosen) reproduced, it would result in another normally distributed population—that is, the bulk of the population would be average or mediocre (Hacking 183). He called this the law of regression and understood it to slow severely the improvement of a race towards the ideal. However, if one could guarantee that those individuals at the opposite

end of the bell curve—that is, the morally, physically, or psychologically deficient—were *not* reproducing, then an accelerated reproduction of the exceptional could take place (Bulmer 83). Thus was born "negative eugenics".

It is important to note that the historical trail of eugenics eventually goes cold somewhere between 1940 and 1945, depending on in which country one is looking. Most obviously the rise of the Third Reich and its party platform built primarily on eugenicist policies had a direct effect on the decline of eugenics towards the midway point of the twentieth century. Previously enacted (and confidently defended) state policies regarding forced sterilization from Scandinavia to the United States were eventually struck-down and stay as embarrassing marks on national histories to this day (Hasian 140). This is not to suggest that the scientific ethos behind the field—that one's genetic makeup determines both physical and psychological traits—went completely out of fashion. Elaborating on this point is something I will come back to, as well. At this point, however, I believe it prudent to focus on the end-point of my attempted genealogy: the quantified self.

Multiple accounts of the history of the quantified self credit Kevin Kelly and Gary Wolf, editors from *Wired* magazine, with coining the term and organizing the QS movement—a community of individuals who identify as "self-trackers" (see Neff and Nafus 30, Lupton 12, Wolf 2011, et al.). Despite the name, these individuals, often through the use of a technologically enabled process, track the daily details about their lives that are both quantitative and qualitative: calories consumed, steps taken, activities accomplished, moods felt, hours slept, etc. (Swan 86). After a "meet-up" at Kelly's Northern California studio in 2008, the pair have been speaking and writing about the formalization and professionalization of this self-tracking process over the past decade—an evolution occurring through the development of both amateur and corporate-backed tracking devices. For instance, the most popular self-tracking device on the market, the FitBit (currently at 22% share in a highly fractured market (Rogerson)), can count the steps you've taken, as well as, depending on the model, record heart rate and sleeping patterns ("Fitbit Official Site").

Certainly, it is no surprise that there is such an emphasis on the "self" within the quantified-*self* movement. Understanding its importance, helps place QS in a context that will prove fruitful in the overall task at hand. In a study published in 2014, a group of researchers from the University of Washington and the Microsoft Corporation found that the term "self-experimentation" was used prevalently among their QS-embracing subjects. "Q-Selfers," they write, "wanted to draw definitive conclusions from their QS practice—such as identifying correlation...or even causation" (Choe, et al. 1149). Although not performed with "scientific rigor", this experimentation was about finding meaningful, individualized information with which to take further action (Choe, et al. 1149).

Looking back at the history of self-experimentation in the sciences—in particular, experimental and behavioral psychology—leads to a 1981 paper by Reed College professor and psychologist, Allen Neuringer, entitled, "Self-Experimentation: A Call for Change". In it, Neuringer argues for a closer emphasis on the self by behaviorists:

> *If experimental psychologists applied the scientific method to their own lives, they would learn more of importance to everyone, and assist more in the solution of problems... The area of inquiry would be relevant to the experimenter's ongoing life, the subject would be the experimenter, and the dependent variable some aspect of the experimenter's behavior, overt or covert.* (79)

The psychologist goes on to suggest that poets and novelists could use the method to discover what causes love and that "all members of society" will "view their lives as important" thanks to their contributions to scientific progress (93). Neuringer's argument is influenced by the work of B. F. Skinner, the father of radical behaviorism—a subset of psychology in which the behavior of a subject (be it human or otherwise) can be "explained through the conditioning...in response to the receipt of rewards or punishments for its actions" (Gilette 114). We can see, then, a lineage of both behavioral and experimental psychologies on the quantified-self: not only do QS devices track, but many of the interfaces built into and around them embrace "gamification." That is, beyond the watch face or pedometer display, the dashboards displaying results, the emails and alerts presented to subjects, the "competition" features, etc., all embrace what Deborah Lupton calls "the rendering of aspects of using...self-tracking as games... an important dimension of new approaches to self-tracking as part of motivation strategies" (23).

As we have seen, Galton's influence on experimental psychology was, largely, a technological one. In an oft-cited paper from 2013, researcher Marie Swan argues that "the idea of aggregated data from multiple... self-trackers[, who] share and work collaboratively with their data" will help make that data more valuable—be it to the individual tracking, physician working with them, corporation selling the device worn, or other stakeholder (86). No doubt, then, the value of the predictive power of correlation and regression to these trackers. Harvey Goldstein, in a paper tracing Galton's contributions to psychometrics, notes that Galton was not the only late-nineteenth century scientist to believe that genius was passed hereditarily.

He was, however, one of the few to take up the task of designing a study to show genealogical causality regarding character, thanks once again to his correlation coefficient and resultant laws of regression.

Galton's contributions to psychometrics go beyond technological, however, and into methodological. In what I might have also included as an example of the scientist's support for self-experimentation, Galton's 1879 "Psychometric Facts" features the results of a word association test performed on himself:

The plan I adopted was to suddenly display a printed word, to allow about a couple of ideas to successively present themselves, and then, by a violent mental revulsion and sudden awakening of attention, to seize upon those ideas before they had faded, and to record them exactly as they were at the moment when they were surprised and grappled with. (426)

Famously, this word association test was used by Carl Jung as he developed methods to classify his subjects into his various psychological types (Paul 82). Eventually, this tool pioneered by Galton was used to build the Myers-Briggs Type Indicator a 93-question test which plots a test-taker's personality along multiple axes. Interestingly, the MBTI works against what Nicholas Lemann calls "the first principle of psychometrics...that all distributions bunch up in the middle, in the familiar form of a bell curve" (91). Because of the MBTI's assumption that individuals are *either* introverts or extroverts, and so on, resultant data would look like an inverse bell curve, with data bunched up on either end of the axes. Though the test had been conceived of decades prior, Katherine Briggs and Isabel Briggs Myers were finally inspired to finalize the MBTI's matrices in 1943. The test was, per its creators, intended to help people understand one another—a concern inspired by the onset of World War II, which also provided a more practical reason for its development: helping women who were replacing men in the industrial workplace to find the right "fit" in their new jobs (Myers 208).

The history of Galton and eugenics, then, can be traced into the history of personality tests. Once again, we come up against an awkward transition—this time from personality tests into the quantified-self. Certainly, shades of Galtonian psychometrics show themselves to be present in QS technologies—that is, the treatment of statistical datasets for the purpose of correlation and prediction. Galton's word association tests strongly influenced the MBTI, a test that, much like quantified-self projects, seeks to help a subject make the right decisions in their life, though not through traditional Galtonian statistical tools. The MMPI and 16PFQ are for psychological evaluative purposes. And while some work has been done to suggest that "mental wellness" can be improved through self-tracking (see Kelley et al., Wolf 2009), much of the self-tracking ethos is based on factors that can be adjusted in order to see a correlative change in the subject (Wolf 2009). That is, by tracking my happiness on a daily basis *against* the amount of coffee I drink or the places I go, then I am acknowledging an environmental approach and declaring that my current psychological state is not set by my genealogy. A gap, then, between Galtonian personality tests and QS.

The previous two sections act as test-beds for a theory that the relationship between eugenics and the quantified-self is more than simply analogous, but homologous. To this point in our study, these experiments appear to have, at best, complicated, and at worst, failed the hypothesis: critical breaks along both genealogies seem more like chasms which make the two phenomena difficult to connect in a meaningful way. At the root of this break seems to be the fundamental tenets underlying each movement. Eugenics, with its emphasis on hereditarily passed physical and psychological traits, precludes the possibility that outside, environmental influences may lead to changes in an individual's bodily or mental makeup. The quantified self, on the other hand, is predicated on the belief that, by tracking the variables associated with one's activities or environment, one might be able to make adjustments to achieve physical or psychological health. On the surface, then, there is an incommensurability between the two fields. However, by understanding how the technologies of the two movements work in the context of the predominant form of Foucauldian governmentality and biopower of their respective times, we may be able to resolve this chasm.

First, it is important to recognize how closely intertwined the eugenics movement was into the welfare state of early-twentieth century Europe and the United States. Per Nils Roll-Hansen in the conclusion to *Eugenics and the Welfare State*, in the first decade of the 1900s, a classical concept of genetics was formed in which an individual's phenotype could be influenced by not only their genetic makeup, but by a combination of genotype and environmental and social factors. After being pioneered by conservative evolutionists such as Galton and his cohort of protégés, then, "reform" eugenics of the 1920s and 1930s was led by scientists looking to jettison the racist reputation of their predecessors through a "renewal of the 'social contract' of the movement" (Roll-Hansen 260). In Scandinavia, Britain, and elsewhere in Europe, newly elected Labour governments used legislation to enact the forced sterilization of the "feebleminded" and weak in the name of the protection of both that marginalized group and the population as a whole. In England in particular, liberals used

"eugenical arguments to disseminate information to the working classes on how they should behave biologically for their own benefit and that of the English 'race'" (Hasian 115). American liberals used neo-Lamarckian ideas concerning the social influences on human traits to emphasize the importance of "race poison" studies (Hasian 128)—research that "proved" that, for example, cigarettes and alcohol had negative downstream effects on the human race (Hasian 28).

I turn, now, to the eighteenth century for an understanding of how this type of welfare state came to be. As sovereign power shifted from individuals ruling over principalities and whomever lived inside of them to governments overseeing populations understood to live in, travel to, trade with, and war with neighboring lands. In a 1978 talk to the Collège de France, Michel Foucault outlined this shift in governance, arguing that it ushered in the birth of economies: collections of goods, people, and money that all fell under the sovereignty of a state. Critical to the management of these economies were technologies of counting and tracking—statistics, anthropometrics, and the like. Majia Nadesan, reading Foucault as well as Nikolas Rose, notes that governmentality addresses some key concepts surrounding the organization of society's technologies, problems, and authorities; it recognizes, too, that individuals are both turned into "self-regulating agents" and/or marginalized as invisible or dangerous (1). In order to explain how hegemonies develop and deploy technologies to control the life of populations, Foucault developed the concept of biopower, "arguably the most pervasive form of power engendering the homologies and systemic regularities across the diverse fields of social life" (Nadesan 3).

Without question, the technologies enabling eugenics and their legislative implementation are prime examples of governmentality and biopower at work—the combination of which can be understood through Foucault's "biopolitics". In the biopolitical realm, knowledge of man—at once global, quantitative (i.e., concerning the population), and analytical (i.e., concerning the individual)—is exploited by loci of power to divide, categorize, and act "upon populations in order to securitize the nation" (Nadesan 25). As the nineteenth century came to a close, the negative effects of *laissez-faire* policies turned the tide towards a more active liberal state, one that enabled citizens to maximize their liberties. Nadesan perfectly sums up where welfare-state sponsored eugenics comes in: "the modern liberal-welfare state utilized biopolitical knowledge and expert authorities to expand its power at the level of the population...while simultaneously these forms of knowledge operated to individualize and subjectify citizens as particular kinds of subjects" (26). This occurred at the expense of the liberties of some individuals, of course, as conceptualizations of the normal and pathological were dispersed throughout the population (Nadesan 26).

As the twentieth century progressed through two World Wars and the biomedical and technological revolutions that accompanied them, psychology, anthropology, and sociology saw major shifts towards the social experiences of the individual in shaping psychologies and behaviors—this is something exemplified in the two brief histories above. Alongside these new visions of what it means to be human, new technologies of the self (e.g., the self-help personality test, the self-experiment, psychotropics) engendered an empowered, self-governing subject of liberal democracy (Nadesan 149). These technologies of the self (Foucault's term) ushered in a neoliberal mode of governance—one in which welfare states jettisoned responsibility for the individual. As Nadesan notes, "By stressing 'self-care,' the neoliberal state divulges paternalistic responsibility for its subjects but simultaneously holds its subjects responsible for self-government" (33). Enter, then, the quantified self: a movement predicated on the use of technologies which enable individuals not only to self-track, but to make changes in their lives—based on the data collected—towards a normative conceptualization of a good, healthy citizen. And while certainly not a prerequisite, sharing that data with others adds "value" to it by enabling comparison and competition, though at the risk of being utilized by surveillance apparatuses.

Eugenics, then, was seemingly predicated on wholesale changes to the collective while quantified-self is based on an individual's efforts to play their responsible part in society—for the sake of that same collective. Both utilize technologies of governmentality that depend on statistical mechanisms invented and/or made mainstream by Francis Galton. But this relationship is more than just analogous—by tracking the development of technologies of experimentation, behaviorism, psychometrics, and personality classification, we see a complex progression from welfare-style "one for all" approach to the neoliberal state's reliance on self-governance. I have already noted a number of social-welfare focused programs offered by "reform" eugenicists. In hard-liner, "positive" eugenics, those deemed worthy are incentivized to reproduce—see, for example, Galton's £5,000 wedding gift proposal, as well as Henry Fairfield Osborn's speech to the Third International Congress on Eugenics, in which he argued for "not more but better Americans" (41). To a eugenicist—even a hard-liner—these types of programs might be considered what William Epstein calls "moral behaviorism—the use of material incentives to promote socially acceptable behavior" (183-4), in this case, reproduction for the sake of the race. The development of

behaviorism into self-experimentation and incentivized self-tracking makes a great deal of sense, then, as the neoliberal emphasis on self-care no longer warranted social welfare programs. Nadesan, once again citing Rose, notes that "political authorities sought to 'act at a distance' upon the desires and social practices of citizens primarily through the promulgation of biopolitical knowledge, experts, and institutions that promised individual empowerment and self-actualization" (27). The classificatory power of psychometric testing under the early-twentieth century welfare state served to exclude and erase those individuals deemed worthy of institutionalization or, worse, deemed unworthy of reproduction. The same technology which enabled these tests drive the self-informing power of the daily happiness meters and mood surveys of the quantified-self. Nadesan, this time citing Mitchell Dean, points out neoliberalism's heavy emphasis on normalization of our social and cultural condition—a normalization centered around containment and extrication of risk; "concerns for 'responsibility' and 'obligation' outweigh freedom and rehabilitation" (35). Participating in the quantified self, one is under the impression that their freedom to excel will be enhanced by the adjustments made thanks to the data they have collected. Welfare states sought to normalize towards compliance through aggregate data. The neoliberal state aggregates through surveillance apparatuses for the sake of risk management. Galton's psychometrically driven tests classified those worthy of breeding and those not. Tracing the progression of these tests along with the shift from social-welfare to neoliberal biopolitic, it is easy to recognize and understand the shift into a market based on products heavily reliant on the collection and analysis of personal data.

What is the history of the quantified self a history of? One could point to technological advances in circuitry miniaturization or in so called "big data" collection and processing. The proprietary and patented nature of the majority of QS devices precludes certain types of inquiry into their invention and proliferation. But it is not difficult to identify one of QS's most critical underlying tenets: self-tracking for the purpose of self-improvement through the identification of behavioral and environmental variables critical to one's physical and psychological makeup. Recognizing the importance of this premise to QS allows us to trace back through the scientific fields which have strongly influenced the QS movement—from both a consumer and product standpoint. Doing so, however, reveals a seeming incommensurability between an otherwise analogous pair: QS and eugenics. A eugenical emphasis on heredity sits in direct conflict to a self-tracker's belief that a focus on environmental factors could change one's life for the better—even while both are predicated on statistical analysis, both purport to improve the human stock, and both, as argued by Dale Carrico, make assertions towards what is a "normal" human.

A more complicated relationship between the two is revealed upon attempting this genealogical connection. What I have outlined above is, certainly, only the beginning of such a project. I did, however, seek to use the strong sense of self-experimentation in QS to work backwards towards the presence of behaviorism in early-twentieth century eugenical rhetoric. Then, moving in the opposite direction, I tracked the proliferation of Galtonian psychometrics into mid-century personality test development and eventually into the risk-management goals of the neoliberal surveillance state. I hope that what I have argued here will lead to a more in-depth investigation into each step along this homological relationship. In the grander scheme, I see this project part of a critical interrogation into the quantified-self. By throwing into sharp relief the linkages between eugenics and QS, I seek to encourage resistance to fetishizing the latter's technologies and their output, as well as the potential for meaningful change via those technologies.

Works Cited

Bulmer, M. G. *Francis Galton: Pioneer of Heredity and Biometry*. Baltimore, Johns Hopkins University Press, 2003.

Carrico, Dale. "Two Variations of Contemporary Eugenicist Politics." *Two Variations of Contemporary Eugenicist Politics*, 1 Jan. 1970, amormundi.blogspot.com/2008/01/two-variations-of-contemporary.html. Accessed 22 Mar. 2017.

Choe, Eun Kyoung, et al. "Understanding Quantified-Selfers' Practices in Collecting and Exploring Personal Data." *Proceedings of the 32nd Annual ACM Conference on Human Factors in Computing Systems - CHI '14*, 2014, pp. 1143–1152., doi:10.1145/2556288.2557372.

Cogdell, Christina. *Eugenic Design: Streamlining America in the 1930s*. Philadelphia, Pa, University of Pennsylvania Press, 2010.

Engstrom, E. J., and M. M. Weber. "Classic Text No. 83: 'On Uprootedness' by Emil Kraepelin (1921)." *History of Psychiatry*, vol. 21, no. 3, 2010, pp. 340–350., doi:10.1177/0957154x10376890.

"Fitbit Official Site for Activity Trackers & More." Fitbit Official Site for Activity Trackers & More, www.fitbit.com/. Accessed 19 Mar. 2017.

Foucault, Michel. "Governmentality." *The Foucault Effect: Studies in Governmentality*, edited by Graham Burchell et al., The University of Chicago Press, Chicago, 1991, pp. 87–104.

Galton, Francis. *Hereditary Genius: An Inquiry Into Its Laws and Consequences*. London, Macmillan, 1869, galton.org/books/hereditary-genius/index.html. Accessed 17 Mar. 2017.

Galton, Francis. "Hereditary Talent and Character." *Macmillan's Magazine*, 1865, pp. 157–327, galton.org/essays/1860-1869/galton-1865-hereditary-talent.pdf. Accessed 17 Mar. 2017.

Galton, Francis. *Inquiries into Human Faculty and Its Development*. London, Macmillan, 1883, galton.org/books/human-faculty. Accessed 17 Mar.

2017.

Galton, Francis. *Natural Inheritance.* New York, AMS Press, 1973.

Galton, Francis. "Psychometric Experiments." *Brain*, vol. 2, no. 2, 1879, pp. 149–162., doi:10.1093/brain/2.2.149.

"Garmin | Vívo-Fitness." Garmin | Vívo-Fitness, explore.garmin.com/en-US/vivo-fitness/. Accessed 20 Mar. 2017.

Gillette, Aaron. *Eugenics and the Nature-Nurture Debate in the Twentieth Century*. New York, Palgrave Macmillan, 2011.

Goldstein, Harvey. "Francis Galton, Measurement, Psychometrics and Social Progress." *Assessment in Education: Principles, Policy & Practice*, vol. 19, no. 2, 2012, pp. 147–158., doi:10.1080/0969594x.2011.614220.

Hacking, Ian. *The Taming of Chance.* Cambridge, Cambridge University Press, 1990.

Hasian, Marouf Arif. *The Rhetoric of Eugenics in Anglo-American Thought.* Athens, University of Georgia Press, 1996.

Hattie, J. (1991). *The Burt Controversy: An essay review of Hearnshaw's and Joynson's biographies of Sir Cyril Burt.* Alberta Journal of Educational Research, 37(3), 259-275.

Hergenhahn, B. R. *An Introduction to the History of Psychology*. Belmont, CA, Wadsworth, 2009.

Lemann, Nicholas. *The Big Test: the Secret History of the American Meritocracy*. New York, Farrar, Straus and Giroux, 2007.

Lupton, Deborah. *The Quantified Self: a Sociology of Self-Tracking*. Cambridge, UK, Polity, 2016.

Myers, Isabel Briggs, and Peter B. Myers. *Gifts Differing: Understanding Personality Type*. Mountain View, CA, Nicholas Brealey Publishing, 2010.

Nadesan, Majia Holmer. *Governmentality, Biopower, and Everyday Life*. New York, Routledge, 2011.

Nafus, Dawn, editor. *Quantified: Biosensing Technologies in Everyday Life*. Cambridge, MA, The MIT Press, 2016.

Neff, Gina, and Dawn Nafus. *Self-Tracking*. Cambridge, MIT Press, 2016.

Neuringer, Allen. "Self-Experimentation: A Call for Change." *Behaviorism*, vol. 9, no. 1, 1981, pp. 79–94., academic.reed.edu/psychology/docs/SelfExperimentation.pdf. Accessed 19 Mar. 2017.

Paul, Annie Murphy. *The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves*. New York, Free Press, 2004.

Pearson, Karl. *The Life, Letters and Labours of Francis Galton. Characterisation, Especially by Letters. Index.* Cambridge, UP, 1930, galton.org/pearson/index.html. Accessed 17 Mar. 2017.

Perkins, Henry Farnham, and Henry Fairfield Osborn. "Birth Selection versus Birth Control." *A Decade of Progress in Eugenics; Scientific Papers of the Third International Congress of Eugenics*, Williams & Wilkins, Baltimore, 1934, pp. 29–41.

Rogerson, James. "Wearables Aren't in Trouble – but Fitbit's Market Share Is Falling." TechRadar, TechRadar The Source for Tech Buying Advice, 2 Mar. 2017, www.techradar.com/news/wearables-arent-in-troublebut-fitbits-market-share-is-falling. Accessed 23 Mar. 2017.