

History of the Future: A Powerful Way to Teach the Past (and Present)

What I came to feel, in the end, is that there is no such thing as the future, or that it exists in the hallucinatory likeness of the present, a comforting fairy tale or a terrifying horror story that we tell ourselves in order to justify or condemn the world we currently live in, the world that has been made around us—out of our desires, in spite of our better judgment.

Mark O'Connell, *To Be a Machine* (2017)

We build our conceptions of history partly out of our present needs and purposes. The past is a kind of screen upon which we project our vision of the future; and it is indeed a moving picture, borrowing much of its form and color from our fears and aspirations.

Carl Becker, "What Are Historical Facts?" (1926)

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I RECENTLY READ AN ESSAY on the proliferation of machines in society and how they contribute towards inequality. Its author considered this a puzzling paradox: automation significantly increases the amount of goods produced, which in turn makes prices drop. This fact should then, according to economics, increase the standard of living for all. Yet, the author noted, the opposite is happening. Automation hasn't made everyone richer; instead, the abundance reaped from increased production pools around those wealthy few who could initially invest in the new automated technologies. Meanwhile, the rest of the world actually loses overall purchasing power because the same machines that create abundance also deskill people's labor, leading to stagnating wages, longer hours, loss of benefits, and even unemployment.

The author I was reading is Friedrich Engels, and the essay (co-authored with Karl Marx) is entitled *The Principles of Communism* (1847).¹ The “automations” he speaks of are not the dreaded job-stealing robots inside today’s newspaper, but the steam-powered assembly mills of the industrial revolution. By 1850, these innovations had made England the richest nation in the world while also creating the unprecedented squalor of the new English working class, popularized by E. P. Thompson and Charles Dickens.

Importantly, Marx and Engels had no complaints with automation per se, and their essay did not seek to solve innovation’s problems through a Luddite return to agrarianism. Instead, they saw automation as a key component in moving towards a classless society. Machines were literally what made Communism possible, by allowing the unprecedented abundance that could provide the future both plenty and leisure. What needed changing, they argued, was *how* these machines were incorporated into society’s existing economic and legal structures.

I begin this essay with Marx and Engels’ vignette because of its similarities to current debates on the possibilities and threats of artificial intelligence (AI) within the workforce. I also use it because Marx and Engels’ commentary is a *technofuturist* one, meaning its analysis of contemporary social problems is inexorably bound to the authors’ beliefs in how technology will change society in coming decades. Today, technofuturism pervades our society; from AI, to robots, to electric cars, to big data, to climate change solutions and more, it’s difficult to read the news without encountering predictions on how machines or computers will change our society in the coming decades (for either good or bad, depending on whom you read).

But Marx and Engels are rarely mentioned in these contemporary pieces. Nor is any other historical actor who once thought or wrote about their society in a technofuturist way (and there are many of them). This is a problem. The dreamlike aspirations of Elon Musk, Mark Zuckerberg, and Ray Kurzweil are nothing new, and Western society has been practicing technofuturism since at least the Scientific Revolution. More important is that *in almost all historical cases, those who predicted the future were wrong*. Usually, what they predicted simply didn’t happen. Other times, the opposite would occur. Occasionally, the inventions they imagined were realized, but society used them in vastly different ways from what was predicted.

Given that our society combines a poor ability to predict future technology with a good ability to forget our poor past predictions, I decided to create a course on “the history of future technology.” My initial idea was to simply showcase a litany of failed technofuturist attempts and projects, and, in so doing, teach students to be more critical of contemporary technology and its surrounding social narratives. In time, this basic course idea branched into a rich network of theories and concepts on science, technology, and society, and this article discusses details of what our class collectively learned about the relationships between past, present, and the imagined future.

Methodology and Course Outline

Ninety-five years ago, American Historical Association president Carl Becker wrote that, to average Americans, historical facts don’t matter.² People aren’t really concerned with *what* happened, he argued, so much as they’re concerned with *how* those facts relate to their own sense of self and community. In other words, the past is just another way for people to think about the present. Over the years, I’ve grown attached to this idea, so much that I eventually stopped teaching dates and facts in my courses. They didn’t disappear from class, but they were pushed to the background to make room for themes that would connect historical events to present ideas. Class now framed history as a series of *narratives* we tell ourselves, and explored how these narratives function to help define and support present identities and paradigms.³ Fleshing out this dialogue between past and present—including how history is portrayed in today’s movies and bestselling books—became the course’s primary focus. I believe this is how most of the public approaches history (whether they’re cognizant of it or not) and that typical student burnout within history courses comes from the dissonance produced when we as teachers try to combat these public understandings with classroom approaches that treat history mainly as a repository of facts. In other words, trying to preach to students about “what really happened” often misses the point of how most people use and understand history in the first place. It’s been a rewarding switch, and over the years, my students have made frequent comments about their preference for treating the

past as present. A benefit of this approach is that it works with most chronological and geographical settings, and I've used it as a framework for history courses on a variety of subjects. Recently, when I was assigned to teach a history of science and technology class, I saw this as an opportunity to combine my methods of teaching past and present with a third dimension: the future.

I hadn't initially planned on teaching a history class explicitly on the future, but two factors led me in that direction. First, my recent research has me reading a lot on the ideas and concepts presently emerging from Silicon Valley—in particular, those that relate to educational technology (a.k.a. the “EdTech” industry).⁴ This in turn has led me to a broader curiosity about contemporary narratives on the future and I wanted to use my course as an opportunity to further investigate this. The second factor pushing me towards a “history of the future” course is that I've always found traditional history of science courses a difficult enrollment draw. Because few students understand what history of science is or why it can be interesting and/or important, I felt an attractive (if not outright sensationalist) title and course description would be helpful. These two impetuses soon turned my conventional history of science offering into “Techno-Utopias: Innovation, Social Planning, and Future Dreaming in Western Society.”⁵ The accompanying catalog blurb promised a course that would cover everything from robots, to Communism, to eugenics, to AI, to the lost city of Atlantis. It worked; the class filled to capacity, and all I had to do now was (gulp) create a curriculum that made good on all these promises.

Fortunately, I'm not the first to attempt a “history of the future” class, and similar efforts by previous teachers have been chronicled in *The History Teacher* over the years. The earliest of these is a class taught at Kansas City College in the mid-1970s by James Schick, Fred Misse Jr., and David Hackett.⁶ Following Carl Becker's above insights, these professors drafted a course that aimed to be more “relevant” to non-history majors by focusing on historical events that relate to students' present lives. In doing so, they hoped to bridge time by using “historical study for an understanding of the present, and to form a realistic concept of the future placed upon that understanding.”⁷ The class included a diverse reading list, ranging from futurist authors like H. G. Wells to interviews with local Kansas citizens about how modernizing technologies had recently shaped

their lives. The class also placed special emphasis on using history to show how technology and society influence one another (a novel idea at the time, given that Science, Technology, and Society Studies had not yet become an official academic subfield). Interestingly, Schick, Misse, and Hackett remark in their 1974 piece about the new career of “futurology,” meaning a new propensity during their time for economists, social scientists, and business analysts to use historical data for predicting future trends. The authors review the notable public recognition these futurists achieve for their efforts, and lament that historians have failed to capitalize on this recent phenomenon, given that historians understand past data far better than any other “futurist” group. It’s a critique just as relevant today as when it was published.

While not a class review per se, J. L. Heilbron and Daniel Kevles’ 1988 piece in *The History Teacher* is a comprehensive summary of how science and technology have been neglected within general history textbooks over the years.⁸ The article was helpful while designing my class because, despite its age, many of the problems described are sadly still present within college history courses today. In particular, Heilbron and Kevles stress textbooks’ over-emphasis on the social consequences of technological innovations without enough explanation on how society informed those innovations in the first place. The piece concludes with the still useful insight that “Students of American history need to know enough about the driving forces, powers, limitations, and institutions of SciTech to enable them to achieve a better understanding of the past and a better basis of judging present than they now have.” (Apparently, the textbook authors reviewed by Heilbron and Kevles didn’t take the Kansas City College class!)⁹

Finally, the concerns of all these above authors are reflected within Nicholas Buchanan’s recent article: “The Kitchen of Futures Past,” which discusses how Buchanan addresses prediction and the future within his college history of science classes.¹⁰ Like Schick, Misse, and Hackett, Buchanan stresses the importance of historical perspective in tempering the ubiquity of predictions in present society; like Heilbron and Kevles, Buchanan argues for history lessons that more fully incorporate science and technology into discussions on society and culture. Importantly, Buchanan’s courses also stress to students that social and cultural institutions can

exhibit remarkable durability in the face of technological change. Taking the kitchen as his main focal point, Buchanan demonstrates, for example, that while past futurist writers have advertised the almost limitless liberating potentials of future technology, gendered attitudes of work typically remain static within futuristic writings on the American home. Finally, Buchanan stresses the significant pedagogical point that teaching students about the future (and how the present views the future) paradoxically helps students better understand historical processes.¹¹

Building off these authors' ideas, I plotted the initial outline for my course. Like Schick, Misse, and Hackett, as well as Buchanan, I wanted students to survey historical examples of future predictions, focusing on examples of past technofuturists getting it wrong (Francis Bacon, Karl Marx, NASA, etc.). Next, like Heilbron and Kevles and, again, Buchanan, I wanted to examine ways that society, culture, and technology influence one another, and how these imbrications affected past technofuturists and their predictions (i.e., to what extent things like race, class, religion, gender, epistemology, etc., informed their thinking about technology, society, and the future). Finally, once students had sufficient experience investigating past technofuturists, I wanted them to apply the same methods to the famous technofuturists of our present (Bill Gates, Ray Kurzweil, Elon Musk, etc.). Through this framework, the class achieved the basic goal of becoming more critical of technology's role within present society, though that was only one of the many insights we collectively gained through studying yesterday's tomorrows.

History of Futures Past

The first insight we gained is that is studying future visions from a past society is an incredibly effective and fun way of better understanding that society itself. This is for the simple reason that thinking about the future requires imagination, and reading predictions from past cultures delineates the *limits* of that culture's imagination. This crucial point goes beyond debunking notions of historical progress; it demonstrates humanity's literal inability to *think* beyond prescribed cultural boundaries: medieval scholars cannot imagine astronauts if they understand planets to be divine, suspended orbs instead of rocks floating in space; Victorian-age

reformers cannot imagine digital computing while unaware of how to apply to logic to electronic currents. Furthermore, because an individual's imagination is bound by time and place, it leads to blind spots within their predictions that can seem comical to students today. An early example of this is Louis-Sébastien Mercier's *L'An 2440, rêve s'il en fut jamais* (*The Year 2440: A Dream if There Ever was One*), a 1771 French Enlightenment and seminal science fiction text in which the protagonist falls asleep and awakens over 700 years later.¹² While Mercier's future utopian Paris is without absolutism, Catholicism, or poverty, people still travel via horse and carriage. In another case, Fritz Lang's 1924 film *Metropolis* imagines a highly vertical future cityscape, with planes and cars moving about a crowded urban center, the rich living atop epic skyscrapers, and the poor crowding in shadows below. Lang grew up in the rapid urbanization of the early twentieth century, and his vision takes the innovations of his period (skyscrapers, urban transit, electric power) and imagines a future that is both fantastic and simply *more* of what was already in development. While Lang could see the potential of electric-powered automatons and closed-circuit televisions, other genuinely new developments—like the horizontal suburban boom which began twenty years after his film's debut—are nowhere to be found.¹³ A final example here is a 1956 General Motors promotional film touting that self-driving cars would be commonplace—by the mid-1970s.¹⁴ The film shows auto-piloted, jet turbine-powered cars whisking across the new (traffic-jam free!) Eisenhower Interstate system, controlled not by GPS, but by a network of radio transmitters and government-operated air-traffic control stations. Inside this futuristic car is a surprisingly conventional family of four; the children access the car's built-in refrigerator for ice cream while dad takes advantage of hands-free driving to enjoy a cigar. Again, the video takes novel technology from its own period (jet planes, radar, and freeways) and creates a future by applying these existing inventions to new uses.¹⁵

A second insight our class gained was the importance of the utopian story genre within technofuturist visions—past and present. As noted by utopian scholars like Howard Segal, there's actually a clear genealogical link between utopian works and the early scientific writings (and science fiction) of the seventeenth century, and this bond still resonates within technofuturist literature today.¹⁶

The influence of utopia on technofuturism is important because, at its heart, utopian writing is less about utopia per se than it is a form of protest against the present—utopias are simply canvases to paint society without present ills.¹⁷ This has been true ever since Thomas More's initial *Utopia* (1516), which was primarily a critique of his day's church and state politics, and subsequent utopian writers have, implicitly or explicitly, followed More's footsteps.¹⁸ The paradigm later informed Francis Bacon's *New Atlantis* (1626), a seminal Scientific Revolution tract wherein Bacon describes a mythical island society that adheres to the new scientific method that Bacon spent his life advocating, a place that contains (and showcases) all the knowledge and technological marvels Bacon believed his new method could produce.¹⁹ Mercier's *L'An 2440* (perhaps the first-ever time travel text) depicts a future society based upon reason, natural laws, and includes a Temple to the Supreme Being—meaning it, too, is less about envisioning the future and more about imagining a place without those things that bothered Enlightenment philosophes. Later writers fare no better. Karl Marx's above-mentioned ideas predict a world where factories led to abundance for all, while Victorian-era biologist and early eugenicist Francis Galton's *The Eugenic College of Kantsaywhere* (c. 1910-1911) is a lascivious tract where citizens grow up healthy, intelligent, and beautiful due to generations of selective breeding.²⁰

But if utopian works are notable for their fixation on what present evils they want abolished, they are equally revealing when investigated for their silences—those areas of society with which the authors are presumably satisfied, as they spend no time imagining counter-scenarios. At this point, it's worth noting that, historically, the published and publicized utopian writers have been overwhelmingly white, male, protestant, and from the middle or upper classes, which may help explain some of the status quo tendencies hidden within their otherwise forward-looking texts.²¹ In any case, as Buchanan has already demonstrated in his "Kitchens of Futures Past," a main example of complacency among utopian and futurist writers is found within gender relations, and not only in the twentieth century. While Thomas More was radical enough to imagine a society without private property, that same society was still primarily ordered through the traditional, heterosexual, nuclear family. Behaviors inside the household followed traditional English

patterns wherein “husbands chastise their wives and parents their children,” mostly without state intervention, the exception being pre-marital or extra-marital sex, which was punishable by enslavement or death.²² Francis Bacon filled his *New Atlantis* with similar sentiments, including a long exposition on what he called the “Feast of the Family”—a three-day, state-sponsored holiday wherein each family’s patriarch would arbitrate inter-family grievances, arrange future marriages, and declare his own line of succession before state authorities.²³ Even Mercier, whose future Paris eschewed dowries and allowed people to marry for love over money, nevertheless emphasized that women were “by nature dependent” on men.²⁴ Indeed, Mercier’s primary motive for eliminating dowries was so women would no longer obsess over beauty in order to court rich suitors, and thus “instead of exercising their vanity, [will] have cultivated their minds.”²⁵

One interesting exception to this patriarchal trend is Karl Marx, who, scattered in his writings, remarked that the future Communist utopia would have no patriarchy.²⁶ Still, it’s unclear if Marx could be considered feminist by today’s standards; his stance grew solely from his opinion that families were outside the realm of economics and therefore irrelevant to his vision. According to his socioeconomic model of base and superstructure, he believed that patriarchy and nuclear families—like religion, race, and just about everything else not related to class struggle—were fictions perpetrated by the bourgeois to distract and divide the proletariat. In a true Communist society, therefore, traditional gender or family arrangements would, like many other things, simply fade away. While these sentiments were mainly afterthoughts in Marx’s writings, they later created a genuine social crisis/opportunity in the aftermath of Russia’s Bolshevik Revolution. When trying to reconstruct Russian society according to Communist ideals, Marx’s dearth of writings on family and gender pushed Vladimir Lenin and his associates to ultimately void most pre-existing rules on marriage and sex. The result was that Soviet Russia was—for a time—the most liberal nation on earth regarding sexual and family relations: abortion, gay marriage, male and female polygamy, and group marriage were all made legal and remained so until Joseph Stalin re-established more conservative norms during the Great Purge of the late 1930s.²⁷

Even with Stalin's return to more traditional sex and family norms, Soviet society remained committed to a technofuturist vision of gendered parity in the home and workplace—at least compared to the U.S. and most other twentieth-century societies.²⁸ The contrasts between Soviet and American ideas on the future role of women were starkly demonstrated in the 1959 Kitchen Debates, an event our class studied in detail.²⁹ During the 1950s, while both nations looked to technology for improving the lives of their citizens, the Soviets criticized Americans for creating technology that reinforced a dated, nuclear family framework. While everyday Russians admired the potential of American dishwashers and washing machines to reduce drudgery, many were also confused as to why Americans would design them for individual homes, to be used by individual women. If the true goal is to reduce labor, why not produce larger units that could power entire cafeterias and laundromats? Why not create entire communal centers where housework and child care could be outsourced and women could then pursue careers and occupations as men did? One Soviet observer went so far as to accuse American homemaking technologies of covertly *hindering* female social mobility, arguing that such devices “consolidate, as it were, the mission of woman as household manager, as wife and as cook. They lighten the burden of this role, but [in doing so]... perpetuate this role for women as a profession.”³⁰

There's a second issue beyond gender at stake in these mid-century technology debates: this disparity between Soviet and American understandings on housework also reminds us that *how* technology evolves has more to do with how we imagine ideal living and working arrangements than with nuts and bolts. This is important because it implies, among other things, that a useful technology for one group or society may be less so for the next. One doesn't have to travel too far into imperial history to find examples of workable inventions and concepts created in the imperial center that went on to fail horribly on the periphery, such as English farming techniques in 1600s Jamestown or French mining equipment in 1880s Panama.³¹ In fact, we don't have to go into history at all to see, for example, the failure of Facebook's Free Basics program in India (which Indians perceived as neocolonialist) or Elon Musk's recent efforts to rescue a Thai soccer team from an underwater cave with a miniature sub, which was deemed “not practical” by the Thai divers on site.³²

Of course, this struggle between competing social values and their corresponding technologies doesn't need to happen on an international scale. One of our class texts was James C. Scott's *Seeing Like a State* (1998), a work that narrates—in case after case—ways that various governments have attempted to better manage their own people by implementing new technologies, and failed horribly.³³ At times, these failures only cost the state millions of dollars; other times, they accidentally kill thousands or more. One of Scott's more benign stories involves Brasilia, Brazil's statuesque planned capital of the 1960s that was created without almost any input from everyday Brazilians on their preferred living, commuting, and leisure arrangements. The result was/is an architectural masterpiece that nobody's willing to live in. Scott then contrasts the failed, planned nature of Brasilia with the ideas of 1960s sociologist Jane Jacobs, who argued that ideal urban living arrangements are organic rather than planned. Left with minimal interference, Jacobs argued, city neighborhoods develop their own overlapping systems of security, surveillance, and traffic flows, one human relationship at a time. Neighbors learn to look out for each other, merchants appear to meet the needs of local people, and the entire city fabric is maintained by “an intricate, almost unconscious network of voluntary controls and standards among the people themselves.”³⁴

Google has recently decided to enter the urban planning business by investing \$50 million into a Toronto waterfront revitalization project, the idea being to create a “smart neighborhood,” where everything—from autonomous cars, to self-shoveling sidewalks, to garbage cans that charge you per toss via your cell phone—will be controlled by algorithms in the hope of making a more enjoyable city experience.³⁵ The plan is in early stages, but ambitions are high. Interestingly enough, Jane Jacobs and her ideas are frequently on the lips of those Google employees commanding the project.³⁶ Whether a people-driven, organic cityscape can be compatible with a centralized data processing center that monitors and adjusts to everyone's surveilled behavior remains to be seen. As our class lessons demonstrated, history is not on Google's side.³⁷

This phenomenon of competing future visions can take darker turns than inconvenient cityscapes. Enter America's Progressive Era, a time when educated people of most political stripes came together to enact sociopolitical reform: monopoly regulation, consumer

health and protection agencies, tenement building codes, and the prohibition of alcohol were all symptoms of the larger Progressive belief that new scientific and technological advancements could be directed against the numerous social problems caused by American's second industrial revolution. Interestingly enough, this period also witnessed a proliferation of utopian works—including Edward Bellamy's bestselling *Looking Backward* (1888)—that, like Progressive-era reformers, frame science as a radical new panacea for social ills.³⁸ Indeed, it's arguable that the period between 1890 and 1930 mark a high tide of futurist thinking (comparable even with our current Silicon Valley mania), touching almost all aspects of American society. Today, history textbooks tend to focus on only one aspect of this era's multi-faceted reform impulse: anti-corporate legislation and the beginning of America's welfare state. Our class, meanwhile, examined another, relatively forgotten aspect: Progressivism's belief in scientific racism and eugenics. Using Harry Bruinius' *Better for All the World: The Secret History of Forced Sterilization and America's Quest for Racial Purity* (2007), we examined how the period's faith in the new sciences of Darwinian evolution and Mendelian genetics inspired most Progressive figures to herald eugenics as a powerful tool for radical social betterment.³⁹ To Progressives, eugenics could be used to encourage procreation of the physically and intellectually fit, mainly through bureaus that would administer standardized I.Q. tests and award top performers. Conversely, those same tests could (and were) used to justify the forced sterilization of those graded as "morons" according to those tests' criteria. Indeed, between 1900 and World War II, American states forcibly sterilized an estimated 65,000 people, in a procedure that was upheld by the 1927 Supreme Court. These laws were later used by Nazi Germany as templates when creating their own legislation on Aryan supremacy.

Teachers often use America's eugenic heritage primarily as another example of our nation's sordid racial past. And while that approach is historically defensible, to categorize the episode as simply another hate crime misses a crucial point when placed within a technofuturist context. What matters most in the eugenics cases—and what caused my students the most discomfort—is that those who advocated for eugenics were otherwise typically moral people who *genuinely thought their actions were making a world a*

better place. It stemmed from a belief that poverty was an effect of mental and moral defects that were biologically rooted in a person's family pedigree. This belief was in turn founded upon decades of biological research performed in universities, and was not seriously questioned by anyone who claimed to be a member of America's educated class.⁴⁰ "I consider myself a liberal person," one student remarked when reading Bruinius' work, "and this is the first time I've ever found myself rooting against the liberals within a political fight." In getting students to swallow this dissonance, they began to appreciate the political tug-of-war that sometimes occurs over historical actors within our current culture wars. How should we commemorate, for example, someone like Margaret Sanger, a person who spent her life fighting for women's rights, access to birth control, and...neutering the poor?⁴¹

Teaching eugenics does more than demonstrate how moral compasses shift over time. It also shows how modern morality is inexorably informed by our current understandings on the natural world. If those understandings change over time, what defense do we in the present have against repeating the errors of the eugenicists? Today, society is rife with legal and political battles over where exactly life begins and ends, yet all sides in these debates concur that science should play an important role in settling them, imperfect as science is. The question becomes even more pertinent when considering recent advancements in CRISPR gene editing and other gene therapies.⁴² Given that our knowledge of nature is continually imperfect and evolving, how careful (or careless) will we be in implementing new gene-centered innovations? How will our increasing biological knowledge influence the future's moral compass? How worried should we be about a return to beliefs in Social Darwinism, or that governments should intervene in people's bodies for the presumably greater good?⁴³ Most public eugenicists recanted after seeing their own influence within the horrors of the Holocaust; prior to that, they saw themselves as social saviors.

These concerns are why I'm bothered by Silicon Valley's mantra of "move fast and break things," which encourages developers to approach new technological innovations with the opposite of apprehension and empathy. For this very reason, it's probably not a surprise that Silicon Valley is increasingly earning a negative perception among everyday Americans—mainly for breaking things.

The Future at Present

“I thought once everybody could speak freely and exchange information and ideas, the world is automatically going to be a better place. I was wrong about that.”⁴⁴ This quote is from Evan Williams, co-founder and former CEO of Twitter, and was issued after Donald Trump’s famous remark that he wouldn’t be president of the United States without their platform. Other companies face similar sobering realizations about their products. Facebook’s global attempts to build community resulted in the Cambridge Analytica scandal and Russian attempts to influence the 2016 election via Facebook’s platform. It was enough to land Mark Zuckerberg before a Congressional hearing and prompted him to draft a soul-searching, 5,700-word essay on how Facebook will improve. Years later, however, their problems are far from solved. While social media sites have garnered most of the recent criticism, this issue of unforeseen social consequences pervades the entire contemporary tech industry. From data mining and spying concerns within our nascent “Internet of Things,” to reports that smartphone use greatly contributes to depression among teenagers, to the revelation that most social media sites are engineered to maximize users’ advertising exposure by playing upon subconscious emotional triggers, to the fact that the Internet’s basic infrastructure makes it almost impossible to prevent widescale financial and privacy breaches, there’s a lot wrong with the products we’ve grown to use on a daily basis.⁴⁵

As mentioned earlier, class spent the final four weeks studying Silicon Valley: its inventions, its beliefs about society that underwrite those inventions, and its rhetoric that bolsters those beliefs. Our conversations during this part of the semester were exceptionally fruitful now that students had a solid framework of previous historical examples to draw from. It also meant class was unsurprised at either Zuckerberg’s recent troubles or his genuine shock over his products’ unintended consequences (which I took as proof that class had successfully learned to critique notions of historical progress). Given society’s long history of failed predictions, and that knowledge of these past failures is almost completely absent from public discussion, what are the chances current technofuturists can prove the exception?

Based on the historical framework we constructed to survey the mistakes made by past and present technofuturists, our class finished the semester by drafting a series of helpful theories for better understanding society's interactions with technology at present. I'd like to close this paper with a review of these ideas, as I hope their publication will allow history teachers to help students better navigate a world that's increasingly mediated through smartphones and automated delivery.

The first student insight—and this can't be repeated enough—is that *humans are notoriously bad at predicting future technology*. As shown earlier, our understanding of what's ahead typically amounts to taking our current situation and simply extrapolating a future with faster and more ubiquitous versions of the things we already have. Genuinely new innovations (like suburbs or the Internet) are never on the radar, while easily imaginable ones (like robot butlers or flying cars) are forever just around the corner. Williams and Zuckerberg may be reeling from setbacks at present, but compare their recent regrets with the continuing ebullience of technofuturist Ray Kurzweil, who—when not working as Google's chief engineer—makes a living predicting the future. Kurzweil likes to boast that (1) his past predictions have an 86% accuracy rate (they don't), and (2) that within forty years, humans will develop both a fully conscious AI and the ability to live forever through cybernetic enhancements, including the ability to digitally upload a human consciousness into cyberspace.⁴⁶ Even more fantastic, his predictions are widely lauded within tech communities as reasonable barometers of future progress. Kurzweil argues that his own predictions are based on More's Law; specifically, that ever-increasing processing power will eventually allow us to simulate human senses and experiences. It seems reasonable on the surface, but when you compare it to past technofuturist predictions, you find it rife with similar technofuturist errors. To wit: his methodology boils down to (1) an assessment that processing power presently allows us to digitally replicate sight and sound, and (2) an extrapolation of this position to argue further developments along a similar trajectory (i.e., that *more* processing power will soon enable us to mimic touch, smell, and even abstract thought). Reading his books is like watching *Metropolis* a second time.

The second insight our class gained into contemporary technology is that *technofuturism is still a form of protest*. As with More,

Bacon, and Marx, we continue to appropriate the future as a space for imagining society without the many things that bother us in the present. With that in mind, we need to ask the following of companies like Google and Facebook: when imagining the future, what exactly are you trying to escape? When I think of a positive future, I imagine things like neutral carbon emissions, nuclear deproliferation, and, if possible, an end to poverty. Tech companies envision robotic cars, virtual reality headsets, personalized learning machines, and ubiquitous data sharing to create a predictive needs-catering service economy. How, specifically, do these dreams work towards a better future? There's a case to be made for reduced accidents and better traffic flows with self-driving cars, and there's a dubious case that computers make for better education. Beyond that, however, this future is mainly just stuff to buy.

Or, maybe Silicon Valley's future-as-protest is simply a vision that most Americans don't share. It's a dream of robotic workers who neither mangle, nor complain, nor need healthcare. It's a future where companies can create individual psychological profiles based on data usage to enable more precise marketing. It's a place where improved optical and facial recognition systems can be purchased by military and police forces to better surveil the population—tools that can reduce petty crime, but also legitimate political dissent. In short, maybe their future dreams are simply that of a reinforced status quo? Of course, tech companies are, by definition, profit-seeking enterprises, so it's no surprise that their imagined future is one where they're all making lots of money. It's also widely accepted (if not encouraged) in America that blue-chip companies like Google and Apple have a right to create technologies that protect their assets while also developing new revenue streams. But if that's to be expected of these entities, it's worth asking: why do we as a society leave so much of our collective hopes for the future in the hands of entities that are, by definition, in the business of selling things? Why do we look to Larry Page and the late Steve Jobs as heroes who will lead us to an improved tomorrow?

The third insight we gained goes hand in hand with the second: that *dreams about the future are just as important for what they don't re-imagine*, meaning those things technofuturists don't examine as targets for reform. Sadly, this is still an area where gender and diversity appear (or, rather, *don't* appear). Like the utopian writers

of the past, the contemporary tech industry is dominated by upper-class white men. Tech companies make frequent announcements on their efforts to improve workforce diversity (and I believe many are sincere in their efforts), yet over the years, most have failed to make more than modest improvements.⁴⁷ To be fair, overcoming the systemic barriers that keep women and minorities from top tech positions is a major social problem, well beyond the power of any single corporate policy to fix. But is fixing a company's diversity harder than, say, building the Singularity? If tech companies invested as much time and money in fixing their corporate diversity as they do trying to perfect artificial intelligence and self-driving cars, how would their workforce look?

This lack of diversity would be of minor note if it was confined to the interior workspaces of Silicon Valley; a much larger problem is that Silicon Valley's lack of diversity gets exported into the products it makes. The most obvious example of this are machine-learning computers that, after hundreds of hours of reading the Internet, became convinced that housework is for women while construction is for men.⁴⁸ Or consider Apple's HealthKit, an app that was designed to monitor "your whole health picture," including diet, exercise, and even your vitamin supplement levels...but forgot about menstruation.⁴⁹ Moreover, these problems within data collection and product development persist despite Silicon Valley's rhetoric that algorithms create a more "colorblind" society, asserting that robots, by default, cannot be racist or sexist.⁵⁰ It's possible these arguments about colorblind machines are for advertising purposes; however, it's equally likely that they stem from the actual lack of diversity within Silicon Valley's workforce, and the limits upon a group's ability to imagine or innovate when all the group's members come from similar socioeconomic backgrounds. The more homogenous a design team's culture, the more likely that team will overlook product aspects that could hold potentially negative consequences for their (more diverse) consumer base.

More important, this homogeneity can have larger repercussions beyond creating devices with negative side effects for minority user groups. It can also sabotage an entire company's overall potential by circumscribing limits onto the design group's imaginative capabilities. A counter example should make this point clear: Octavia Butler was also a futurist. An award-winning science fiction writer,

she made a living by imaging space travel and genetic advancements, and gave professional lectures on predicting the future and how humanity can work towards a better tomorrow.⁵¹ She was also a black woman who grew up poor and was, by her own estimation, incredibly shy and awkward. Growing up in the 1960s, she had little encouragement, few mentors, and she knew of no black science fiction writers she could look to as career examples. She got beat up at school and her family told her, “negroes can’t be writers.”⁵² As a young adult, she ground her way through years of menial jobs, writing at night before slowly becoming known for her work.

These formative events had a profound impact on the stories she created, which were typically bleak. She once stated that her visions on the future begin with her “remembering the schoolyard” and the lesson “that five- and six-year-old kids have already figured out how to be intolerant.” Rather than emphasizing the future’s potential, she saw its pitfalls. Rather than thinking innovation would lead to a better world for all, she saw it as further separating the haves and have-nots. She didn’t dismiss things like fanaticism and religious zeal as ultimately irrelevant before the march of technology. She was not a nihilist, and many of her works are fundamentally about hope at their core. However, she stressed that real solutions to problems are never singular or simple. Most important, she believed that humans are by nature both unpredictable and selfish. You can give them a new technology, but there’s no guarantee they won’t find ways of using it to hurt others.

My point here isn’t to showcase how we should be pessimistic when thinking about the future, but rather to highlight the value a viewpoint like Butler’s brings to technofuturist conversations. At the time of writing this article, the governing boards of Apple, Google, and Facebook were all over 67% male and 100% white.⁵³ Most probably come from well-to-do families, have stellar academic pedigrees, and spent their childhoods in academically challenging yet comparatively sheltered environments, free from the many stressors experienced by those in poverty. When they imagine the future, what memories do they access? If someone like Butler sat on the boards of these companies, how might their deliberations be different? Would Twitter have still naively thought their invention would “automatically” make the world a better place? Would Google have made Google Glass? Note that it’s not Butler’s gender or

color per se that informed her world view (although they certainly contributed). It's that she was ridiculed daily and given few reasons to be hopeful. As a result, her worldview was one where things don't go as planned, where people can't be trusted to do the right thing, and where—consequently—it's crucial to approach situations with apprehension, empathy, and the expectation that positive change is a lifelong struggle.

Conclusion

Like most technofuturists, Marx and Engels were wrong in their predictions; a global overthrow of the bourgeoisie did not occur. Their writings did, however, cause thirty nations and almost half the world's population to adapt Communist rule, force the rest of the world to take socialism and/or labor unions seriously, and generate a contest against capitalism that was the dominant global ideological struggle of the twentieth century. Today, thirty years after capitalism's victory in that struggle, the magnitude of this conflict is mostly forgotten. The saga is now mainly invoked by pundits who like to blithely generate reasons why Communism was untenable and ultimately doomed from the start. Yet during the Cold War, few people believed this struggle would end like it did. You need only review America's vast military expenses against Communism (\$738 billion in Vietnam alone), to see that nobody at the time saw its collapse as inevitable.⁵⁴

Even more forgotten than the seriousness of the Communist challenge is that Communism was also a technofuturist failure. Outside a small circle of academics and specialist bloggers, the futurist aspirations of Marx and Engels have been erased from public memory, as have the actions of numerous subsequent Communist leaders to realize a utopia underwritten by standardization and mass automation.⁵⁵ Much like America's silenced eugenics history, there are myriad reasons for our collective erasure of Communism's technofuturist ambitions. But for our purposes, the most important is that it's part of our larger failure to conceptualize failed past attempts at bettering the human condition. To understand Russia's Collectivization program, or China's Great Leap Forward—or even California's mass sterilization program—as a technocratic and technofuturist error is to put our own certainty on data-driven social solutions into doubt.

Given the increased speed at which technology pervades and mediates our collective and individual lives, it becomes increasingly crucial we keep these failures in mind. That means ensuring today's students learn the history of the future. It also means history teachers are—like Schick, Misse, and Hackett stated over forty years ago—in a unique position to make much-needed contributions to our society's discussions about technology's present role in society—*perhaps better than anyone else*. Hopefully, this article has offered some ideas on how to approach these relevant yet understudied concepts in your own classroom; my ideas here are only the tip of the iceberg, insights I gained from only a semester of classroom research. Through studying and teaching the history of the future, it's my hope that we can gain insights into the imaginations of past societies unattainable through other means. It's my hope that our own society can arrive at more sober assessments on technology and a more cautious approach to its future implementation. It's my hope that we can teach Silicon Valley and other tech companies to be more empathetic and proactive in thinking beyond their own socioeconomic backgrounds when developing products for society writ large.

But most of all, it's my hope that, through studying the past, we can be mindful of how our present fears and ambitions shape our assessments of the future, regardless of how much scientific rigor these assessments possess. Carl Becker spent much of his career arguing that the past exists more within our imagination than it does within archival records, regardless of how many sources we consult. So, too, I argue, does the future. Whether it be dreams of an automated household or fears of atomic annihilation, our understanding of what will happen has more to do with our present beliefs and shibboleths than it does with any statistical modeling. Despite the brilliance of Becker's insight, present society (both within and without academia) has largely overlooked his words, choosing instead to ignore the ghost within the machine and treat history as the study of "what really happened." Likewise, our data-driven culture shows a similar penchant for ignoring that our best predictive assessments are, at the minimum, heavily influenced by our individual emotions and collective belief systems.⁵⁶ A simple browsing of past events easily proves this. This fact deserves to be disseminated, and I encourage history teachers everywhere to do so.

Notes

1. Friedrich Engels, *The Principles of Communism*, found in Karl Marx and Friedrich Engels, *The Communist Manifesto* (London, United Kingdom: Hirschfeld, 1848). Available through the Marxist Internet Archive, <<https://www.marxists.org/archive/marx/works/1847/11/prin-com.htm>>.
2. Carl L. Becker, "What Are Historical Facts?" *The Western Political Quarterly* 8, no. 3 (September 1955): 327-340. According to the journal, Becker's paper initially was "read at the 41st annual meeting of the American Historical Association at Rochester, New York, in December, 1926" (p. 327).
3. For a longer description of this method, see Eric Otremba, "A Case Against Facts: Or, How I Learned to Stop Worrying and Love the Survey," *The History Teacher* 48, no. 1 (November 2014): 37-51.
4. For much of this literature, and for many ideas regarding the history of the future in general, I'm greatly indebted to Audrey Watters, whose Hack Education website (<https://www.hackeducation.com>) is a treasure trove of useful insights regarding technology, education, and all things related to the STS (Science-Technology-Society) field.
5. The original course was entitled "Techno-Utopias: Innovation, Social Planning, and Future-Dreaming in Western Society." I've since changed it to "Techno-Futurism," as I think it better represents the ideas pursued throughout the course.
6. James B. Schick, Fred B. Misse Jr., and David A. Hackett, "'The Future as History': An Experimental Approach to Introductory History for the General Student," *The History Teacher* 7, no. 2 (February 1974): 220-227.
7. Schick, Misse, and Hackett, "The Future as History," 223.
8. J. L. Heilbron and Daniel J. Kevles, "Science and Technology in U.S. History Textbooks: What's There—And What Ought to Be There," *The History Teacher* 21, no. 4 (August 1988): 425-438.
9. Heilbron and Kevles, "Science and Technology in U.S. History Textbooks," 428.
10. Nicholas Buchanan, "The Kitchen of Futures Past: Using Predictions About the Future of Housework to Teach about Gender, 'Progress,' and Historical Perspective," *The History Teacher* 49, no. 3 (November 2016): 329-358.
11. In Buchanan's words, comparing past predictions about the future can "vividly juxtapose changing notions of what constitutes ideals such as 'progress' and 'equality,' creating a concrete foundation on which to build discussions of historical contingency, relativism, and universalism." Buchanan, 330.
12. Louis-Sébastien Mercier, *L'An 2440, rêve s'il en fut jamais* (*The Year 2440: A Dream if There Ever was One*) (1771). Translated into English as *Memoirs of the Year Two Thousand Five Hundred*, trans. William Hooper (London, United Kingdom: 1772). Available at <<https://archive.org/details/memoirsofyeartwo01merc/>>. See also Tracy Rutler, "Writing in Reverse: Archiving the Future in Mercier's *L'an 2440*," *The French Review* 91, no. 2 (December 2017): 35-47.

13. *Metropolis*, directed by Frantz Lang (1924).
14. "From 1956: A Future Vision of Driverless Cars," YouTube video, 8:55, posted by CBS Sunday Morning, 19 January 2014, <<https://www.youtube.com/watch?v=F2iRDYnzwtk&t=317s>>.
15. Of further note is the static social situation within the film. The nuclear family abounds, smoking is safe, and privatization of communication or transport networks is unthinkable.
16. The literature on Technological Utopias is surprisingly thin. Two chief works that deal with this topic are a monograph: Howard P. Segal, *Technological Utopianism in American Culture* (Chicago, IL: The University of Chicago, 1985); and an anthology: Joseph J. Corn, ed., *Imagining Tomorrow: History, Technology, and the American Future* (Boston, MA: MIT Press, 1986). On the genealogy of utopian works from Thomas More through the twentieth century, see Segal, *Technological Utopianism*, Ch. 4-5.
17. For more on this, see Segal, *Technological Utopianism*, Ch. 9.
18. For a review of Thomas More's work and its contemporary contexts, see Thomas More, *Utopia*, with an introduction by David Harris Sacks (New York: Bedford/St. Martin's Press, 1999).
19. Francis Bacon, *New Atlantis* (1626). Available through The Gutenberg Project, <<https://www.gutenberg.org/files/2434/2434-h/2434-h.htm>>.
20. Karl Marx and Friedrich Engels, *The Communist Manifesto* (London, United Kingdom: Hirschfeld, 1848). Available through the Marxist Internet Archive, <<https://www.marxists.org/archive/marx/works/1848/communist-manifesto/>>. On Galton's *Kantsaywhere* manuscript, see Harry Bruinius, *Better for All the World: The Secret History of Forced Sterilization and America's Quest for Racial Purity* (New York: Vintage: 2007), 106-107.
21. On Utopian authors being white, male, protestant, and of middle or upper class, see Segal, *Technological Utopianism*, Ch. 2.
22. More, *Utopia*, 171. Furthermore, occupations were much more restricted than may present-day writers have commented upon. While women technically had access to a wider range of positions, they were still restricted to the more basic crafts like spinning, while more "laborsome sciences" (meaning skilled occupations) were passed from father to son through traditional apprenticeship. See More, *Utopia*, 136.
23. Bacon, *New Atlantis*. He also forbade men and women to marry without parental permission, lest they forfeit their inheritance. Many of these rules were based upon the Family of Noah in the Old Testament, which Bacon presumably admired.
24. Mercier, *L'An 2440*, 227.
25. Mercier, *L'An 2440*, 229. Mercier continues for some time about the bad habits of women, who he pines should be "constantly submissive to the duties that their sex requires" (p. 228). He goes so far as to assure his readers that, in his future Paris, women "do not affect that miserable jargon so much in vogue among you...called wit" (p. 230).
26. See, for example, Karl Marx, "Private Property and Communism," in *Economic and Philosophic Manuscripts of 1844* (Moscow, Russia: Progress

Publishers, 1959). Available through the Marxist Internet Archive, <<https://www.marxists.org/archive/marx/works/1844/manuscripts/comm.htm>>. See also Friedrich Engels' section for "Question 21: What will be the influence of communist society on the family?" in Friedrich Engels, *The Principles of Communism*, found in Karl Marx and Friedrich Engels, *The Communist Manifesto* (London, United Kingdom: Hirschfeld, 1848). Available through the Marxist Internet Archive, <<https://www.marxists.org/archive/marx/works/1847/11/prin-com.htm#21>>.

27. Good contemporary commentary on these events can be found in Alexandra Kollontai, "Sexual Relations and the Class Struggle," in *Alexandra Kollontai Selected Writings*, trans. Alix Holt (London, United Kingdom: Allison and Busby, 1977). Available through the Marxist Internet Archive, <<https://www.marxists.org/archive/kollonta/1921/sex-class-struggle.htm>>.

28. Soviet society was never as equal in reality as it was in its rhetoric and aspirations. Nevertheless, women found occupations in skilled jobs at a significantly higher rate than in the United States or other Western nations during this time.

29. The material used for these class discussions came from Shane Hamilton and Sarah Phillips, eds., *The Kitchen Debate and Cold War Consumer Politics: A Brief History with Documents* (New York: Bedford/St. Martin's Press, 2014).

30. Marietta Shaginian, "Reflections on the American Exhibition, August 23, 1919," in *The Kitchen Debate and Cold War Consumer Politics: A Brief History with Documents*, ed. Shane Hamilton and Sarah Phillips (New York: Bedford/St. Martin's Press, 2014), 123-125.

31. Two examples are the early disasters at Jamestown, which were largely predicated on the English believing that the Indians would trade corn for English glass baubles (they didn't, and the English starved), and failures of France's Panama Canal Company, which went bankrupt digging the canal because they failed to account for local conditions when planning the canal route, precipitating the world's 1893 stock market collapse.

32. On Facebook's Free Basics failure, see Rahul Bhatia, "The Inside Story of Facebook's Biggest Setback," *The Guardian*, 12 May 2016, <<https://www.theguardian.com/technology/2016/may/12/facebook-free-basics-india-zuckerberg>>. On Musk's submarine, see Aaron Mak, "A Complete Timeline of Elon Musk's Fruitless Attempt to Rescue the Thai Soccer Team," *Slate*, 10 July 2018, <<https://slate.com/technology/2018/07/elon-musk-thai-soccer-team-cave-rescue-fruitless-attempt.html>>.

33. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998).

34. Jane Jacobs, as quoted in Scott, *Seeing Like a State*, 135.

35. See, for example, Nancy Scola, "Google is Building a City of the Future in Toronto: Would Anyone Want to Live There?" *Politico*, July/August 2018, <<https://www.politico.com/magazine/story/2018/06/29/google-city-technology-toronto-canada-218841>>.

36. See, for example, Lauren Vespoli, "The Take: Dan Doctoroff," *Hemispheres* (by United Airlines), February 2018.

37. As of November 2018. Resistance to this project became considerable, with a number of prominent Toronto public officials coming out against Google's

endeavor. See Ava Kofman, “Google’s ‘Smart City of Surveillance’ Faces New Resistance in Toronto,” *The Intercept*, 13 November 2018, <<https://www.theintercept.com/2018/11/13/google-quayside-toronto-smart-city/>>. Notably, this project was cancelled in May 2020, while this article was in press. Google cited COVID-19 for the cancellation, but growing resistance from Toronto citizens also arguably played a part.

38. Segal’s *Technological Utopianism* is primarily a case study of many of the works produced during this period.

39. Harry Bruinius, *Better for all the World: The Secret History of Forced Sterilization and America’s Quest for Racial Purity* (New York: Vintage, 2007).

40. Interestingly enough, the primary opponents to eugenics were rural Christian Fundamentalists, who associated (and still associate) evolution with the potential for government intervention over the power of life and death.

41. Even today, Margaret Sanger’s legacy is highly contested, primarily due to the continued fights over abortion and birth control in America. See Jennifer Latson, “What Margaret Sanger Really Said About Eugenics and Race,” *Time*, 14 October 2016, <<https://www.time.com/4081760/margaret-sanger-history-eugenics/>>.

42. See, for example, Jim Kozubek, “Biopower in the Era of Biotech,” *Los Angeles Review of Books*, 7 September 2017, <<https://www.lareviewofbooks.org/article/biopower-in-the-era-of-biotech/>>.

43. I’m a fan of the Affordable Care Act; however, when placed within this longer historical context, the fears of conservatives and the Religious Right over the Act’s supposed “death panels” becomes more understandable.

44. David Streitfeld, “‘The Internet is Broken’: @ev Is Trying to Salvage It,” *The New York Times*, 20 May 2017, <<https://www.nytimes.com/2017/05/20/technology/evan-williams-medium-twitter-internet.html>>.

45. On the Internet of Things, see Surya Mattu and Kashmir Hill, “The House that Spied on Me,” *Gizmodo*, 7 February 2018, <<https://gizmodo.com/the-house-that-spied-on-me-1822429852>>. On cell phone use and depression, see Jean M. Twenge, “Have Smartphones Destroyed a Generation?” *The Atlantic*, September 2017, <<https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/>>. On the general psychological effects built into modern web platforms, see Paul Lewis, “‘Our Minds Can be Hijacked’: The Tech Insiders who Fear a Smartphone Dystopia,” *The Guardian*, 6 October 2017, <<https://www.theguardian.com/technology/2017/oct/05/smartphone-addiction-silicon-valley-dystopia>>.

46. Kurzweil is an interesting example, as he has a long and successful track record as an electrical engineer, especially in getting computers to understand and translate sounds into text and executable commands. Nevertheless, I find his ideas on the Singularity untenable for the reasons described in this essay. He also goes to special lengths to defend/cover up his past predictions, and becomes angry when journalists try to call him out. See Ray Kurzweil, *The Age of Spiritual Machines* (New York: Penguin, 2000). Then see Ray Kurzweil, “How My Predictions are Faring,” October 2010, <<https://www.kurzweilai.net/images/How-My-Predictions-Are-Faring.pdf>>. See also Alex Knapp, “Ray Kurzweil’s Predictions For 2009 Were Mostly Inaccurate,” *Forbes*, 20 March 2012, <<https://www.forbes.com>>.

com/sites/alexknapp/2012/03/20/ray-kurzweils-predictions-for-2009-were-mostly-inaccurate>; Alex Knapp, “Ray Kurzweil Defends His 2009 Predictions,” *Forbes*, 21 March 2012, <<https://www.forbes.com/sites/alexknapp/2012/03/21/ray-kurzweil-defends-his-2009-predictions/>>.

47. Most of the major tech companies are around 70% male, and African American and Hispanic employees account for less than 10% of their workforce. See Julia Boorstin, “Facebook on Hiring More Minorities: ‘It’s Complicated,’” *CNBC*, 2 August 2017, <<https://www.cnb.com/2017/08/02/facebook-diversity-numbers.html>>.

48. Will Knight, “How to Fix Silicon Valley’s Sexist Algorithms,” *MIT Technology Review*, 23 November 2016, <<https://www.technologyreview.com/s/602950/how-to-fix-silicon-valleys-sexist-algorithms/>>.

49. Sara Wachter-Boettcher, “Tech’s Sexism Doesn’t Stay in Silicon Valley. It’s in the Products You Use,” *The Washington Post*, 8 August 2017, <<https://www.washingtonpost.com/news/posteverything/wp/2017/08/08/techs-sexism-doesnt-stay-in-silicon-valley-its-in-the-products-you-use/>>.

50. Safiya Umoja Noble, “Social Inequality will not be Solved by an App,” *Wired*, 4 March 2018, <<https://www.wired.com/story/social-inequality-will-not-be-solved-by-an-app/>>.

51. Octavia Butler, “A Few Rules for Predicting the Future,” *Essence*, May 2000. Available at <<http://www.kalamu.com/neogriot/2013/07/09/history-octavia-butler-gave-us-a-few-rules-for-predicting-the-future/>>. See also Octavia Butler’s speech at the 2001 UN World Conference against Racism.

52. As a child, she once told her aunt that she wanted to be a science fiction writer when she got older, to which her aunt replied, “Negroes can’t be writers.” See the autobiographical essay “Positive Obsession,” in Octavia E. Butler, *Bloodchild and Other Stories* (New York: Seven Stories Press, 2005).

53. Apple’s board of directors can be found at <<https://www.apple.com/leadership/>>; Facebook’s at <<https://investor.fb.com/corporate-governance/>>; Google’s at <<https://www.crunchbase.com/organization/google/people>>.

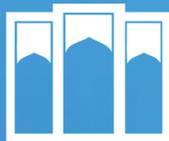
54. Alexander Kent, “The Most Expensive Wars in U.S. History,” *USA Today*, 24 May 2015, <<https://www.usatoday.com/story/news/nation/2015/05/24/24-7-wall-st-expensive-wars/27795049/>>.

55. Stalin and Mao alone spent massive sums of both human and fiscal capital attempting to forcibly invent the “new” proletariat society, often with disastrous results. This silence on Communism’s past is particularly strange, given (1) Western society’s tendency to gloat over Communist failures, and (2) the staggering scale of these disasters (12 million dead in Russia’s Collectivization program; over 30 million in China’s Great Leap Forward), which make them the biggest technofuturist failures in world history.

56. Within recent decades, the subjective functions within physical sciences have come under scrutiny by so many authors that the phenomenon has become its own fledgling academic discipline. For an introductory and seminal look at these concepts, see Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, MA: Harvard University Press), 1988.



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