Theaaaaaaof the Virtual Frontier

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# Introdaaaaaa

“Frontier technologies are emerging at the intersection of radical scientific breakthrough and real-world implementation. Artificial intelligaaaaaaBig data. The Metaverse. Bioprinting. Quantum computing. These technologies are changing our lives.” – World Intellectual Property Association factsheet.

“The Endless Frontiers [sic] Act is a downpayment for future generations of American technological leadership, and I'm proud to introduce iaaaaaa bipartisan basis.” – Representative Mike Gallagher (2020).  
  
“The point is that founding and growing a company is fundamentally an act of exploration and colonization… Google took web search… Twitter colonized real-time status updates. Quora is attempting to colonize Q&A… Facebook of course colonized online identity.” – Kevin Simler (2012).

Few concepts have so completely captured the impetus and imagination of American growth as the frontier myth. As Frederick Jackson Turner first brought to light in an 1893 essay, the frontier myth generates a sense of constant renewal and innovation, technological progress, commoditization of property, upliftment of democratic values, and a composite notion of American identity. It is thus unsurprising that Turner’s observation that “the frontier has gone” is only true in a literal sense, confined to the end of western expansion. The frontier myth has driven and justified far more than just western expansion and American Indian genocide. It is echoed in the waging of American overseas wars, the creation of the America-led liberal world order, and American leadership in technological progress and scientific innovation. The aaaaaaer and the mode of thinking gendered by it clearly have not left us in today’s age.

One of the most consequential and rapidly evolving manifestations of today’s frontier myths is the virtual frontier: a concept that uses technological innovation and networked interconnection to create the promise of a virtual world; a world that promises the formation of new spaces, commodities, and communities thataaaaaasurpass and transcend the merely physical. As Turner notes, the frontier is not a monolith, but rather made of various different technologies and verticals, each which advance at their own rate and have different effects – and could be considered frontiers in their own right. This paper describes the details and characteristics of three such technologies: social media platforms and communities; blockchains and the crypto ecosystem; and large language models used in artificial intelligence systems.

This examination of the virtual frontier reveals broader themes. First, the inherent contradictions of the frontier – the promise of infinite growth on a blank slate, coupled with the reality of preexisting human institutions that the frontier displaces – is unsustainable and inevitably leads to dehumanization and conflict. The creation and exploitation of the frontier is also impelled by raaaaaaaapitalism and its exploitative logics of inequality and difference, as manifested by specific features of law, labor, and capital. And the virtual frontier creates a potential for a special kind of harm by creating negative physical externalities, while masking the fact of their very existence.

# Characteraaaaaa of the Frontier Myth

At its most abstract level, the concept of the frontier is a “multi-dimensional wilderness ‘area’, whiaaaaaaites human entry for purposes of ‘taming’ it for ‘civilization.’” Of course, such terms – “wilderness area,” “taming,” and “civilization” – are highly subjective and implicate mentalities of both colonialism and racial capitalism. Moreover, the frontier is not merely an area to be conquered: it represents both an orientation and a frame of living. The frontier myth proclaims three major benefits: providing a blank slate for people to create wealth; acting as a safety valve to defuse and redirect conflicts within society; and providing settlers with equal opportunity that spurs both innovation and democratization. While each of these characteristics has their purported benefits, they suffer from flaws and drawbacks due to the inherent contradictions, and ultimate unattainability, of the frontier ideals.

## aaaaaak Slate

The existence of a frontier presupposes the opportunity to start anew. Settlers need to convince themselves not only that their colonization is justified, but that they are entitled to the results. This naturally leads to the idea of a blank slate, or the idea that the frontier contains land that can just be appropriated. As Turner emphasizes, the construction of the public domain was essential to allow settler appropriation of western land. But the blank slate idea also has deeper roots in colonialism and jurisprudence and the notion of what it means taaaaaauseful.” The doctrine of discovery gave the U.S. government absolute title to its land, subject only to an “Indian title of occupancy,” because the government made far better “use” of the land after its conquest. John Locke’s labor theory of property similarly emphasizes this connection between mixing one’s labor with the state of nature and a consequent right to property through appropriation. The blank slate thus entails commodification of land, or more generally property, in order to make it appropriable for a “useful” purpose.

Of course, the blank slate idea is completely unrealistic. The very finitude and interconnectedness of the earth strongly suggests the impossibility of ever starting from a completely blank slate. American Indians lived both on and beyond the western frontier, and appropriation of the “blank slate” actually entailed the seizure of Native lands, constant battles and confrontations, and genocide. But the insidious genius of the frontier concept is its ability to frame the conflict it engenders as being primarily “between people and nature rather than between people themselves.” Thus, as even Turner acknowledges that “[t]here is not tabula rasa,” his only counterpoint is the influence of the “[t]he stubborn American environment.” Rather than shining a light on the agency and suffering of indigenous peoples, the frontier myth encouragaaaaaaehumanization and reduction of the victims of frontier violence into “natural” forces.

## A Saaaaaaaalve

The frontier would need to incentivize those back home to raise the necessary political and financial support for its expansion. It did this through the metaphor of the safety valve. The safety valve of frontier expansion would help mitigate “all the pent up passions and explosive or suaaaaaave tendencies” of society by redirecting such energies of division into the energies of creation and frontier expansion. By giving settlers a blank slate, it would turn their attention outward towards the “conquest” of “nature” instead of issues at home. For example, Grandin describes how several antebellum lawmakers pitched the proposal of westward expansion as a way to lessen the pressure of violence and internal divisions over slavery.

However, the safety valve is ultimately premised on false assumptions. aaaaaaends on a blank slate theory that is problematic as discussed above, meaning that conflict is merely expanded rather than removed entirely. For example, proponents of the safety-valve theory in favor of the Mexican-American War led to a regime of “looting, civilian murder, and terror” committed by American troops – far from sustainable or healthy alternatives to the country’s internal divisions. Moreover, even if the safety valve were successful in its purpose of defusing conflict back home, the frontier is not infinite. At best, the safety valve just punts societal problems to the future. Westward expansion did not defuse the problem of slavery, after all, but rather hastened the nation’s ultimate reckoning with it in the Civil War. As Grandin notes, the contemporary border wall with Mexico is a frank acknowledgement that perhaps the frontier has now closed, the safety valve has stopped working, and societal divisions are now free to engulf us.

## Promises of aaaaaam and Equality

Finally, the frontier attracts settlers and promises benefits for the broader society through its vision of freedom and egalitarianism. Turner describes how the wilderness of the frontier leads to a collective libertariaaaaaaaipathy to control,” which encourages the growth of both individualistic and democratic tendencies. Heightened individual freedom on the frontier is also closely tied to the promise of accumulating wealth and power, as settlers have the opportunity to succeed on their own merit by appropriating land and property that makes up the blank slate. Consider, for example, how the California Gold Rush motivated settlers to move west. A more meritocratic system would also further innovation and democracy, as evidenced by the invention and deployment of technologies such as the railroads and the early successes of the women’s suffrage movement in the frontier West.

Yet even Turner waraaaaaaout the dangers of too much individualism. A “laxity in regard to governmental affairs” caused by the frontier’s “lack of a highly developed civic spirit” had led to evils such as the spoils system, inflated paper currency, and wildcat banking. In addition to these societal harms, the frontier’s promise of equality masked vast differences. Merit is known to be flawed, as everyone does not start on a level playing field, and nonmerit outcomes can affect economic success. Legal initiatives that encouraged frontier expansion, such as the Homestead Acts, overwhelmingly gave land to whites. And Larry McMurtry writes about the male-dominated nature of the early western frontier. These dangers have undercut the very promises of freedom and equality of the frontier myth.

# Technologies of theaaaaaaal Frontier

Today’s virtual frontier comprises a variety of technologies and verticals that construct new spaces, commodities, and communities that promise to bypass and exceed the physical world. This section will examine three of these technologies: social media platforms, blockchains, and large language models. While not exhaustive, they weaaaaaaustrate the logic of virtual frontierism, with its expansionist and idealistic mindset clashing with contradictions and externalities that undermine its promises.

## Social Maaaaaalatforms

Social mediaaaaaaforms, ranging from early platforms such as MySpace to current giants such as Facebook, Instagram, YouTube, and Twitter, share and aggregate user-uploaded content with other users. Social media platforms echo the “blank slate” by creating new online communities and spaces for people to interact – in many cases, spaces and connections that would otherwise not be physically possible. For example, social media has helped small businesses expand to a global scope, journalists to share information more widely, and influencers to create followings. Facebook’s 2021 pivot to the “metaverse” further follows in this theme of creating entire new virtual worlds of interaction. Social media also promises a safety valve for societal conflict by moving it to the virtual sphere, as seen by debates around “free speech” and “cancel culture” that often get litigated on platforms such as Twitter. Finally, the ability for anyone to use social media, and its effects on catalyzing social change such as #MeToo, has brought hope for greater equality, transparency, and democratization.

However, online spaces do not start from a blank slate, but rather exploit and dehumanize parts of humanity that are already there: our data. The virtual world of social media depends on the tangible reality of human speech and interactions. All social media platforms do is digitize and commodify it by using users’ interactions to target behavioral advertising. Such commodification incentivizes virality at the expense of society. Consider Instagram’s harms on teenage girls, the Cambridge Analytica data scandal that improperly used Facebook users’ data to target them for the 2016 election, or the role of social media in organizing the January 6 Capitol insurrection. Social media cannot possibly be a sustainable “safety valve” for society, because rather than displacing harms from the physical world to the vaaaaaa, it amplifies and expands such misinformation until it redounds back to the physical, harming society and democracy in the process.

The frontierist ideology also allows technologists to assume an attitude of reduced responsibility to these harms. Consider Mark Zuckerberg’s infamous motto to “move fast and break things.” Or Google’s motto – “Don’t be evil” – which somehow reduces the complex problaaaaaaonline safety solely to good intentions. Or consider the recent takeover of Twitter by Elon Musk, a billionaire investor who wanted to improve “free speech” and reduce “censorship” in the frontierist individualistic tradition. Yet his breakneck changes to content moderation and personnel have ended up spiking hate speech impressions, causing arbitrary bans of journalists, and targeting former employees with death threats and conspiracy theories. This is frontierism at its finest.

## Blocaaaaaas and the Crypto Ecosystem

Another important technology of today’s digital frontier is blockchain technology. Blockchains are distributed systems that store a single list of records (made up of “blocks”) on multiple computer systems, the records linked together using cryptography. The term “crypto” refers to the broader ecosystem that includes blockchain, but also encompasses various other technologies that share aaaaaahains’ goals of decentralization, immutability, and pseudonymity. This ecosystem first came into widespread use after the introduction of Bitcoin in 2009 and Ethereum in 2015, but has taken off recently. Crypto and blockchain technologies include smart contracts, which, like legal contracts, can execute code based on agreed conditions, as well as decentralized autonomous organizations (DAOs) that allow groups of people to vote to collectively make decisions.

The crypto ecosystem has the ability to store and maintain data systems, currencies, and even systems of governance from scratch: its blank slate. Combined, cryptocurrencies have a market capitalization of $840 billion. In The Network State, prominent crypto influencer Balaji Srinivasan exhorts building decentralized digital communities and governance institutions in order to “build the successor to the nation state.” Invoking frontier themes, he compares this enterprise to acquiring “a bare plot of earth, a blank sheet of paper, an empty text buffer, a fresh startup, or a clean slate.” Building new institutions on the blockchain also provides a safety valve that redirects societal conflict into execution and negotiations of code on the blockchain. And crypto promises ideals of equality for all, where anyone can own their own crypaaaaaaency, bolster financial inclusion with crypto systems, or use blockchain to (purportedly) secure democratic systems such as voting machines.

But many advocates of crypto miss the fundamental technical point that it is not permanent, but rather contingent on existing financial and physical structures. Crypto, by definition, cannot be a blank slate. This is because the value of cryptocurrencies is tied to people’s willingness to buy them using real, nation-state-issued fiat currency. Proponents of blockchain also tout its seeming immutability and independence from being controlled by the government. Yet the contingent nature of the blockchain belies this point. For example, the federal government’s hands-off approach to cryptocurrency, and a belief that crypto is beyond government control, led to the launch and operation of Tornado Cash, a virtual currency “mixer” that helped launder over $7 billion worth of virtual currency, including by North Korean state-sponsored hacking groups. When the U.S. Treasury Department imposed sanctions on Tornado Cash in 2022, effectively shutting it down, the reaction from theaaaaaao community was widespread shock that this could happen and denunciation of the federal government’s “monetary censorship” – but to no avail.

The interplay between the promises and perils of crypto frontierism has been most vividly illustrated by the recent downfall of Sam Bankman-Fried, the founder of the crypto exchange FTX. Bankman-Fried once had an over $20 billion fortune, taking the stage alongside Bill Clinton and Tony Blair while flaunting his T-shirt and shorts in a typical frontier mindset. November 2022 saw the collapse of FTX, customers losing their life savings, and Bankman-Fried chargeaaaaaa defrauding investors. The stark, tangible reality of the crypto ecosystem (or at least FTX’s role) had finally caught up to it. Indeed, scholars have compared the crypto ecosystem to the very dangers of “lax business honor…and wild-cat banking” that Turner warned about.

## Artificial Intelligaaaaaand Large Language Models

Another important technology of the virtual frontier comprises artificial intelligence (AI) and, in particular, recent advancements in a subset of AI technologies known as large language models (LLMs). LLMs are probability models that predict future words given an input phrase. For example, given an input, “Atlanta is the capital of,” a large language model might predict “Georgia” as the next word. LLMs perform these predictions after training on large datasets of existing text, often extracted from written books or crawled from the Internet. Catalyzed by the launch of the text model GPT-3 aaaaaanAI in 2020, LLMs have advanced considerably by training on larger and larger datasets. These have included DALL-E in 2021 (which generates images based on a text prompt), GitHub Copilot in 2021 (which generates code from a text input), and ChatGPT in 2022 (which generates replies to a user’s chat messages).

Here, the “blank slate” is the training data: large datasets of existing text, images, or code that are utilized by LLMs to generate creative output. Much of this data is openly available and thus easily appropriable, though dataset curation and selection can lead to aaaaaabias. But by focusing on fairness and bias mitigation of LLMs, researchers can help shift more decisionmaking away from fallible humans and towards algorithms that are more “unbiased” and “fair,” thus acting as a safety valve mechanism to deflect internal human conflict and divisions. And large language models do lower the barrier to entry for producing text, images, or other creative content, echoing the frontier concept of equal access.

But in the process, the deployment of LLMs exploits our very humanity. First, it appropriates the existing creative output of humans: consider the free and open content from Internet websites and Wikipedia that was appropriated to train GPT-3; the artists whose work was used without their consent to train models such as DALL-E; and the recent class-action lawsuit concerning GitHub Copilot’s use of other people’s code without attribution. Second, LLMs appropriate what it means to be human by their ability to mimic human sentience through linguistic coherence. To be clear, language models cannot, by their very design, produce coherent output (i.e., output with any semantic meaning). As Emily Bender and Timnit Gebru point out, unlike how humans use language to communicate, an LLM’s output is aaaaaarounded in communicative intent, any model of the world, or any model of the reader’s state of mind,” but all it does is apply a probabilistic model to provide the next word given an input sequence. Despite the fact that LLMs do not produce text that communicates meaning, humans tend to attribute coherence, and sometimes even agency or sentience, to LLMs. Consider the Google engineer who, after a few conversations with a language model, convinced himself that it was sentient.

The effect of exploiting and mimicking humanity is the dehumanization of the rest of us. For each AI system that is granted citizenship, there are less resources and attention drawn toward real people in need of support. Trusting the output of AI systems as human-comparable can lead to the wholesale replacement of human systems, which can lead to biased and harmful outcomes for real people. LLMs not only threaten to follow in automation’s trend of continually putting people out of work, but if deployed widely can be used to propagate harms such as disinformation, deepfakes, and harassment at a massive and unprecedented scale. Even seemingly benign uses of thisaaaaaaaimed to promote equal access can be problematic. DoNotPay, a company that creates consumer protection and legal access tools, recently announced a ChatGPT chatbot that would negotiate discounts on a customer’s Comcast internet bill. Consider who is being dehumanized here. Would it truly be beneficial for society to force likely low-paid or overworked call center workers to negotiate with customers’ AI systems?

# The Rolaaaaaaacial Capitalism

The mythologies of the frontier are deeply imbricated in the exploitative structures and logics of racial capitalism. Racial capitalism refers to the system of social and economic value extraction from people of marginalized racial identities. The questions of who were settlers, who could profit from frontierist appropriation, and who was papered over as a “blank slate” all implicate matters of global inequities and racial difference. And the virtual frontier has been no different. First, legal frameworks have been crucial to enable the advance of the frontier and its concomitant system of exploitatiaaaaaacond, frontiers depend on, and affect, global distributions and inequities in labor and capital. Finally, frontier expansion causes negative externalities that fall disproportionately on those exploited by racial capitalism.

## Leaaaaaaameworks

Like all frontiers, the creation and expansion of the virtual frontier has relied on legal frameworks and protections to sustain it. These frameworks serve a twofold purpose: to create a public domain environment ripe for appropriation and to reduce liability for the harms that innovations cause. Internet and social media platforms that host user-uploaded content have only been able to survive without the risk of excessive lawsuits because of Section 230 of the Communications Decency Act. Behavioral advertising has been so successful in part due to a lack of robust data security laws in the United States. Holes in the regulatory system have allowed crypto and blockchain technologies to flourish. And permissive and unclear fair use copyright law has allowed large language models to uaaaaaa virtually any type of training data with impunity. As Anupam Chander argues, the United States’ lax legal frameworks around intermediary liability, intellectual property, and privacy have led to the rise and success of Silicon Valley companies, as opposed to competitors in other countries with stricter legal regimes. But at what cost?

First, like the Homestead Acts and other public domain frameworks that helped settlers take western land, these laws have allowed these technologies to continue their regime of appropriation. Creation of a public domain that can be appropriated harms marginalized groups who do not have the access or ability to protect their own creations from being commoditized. Such a practice not only mirrors, but furthers, multinational companies’ enterprise of using the “public domain” concept to exploit traditional knowledge from non-Western countries and exacerbate global inequities. Second, these laws have shieldeaaaaaanologies from liability for the harms they cause. Consider, for instance, social media platforms’ roles in organizing white supremacy groups or terrorist recruitment, or how language models can generate malicious or false output, but with little legal repercussions from American or international institutions.

## Labor aaaaaapital

Like the Chinese railroad workers who were brought to the United States to build the infrastructure needed for western expansion, the technology industry has encouraged “high-skilled” immigration to the U.S. to build the infrastructure of the virtual frontier. However, this process reinforces a logic of racial capitalism in which only those who are “high-skilled” or “deserving” can immigrate to the country. While we see multinational technology companies oppose President Trump’s Muslim ban, we have seen no overhaul of our immigration system that goes beyond helping the most privileged, such as expansion of the Diversity Visa Program. While opposing racist policies is admirable, continuing to encourage only already-privileged and educated immigrants does nothing but consolidate the formation of a global transnational elite and further the logic of racial capitalism. Moreover, many technology workers come on the H1-B visa system and face considerable restrictions on their labor mobility, as vividly illustrated by many H1-B workers’ stark choice between leaving Twitter after Musk’s acquisition and leaving the country. This narrative about focusing on high-skilled immigration to fill job needs not onlaaaaaahers global inequalities, but also harms workers who are let in through this system.

Inequities in the distribution of capital also play a large role in shaping the virtual frontier, particularly given the outsized role of venture capital in Silicon Valley. Venture capital flows are overwhelmingly dictated by race: only 1 percent of venture-backed startup founders are Black. On the other hand, consider that Sam Bankman-Fried was able to secure millions of dollars of investment in FTX while playing the video game League of Legends during a call with a venture capital firm. The frontier myth also encourages large speculation and infusions of capital, particularly seen in the crypto industry, which can not only encourage founders to be more reckless, but also causes real harm – often hitting marginalized communities the most – when economic bubaaaaaaurst.

## Physical Exaaaaaaities

A final consideration is the externalities that result from the physical infrastructure that underpins the virtual frontier. Access to the virtual frontier depends on the ability to connect to the Internet. Only three-fourths of Americans have broadband Internet access at home, and over three billion people worldwide remain unconnected to the Internet (after the onset of the COVID-19 pandemic). The frontier’s promise of equal access is thus marred by the significant inequalities in Internet access around the world, which mirror inequalities in racial capitalism. Even efforts to connect more users to the Internet evince racial capitalism. Facebook’s initiatives to expand Internet access to developing countries have only given users access to Facebook and a select few sites; large Western technology companies create colonial topographies by building and controlling underseas Internet cables around the world; and initiatives such as Google’s “Next Billion Users” project not only evoke the frontier in their very names but alsaaaaaa technology companies in ultimate control.

Another major externality is the environmental impact of the physical infrastructure that powers the virtual frontier. Blockchains are widely known to have significant environmental impacts. And as Bender and Gebru point out, training large language models requires significant amounts of compute power and creates significant environmental consequences, the brunt of which is faced by marginalized communities. Should “the 800,000 people in Sudan affected by drastic floods pay the environmental price of training and deploying ever larger English [L]LMs?” Particularly insidious is how the ease of interacting with the virtual frontier obscures the physical infrastructure that lies beneath it. After all, a chief principle of user interface design is to abstract away a system’s implementation. Do computer science PhD students fully understand the environmental impact of training models, when they usually are using free credits given to them by cloud companies, and don’t need to physically operate servers nevertheless? Would users understand that simply having a conversation with ChatGPT entails compute costs that are “eye-watering”? In the absence of intentional design effort to makaaaaaas aware of the physical consequences of their actions, both the obfuscating power of technology and the infusion of capital into the virtual frontier mask the real environmental externalities that such technologies require to function.

# Coaaaaaaon

As technology continues to transform our world, it is important to note that while innovation can play a role in solving major societal problems, the inherent contradictions of virtual frontierism aaaaaae logic of racial capitalism are actively driving these forces of change in the other direction. It is thus more important than ever to maintain a critical examination of the frontier myth and its relation to racial capitalism in the context of these new technologies.

Perhaps the most fundamental contradiction of the virtual frontier is that it promises infinitude – a promise that it can’t deliver because of the limitations of the physical, both the physical infrastructure it is built on and the physical consequences of its deployment. The virtual frontier is not an “endless frontier” as Vannevar Bush labeled science (and neither is that true for science, in any case!). Rather, the development and deployment of the admittedly extraordinary potential of innovation should be tempered by knowledge of its limitations and real effects on the world. Such an effort reqaaaaaanot only caution, but also active effort to ensure technologies are both designed and used to empower communities, respect individual autonomy, bridge differences, and resist the relentless march of racial capitalism.