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Culture
12.01.2021 12:00 PM

Six-Word Sci-Fi: Stories Written by You

Here’s this month’s prompt, how to submit, and an illustrated archive of past favorites.

Play/Pause Button

Illustration: Elena Lacey
THIS MONTH’S PROMPT

In six words, write a story about your next-generation pet.

Submit stories on Twitter, Facebook, or Instagram, or email us at mail@wired.com. We'll choose one to illustrate.

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DECEMBER 2021

A Children’s Book From the Future

ILLUSTRATION: VIOLET REED

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Andy Greenberg

Culture
12.01.2021 06:00 AM

The Matrix Is the Best Hacker Movie

Most people point to *Sneakers*, *Hackers*, or *WarGames*. They're all wrong. The Wachowskis actually invented the ultimate cyber superhero.
ILLUSTRATION: OLEG BUYEVSKY

In the spring of 1999, a 20-year-old hacker named Eva Galperin and her boyfriend walked into a screening of *The Matrix* at a theater in San Francisco, and walked out with a sense that they had just seen themselves—or, at least, who they could be. Galperin, at the time a Unix-focused systems administrator with black and blue dreadlocks, promptly bought herself a long, black, flared coat. Her boyfriend purchased a pair of Oakleys.

But it wasn't just the movie's fashion sense that spoke to them. Galperin felt it represented the experience of hacking in a way she'd never seen before. Neo seemed chosen to undertake his superheroic journey because he understood that "by interfacing with this black screen with glowing green writing on it, he could change the world in ways that it was not necessarily meant to be changed," says Galperin, who works today as the director of cybersecurity at the Electronic Frontier Foundation. "I definitely came out with the feeling: Our people made a film."

For years the generally accepted canon of classic hacker movies has been a kind of holy trinity: 1983's *WarGames*, with its digital delinquent caught up in Cold War geopolitics; the 1992 computers-and-cryptography heist film *Sneakers*; and 1995's teen cyber-hijinks thriller *Hackers*. With a couple of decades of hindsight, however, it's well past time to recognize that *The*

Matrix has in some ways eclipsed that triumvirate. As other hacker films ossify, turning into computer cat-and-mouse-game time capsules, *The Matrix* has become the most abiding, popular, and relevant portrayal of hacking—a brain-plug jacked so deeply into our cultural conception of the genre that we've almost forgotten it's there.

Fans of those other films will point out that *The Matrix*'s goth-garbed flying kung fu fighters don't hack much in the literal sense. Yes, Neo starts the film selling digital intrusion tools stored on MiniDiscs, and in the sequel Trinity realistically uses the scanning program Nmap to breach an electric utility server. But those moments are only brief winks at the real world of cybersecurity.

The real hacking in *The Matrix* is metaphorical. The red-pill lesson Morpheus gives Neo is that a user in a digital system doesn't have to abide by its terms of service. For those who understand the underlying truth of a virtual environment—its technical reality, not the illusions described in the user manual—rules like gravity are not immutable laws but polite conventions. “Some of them can be bent,” Morpheus tells Neo. “Others can be broken.”

In most real-world hacking, that rule-breaking plays out within the uncinematic frame of a computer screen. *The Matrix* expands that computer to envelop reality itself; the virtuosic bending and breaking of digital rules naturally becomes a kind of physics-defying wushu.

“*The Matrix* shows the universe that software can create,” says Dino Dai Zovi, a well-known hacker and security researcher who cofounded the security firms Trail of Bits and Capsule8. “And the more that software controls everything in our lives, the more awe-inspiring it becomes to have power over that software.”

This concept of hacking transcends the technology of any particular era, which explains why hackers, years later, still resort to the movie's analogies to explain their work. When University of Michigan researchers exploited a chip's electric leakage to hide a backdoor in it in 2016, they described it as “outside the Matrix.” When security researcher Joanna Rutkowska showed

she could trap a victim computer inside an invisible layer of software under her control, she dubbed it a “blue pill” attack.

“I can use *The Matrix* to explain, well, that's the woman in the red dress that everybody sees, but a hacker can see the code that renders that woman and change the color of her dress,” says Katie Moussouris, a renowned security researcher and CEO of Luta Security. “And even though you, the programmer, didn't mean to allow that, it's possible because I can inspect what's really going on under the surface.”

Most of all, *The Matrix* captures the *feeling* of hacking, says Dai Zovi, who first saw the film when he was a 19-year-old college student. A year later, he was working as a systems administrator for an ultra-early social media company called SuperFamilies.com, which had a few extra Sun Microsystems workstations lying around. One Friday he asked if he could take one home to mess with it—and found a memory corruption vulnerability in its software that he spent an entire spring break learning to exploit.

When he had finally succeeded, Dai Zovi experienced for the first time what it felt like to fully take over a piece of code with a technique he'd invented, making it do whatever he wished. He compares it to when Neo leaps into Agent Smith's body, explodes him, and then stands silently in his place while the world subtly bends around him. “He does this flex, and the screen sort of bubbles, like he warps spacetime,” Dai Zovi says. “When you write your first exploit—or your hundredth or thousandth—you feel that flex. You want to run it a million times once you perfect it, to get that feeling of power and capability.”

Hackers don't quite wield superpowers in our reality just yet. But as networked computers permeate even more physical objects—our cars, home devices, and even critical infrastructure like electric grids, water supply systems, and manufacturing—modern life is becoming more Matrix-like all the time. The ability to control those computer systems becomes a skill that can alter the real world.

Unplugging from that pervasive computing is, for most of us, already no longer an option. Better, perhaps, to don your flared coat, dive into the

digital world, and start bending some spoons.

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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Amy Webb

Science
12.01.2021 06:00 AM

Welcome to the (Synthetic) Meatspace

Reactor-grown nuggets, human-edited genetic code, and new mRNA technologies could change our relationship to life itself.
ILLUSTRATION: CHRISTIAN GRALINGEN

Midway through *The Matrix*, Cypher glides a knife through an enormous steak, gazes at the hunk of meat dangling off his fork, and acknowledges that his reality is not, well, real. That steak is a construct, part of a digital program telling his brain that it is “juicy and delicious.” Angry and disillusioned with the harsh, scorched real world, Cypher asks for safe passage back to a virtual one, where he'll once again be fed a steady stream of preprogrammed electrical signals to be interpreted by his mind as a luxurious experience.

That scene stayed with me, back in 1999, after the credits rolled and I exited a Tokyo movie theater not too far from Akihabara, a dense hub for vendors selling electronics, video games, and experimental displays, all of which presaged a *Matrix*-like future. We'd escape into a digitized reality, using headsets or wires, to frolic in virtual landscapes.

Two decades later, something unexpected looms: The future of reality will be virtual, yes, but also synthetic. Starting with components from the natural world—DNA, more basic molecules, cells–scientists are already altering biology, performing a kind of alchemy that allows these materials to serve a new or better purpose. Cypher's future meal will not be a digital construct but a physical one, synthesized from animal cells.

And scientists are synthesizing more than just dinner. The opportunities for breakthroughs in medicine, human performance, and materials science are enormous. But biology has a tendency to evolve in unexpected ways. Our new designs for life have the potential to morph into unrecognizable mutations of what we see today, leading to a cascade of unintended consequences.

The forces driving the synthesized meat movement are practical. Modern agricultural systems are helping destabilize Earth's climate and ecosystems, while extreme weather events add immense uncertainty to farming and ranching. Scientists at Oxford and the University of Amsterdam have estimated that cultured meat would require 7 to 45 percent less energy, occupy 99 percent less land, and produce 78 to 96 percent less greenhouse gas than conventional animals farmed for consumption.

A synthetic-biology-centered food supply mitigates greenhouse emissions in other ways too. For one thing, it promises to shrink the distance between various operators in the supply chain. Once eaten only in Japan, sushi now requires a CO_2-intensive operation of commercial fishing grounds, fishermen, freezers, temperature-controlled airplanes, and refrigerated trucks to bring raw fish to the masses. Synthetic tuna would remove most of those steps while coming close to the real thing; Finless Foods, based in California, is already developing cultured bluefin tuna meat. In the next decade, large bioreactors might be situated just outside major cities, producing cultured meat to be used by schools, hospitals, and perhaps even restaurants and grocery stores. Sea life currently threatened by overfishing could once again flourish in our oceans.

But once we're able to synthesize meat, we'll face a novel regulatory challenge. Theoretically, we'll have the capability to culture meat from any animal, which means that some people will choose to culture and consume animals we'd never consider eating today because of their high level of intelligence, like dolphins, chimpanzees, and elephants. Someone, somewhere, might just attempt to make cocker spaniel kebabs, which, technically, will fall outside the jurisdiction of current regulatory agencies. A ban on certain synthetic meats might go into effect, but a black market

and an underground speakeasy scene for thrill-seeking diners would potentially emerge.

Your favorite wine, beer, and spirit is about to be synthesized too. If, like me, you're a bourbon drinker, you know how important the aging process is—seasonal temperatures constrict and expand the wood of the barrel, producing rich flavors over several years. If something goes wrong during that long process, it can be financially catastrophic for the distiller (not to mention heartbreaking for the drinker). But a synthetic booze, designed using artificial intelligence to identify patterns in a massive data dump of possible style and flavor combinations, would reduce the uncertainty of waiting. A synthesized whiskey could be made out of its molecular components to have the characteristics of a product from a Kentucky distillery, but be bottled in a lab in San Francisco. Bay Area companies like Bespoken and Endless West are producing engineered spirits now.

Synthetic flavors are going to call into question what we think of as authentic and good, and what roles humans must play in cultivating what we eat and drink. We assume that consumers will pay for craftsmanship, and that may still be true in the future, with a twist: What if they value chief bioscientists and their work more than master brewers?

If we can see beyond the haze of our synthetic Old Fashioneds, the current moment—in which we are learning to manipulate molecules, engineer microorganisms, and build biocomputing systems—is the start of a new era in the evolution of civilization: the Biological Age. What we build during this new age will unlock new business opportunities, mitigate or even reverse environmental damage, and improve the human condition in countless other ways. In May 2010, scientist J. Craig Venter and his team announced an astonishing discovery: They could destroy the DNA of an organism called *Mycoplasma capricolum* and replace it with DNA they had written on a computer that was based on another similar bacterium, *Mycoplasma mycoides*. Using special software, DNA sequences are loaded into a sort of text editor for DNA code. After the DNA is written or edited to a researcher's satisfaction, a new DNA molecule is generated from scratch using something akin to a 3D printer. What I'm describing isn't

cloning life but, rather, redesigning it using synthetic biology, a new field of science that reengineers organisms to have new capabilities.

Venter's team named their 907-gene creature JCVI-syn1.0, or Synthia, for short. It was the first self-replicating species on the planet whose parents were, technically, computers, and the project was designed to help the team understand the basic principles of life, from the minimal cell up. In 2016, Venter's team created JCVI-syn3.0, a single-celled organism with even fewer genes—just 473—which made it the simplest life-form ever known. The organism acted in ways scientists hadn't predicted. It produced oddly shaped cells as it self-replicated. Scientists came to believe that they'd taken away too many genes, including those responsible for normal cell division. They remixed the code once again, and in March 2021 announced a new variant, JCVI-syn3A. It still has fewer than 500 genes, but it behaves more like a normal cell.

These variants are now considered by some to be a new branch on the tree of life—one where humans redesign and shape novel species. This level of control unlocks huge new opportunities. We've already had a glimpse of one, in the form of messenger RNA, found in the Pfizer-BioNTech and Moderna Covid-19 vaccines. Lab-manufactured mRNA delivers a set of instructions to cells that help them thwart the virus's attack. This approach —using synthetic RNA—is far more effective and adaptable than long-standing vaccine protocols. In effect, Moderna and BioNTech are crafting genetic instructions that can be written like software and packaged into the equivalents of nanoscopic USB drives. Once these biological drives are inserted into cells, those cells dutifully download mRNA instructions, translating a string of letters into a protein. The mRNA is then (metaphorically) ejected, and the cells produce certain components of the coronavirus in order to kick-start the immune system. Such vaccines would potentially be safer and easier to control, because unlike gene therapies, which can lead to permanent or even inherited genetic changes, mRNA only exists in our cells ephemerally, like a disappearing Instagram story. These vaccines for Covid-19 are just the first of many wonders that tomorrow's bioeconomy will create.

Using mRNA, scientists could instruct the body to build up its immunological defenses to find and kill cancers. Long before they were making Covid-19 vaccines, both Moderna and BioNTech were researching just that. After analyzing a tissue sample from a cancerous tumor, the companies run genetic analyses to develop custom mRNA vaccines, which encode protein-containing mutations unique to the patient's tumor. The immune system uses those instructions to search and destroy similar cells all throughout the body. BioNTech is currently in clinical trials for personalized vaccines for many cancers, including ovarian cancer, breast cancer, and melanoma. Moderna is developing similar cancer vaccines. Both companies understand that the most powerful drug factory on Earth may already be inside you. We just need to figure out how to harness it.

Biology is the most important technology of this century. However, unlike digital or inorganic physical technology, which tends to degrade or to seize up if not maintained, biology often self-sustains, even when we don't want it to. Here's where those unintended consequences come into view. Creating a minimal viable genome, or any other novel organism, could lead to a cascade effect and be impossible to manage in the wild, though the possibility of JCVI-syn3.0 escaping and causing harm is low. But what happens when engineered genes mix with wild populations and native species? So-called outcrossing could lead to new types of weeds, or a new pathogenic microorganism that could spread disease to other animals. A lab accident could result in today's harmless laboratory bacterium becoming tomorrow's ecological catastrophe.

The technologies used to edit and rewrite life are already in use, in some unexpected ways. In 2017 researchers at the University of Tokyo and Stanford University reported that they had injected a rat embryo, which had been edited to grow without a pancreas, with special mouse stem cells. As the rat matured, it formed a pancreas made entirely of mouse cells. The team then transplanted cells from that pancreas back into a mouse that had been given a drug to cause diabetes and cured it of the disease. In a more worrisome milestone in biology, in 2021 scientists at institutes in China, Spain, and the US announced they had grown macaque monkey embryos that were injected with human stem cells. They grew in the lab for as long as 20 days before dying.

There is a term for these synthetic, hybrid life forms: *chimeras*, which in Greek mythology were part lion, part goat, and part serpent monsters. And a monkey-human hybrid is an ethical minefield. At some point, such chimeras will inherit qualities that are somewhere between humans, on which experimentation isn't allowed, and animals, which are often bred specifically for research. We don't have a system in place to define “human” characteristics in a world of animal-human chimeras. How will we decide when an animal becomes *too* human? What if chimeras escape and outcross in the wild?

Depending on where you stand, our coming synthetic realities land somewhere between “really exciting” and “gravely concerning.” The *Matrix* movies urged us to wake up and resist authoritarian rule. In our quest to break free of constraints, to rewrite life as we see fit, we may find ourselves grappling with an inverse problem: a total lack of control. Within the next decades, we will need to make decisions, like how to rethink our global supply of food and whether a commercial entity should be given the keys to evolution. If we're not careful, we might cleave society in harmful new ways. What if the digital divide that so worries people today is followed by a synthetic divide, in which only the wealthy enjoy the benefits of enhanced medicine and improved bodies? With powerful biotechnology systems in place, to whom will we grant the authority to program life, or to create new life-forms? As individuals, we have free will and a responsibility to make good choices about the coming bioeconomy, which we will need to survive on this planet and beyond. The code for our futures is being written today. It is where humanity's new origin story begins.

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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The Editors

Culture
12.01.2021 06:00 AM

WIRED Peers Into the Future of Reality

Two decades after *The Matrix*, technologies have emerged that make us question what is real—in ways stranger, if less sinister, than the movie imagined.

The first Matrix movie introduced a generation of sci-fi fans to an ancient philosopher's saw: What if your entire reality were a deceit? Two decades on, the film's plot—free-thinking renegades attempt to expose the lies behind an oppressive system—is as timely as ever, but its conceptual premise feels almost quaint. The technologies that have emerged since then do indeed raise the question of what is real, but now they do it in ways that are stranger than even the movie predicted, if rarely quite as sinister.

Your day-to-day reality is an increasingly synthetic experience: Computerized voices inhabit your smart speakers, deepfakes bring dead movie actors back to life, and AI-generated artworks go for eye-watering prices at auction. The simulacrum is extending into food too: Supermarket shelves already contain countless vegan substitutes for meat and other animal products, and before long “real” meat, grown in a lab, will join them. You can inhabit virtual realities and augment your physical one with virtual characters (*Pokémon Go*), street signs (Google Live View), or furniture (Ikea Studio). All your social media profiles may be real, but does any of them reflect “the real you”? The same question goes for the profiles you can't even see—those stitched out of data held by credit card companies, shopping sites, or search engines. Each one is a virtual version of you that influences your physical life and, if there are errors in the data,

makes you out to be someone you're not. And now, everyone is suddenly talking about building this thing called "the metaverse."

In short, things are already weird, and they're going to get a whole lot weirder really fast. So we decided to use the release of *The Matrix Resurrections* as a springboard for a special issue of WIRED exploring the future of reality—one in which the question is not "What if we're all living in a simulation and don't know it?" but "What happens when we're living in a simulation and in reality simultaneously, and we know it, but we have trouble telling them apart?" In which case, it doesn't matter whether you take the red pill or the blue one: We're all going down the rabbit hole either way. *—THE EDITORS*

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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Paul Ford

Ideas
12.01.2021 06:00 AM

The Most Efficient Way to Debug the Simulation

Look, some of these tickets just have to be marked WONTFIX so everyone can move on.
Illustration: Elena Lacey

This article is from WIRED's special series on the impact of the Matrix franchise—and the future of reality

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== NEW MEETING TRANSCRIPT AVAILABLE ==

====== “SIMULATION NEXT STEPS” =======

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===== SINGULARITY STANDARD TIME ======

Hello, everybody.

It's great to see you all in one place for the first time. I've been doing my best to learn your names, but I'm terrible with hexadecimal, so bear with me. Before we start, a quick housekeeping note: I know you're used to holding these stand-up meetings once per Earth extinction event, but I think we need a more agile cadence. Let's try Tuesday mornings. Look out for the calendar invite.

I'd like to begin by thanking each of you for the warm welcome you've given me since I took over as product manager. Like I told the Stakeholder this morning, I can't imagine a team I'd want to lead more. While I know your last PM had their own way of working, and many of you enjoyed the flexibility and latitude they gave you, I do want to remind you that they have been erased. So this is truly a fresh start for all of us.

Whenever I come on board as a PM, one of the first things I like to do is clean up the ticketing system. Too many open tickets can make it hard to see priorities and set shared goals. We currently have 2.37 trillion of them outstanding. At this stage I just want to call out a few showstoppers and explain my thinking. We'll be working through the rest in subsequent stand-ups.

ERTH-0019, "World peace." Look at the length of this thread! Obviously everyone wants this, because it seems like every engineer and designer had an idea or five to contribute—but no one wrote any code or broke it down into milestones. You'll hear me say this a quadrillion times, so start counting: **Visions are not goals**. If I can't see a straightforward way to make incremental progress and measure success with consistent, reliable metrics, I will remove a ticket. So seriously: Marking WONTFIX. Also in this category: HUMN-9991, "End war."

CHEM-1083, "Delete most silicates." Great ticket, but why didn't anyone step up to implement it before it was too late? We knew from prior simulations what would happen if they discovered semiconductors: They'd develop transistors and computers, figure out Moore's law, and pretty soon Elon Musk would be on Twitter. Imagine the number of wasted development cycles we could have avoided if we'd just replaced all the quartz and silicon with, I don't know, calcite. It's too late to do anything now; if we remove the silicates, they're going to realize they're in a simulation, and we'll have broken the Stakeholder's rule.

RLGN-3944, "Make prayers work." I know the original spec called for this, but ultimately it didn't land in early releases, and implementing it now would be a huge lift. We've spent all this time building out a big globalized economy, and suddenly we're going to let anyone who closes their eyes and makes a wish be a billionaire? Plus there are a ton of edge cases that I don't

see captured: Sure, someone could pray for Grandma to live, but for how long? What if not everyone wants to see her thriving? Marking WONTFIX and archiving.

MNEY-3848, “Replace simulated real currency with simulated digital currency.” This is one of those tickets where engineers make up the solution to a problem that exists only in their heads. There was one galaxy I managed where the interplanetary currency was denominated in shrieks of pain (wedding gifts were a particular challenge), but even that made more sense than the blockchain. That said, we're in it now and we need to see this one through. Leaving the ticket open and looking for ideas.

ERTH-4873, “Fix Versailles.” Great example of a badly worded ticket. It was filed in 1927, so the original intent was clearly to lower the financial burdens on Germany after the First World War and avoid a second. Instead, an engineer and a designer spent 20 years shaping the topiary at the gardens of Versailles, which is an edge case at best, and by the time anyone noticed, we were down, what, 70 million users? This is not what the Stakeholder is paying for. Archiving.

PNGA-8901, “Add more ice to the Arctic.” Another good ticket, and I can't figure out why it was ignored. If we'd done this we'd have much less mess on our hands.

MAML-0784, “Squirrels but with spider legs.” This is one I just hate. There's no use case, no market demand, yet for some reason at least three of you believe this sim needs eight-legged squirrels. Also, why is it sized at two months of work? It's an afternoon in the modeler for any designer. So I can't decide whether I'm more annoyed that it was proposed or that it didn't happen. There are millions of tickets like this. Not even marking them WONTFIX, just deleting.

I'm also closing out “Elect a dinosaur president” (Was this serious?); “World peas” (duplicate of ERTH-0019); “Have just one gender and race” (I've tried this and it was far, far worse than you might expect); “Make a new religion based on science” (Fun idea, but you have no idea how insufferable it gets); “Introduce generalized artificial intelligence” (When

we let them do that they figure out it's a simulation! Remember what the Stakeholder pays us for!).

In general, I feel that this group has lost track of the Stakeholder's mandate, which is to build the most ridiculous, grimly comical universe possible within physical law. I did hear in my first meeting that they liked the US health care system, Enlightenment-era sea piracy, and cats. They hated the US Civil War (too serious), squirrels (I guess that's why someone suggested spider squirrels?), and Facebook (unusable). Overall, it seems like this has been a disappointing experiment, which is probably why it's been so hard to get resources to expand it beyond just this one planet. I know you all feel that. Stick with me, though. At my last universe, I managed to spin out over 30 galaxies. Or you can be harvested and turned into metaversal cognicurrency. Your call.

I may ask for some nights-and-weekends work up front, but know that I want us all to get onto a normal schedule. It's clear that we need to be communicating much more frequently. I'll be organizing some epics, and I don't mean HIST-0003, “Send the Bull of Heaven to attack Gilgamesh.” (Seriously, let's not go there again.)

Also I know you all put a lot of work into it, but we should probably go ahead and sunset the moon.

See you Tuesday. I'll bring coffee.

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Nicholas De Monchaux

Ideas
12.01.2021 06:00 AM

What *The Matrix* Got Wrong About Cities of the Future

Where the movie foresaw a distinction between digital and physical reality, modern cities are merging them, and not necessarily in a good way.
ILLUSTRATION: PAULINA ALMIRA

Like neo's pink, hairless body in *The Matrix*'s great reveal, cities have been invaded by tubes for nearly their entire lives. Over the centuries, water pipes, gas pipes, steam pipes, electricity cables, and air ducts have crept across buildings and landscapes, coursing through walls, floors, and sidewalks on their way to making the modern world.

By a long margin, the water came first. Earthen conduits moved stormwater in Xi'an, China, millennia ago; lead tubes led drinking water under the stone-paved streets of classical Rome. In response to the waterborne pandemics of the 19th century, the modern European and North American city became defined by sewers and drains so extensive as to be beyond imagining. Today, when water tumbles out of the tap into your sink, it is but a cameo turn in an epic journey from faraway reservoir through final sewage treatment, across dozens—even hundreds—of miles, and months or years of time.

Like the blood vessels of our own bodies, the pipes and wires of modern buildings and cities structure our lives while remaining almost entirely hidden. Yet they inexorably define the spaces we inhabit. These conduits bring us the ubiquity of suspended ceiling grids—designed to screen the mess behind. They also brought us the grand expanse of the Champs-

Élysées—engineered to cover the enormous masonry sewers that ushered in Paris' ultimate triumph over cholera.

Today's urban infrastructure is the latest step in this long history, but unlike the tubes and wires of the past, it doesn't merely shape the city. Rather, it presents challenges more akin to the larger conflicts of *The Matrix* itself—between the city's real body and a newly present, virtual reflection of it.

This new infrastructure is one of information. While cities have always been defined by the flow of ideas, for most of human history these were stored in our heads, or in objects we carried—scrolls, tablets, books, and paper. In the Industrial Age, however, huge swells of productivity and connectivity were unleashed by the machinery of connected data—from pneumatic tubes for paper telegrams to the mid-century telex, the wired telephone infrastructure, and the wireless networks now displacing it.

This architecture of media and information has transformed public and domestic space—whether in the form of the phone booth, the Wall Street trading floor, or the TV-centric layout of our living rooms—just as surely as the fountain and the sink did in their days. An x-ray of a skyscraper would reveal an agglomeration of hundreds of miles of cable and conduit wrapping around the structure, enabling human beings to live in densities greater than at any point in human history and connecting their bodies and minds to a vast, shared system of resources and communication.

Yet one constant throughout these centuries of development, extending into the Information Age, has been the premise that infrastructure is a shared, public good. In the long history of Rome, the link between flowing water and good governance has always meant that, even in a modern drought, the city's mayors turn off the *nasoni*—Rome's ubiquitous public drinking fountains—at their peril. In the 1970s, contracts were handed to US cable television providers only in return for the promise of public programming—from school board hearings to city council meetings. This balance of real and virtual, public and private, remained fairly constant for most of the 20th century.

What's more, the public good of shared infrastructure includes something more intangible and encompassing than the simple provision of stuff. By

providing the same thing, in the same way, everywhere, traditional infrastructure opens up a space of innovation—whether for business owners or appliance designers or even sidewalk vendors—in which further experimentation and invention is possible. Whether street grid or electricity grid, this foundation of public infrastructure is what enables much of our global culture's inventiveness, resilience, and meaning. It makes neighborhoods and collaborations possible.

It is not just the pervasiveness of infrastructure but its relative neutrality that is at the core of such possibilities. When you can walk everywhere, you might end up wandering anywhere. You see the whole city on your way, but you are, to all who don't yet know you, whoever you wish to be. And architecturally, the space you find, empty but with utilities, is not a liability so much as a cultural and social possibility. Just as much as running water, the city's infrastructure supports the serendipity, anonymity, and reinvention at the core of all of our best possibilities—and the city's generative role in our economy and society.

This is also where the transition to a third age of information-led city infrastructure represents a break with the past—and where *The Matrix*, for all its prescience, likely misread the future.

In 1999, the virtual world of computing was still something we thought of as quite separate from our real bodies and cities. As in *The Matrix*'s own influences—William Gibson's cyberspace, Neal Stephenson's Metaverse—a digital, networked reality was another domain, unconstrained by limitations like space and gravity and untethered from our real-world selves. *The Matrix*, accordingly, is premised on a clear division: between reality, where the rebels' ship coasts through underground caverns in a postapocalyptic wasteland, and the virtual realm of city streets and office buildings in which most people live out their simulated lives. In today's landscape of urban data, by contrast, the effect of technology working its way into every body, object, and environment has been to create a parallel world that is bound indelibly to the real one—but, like the Matrix, still operates by very different rules.

This new world is inhabited by our digital shadows. They follow our steps in the real one and are born from the data trail we leave when we post on

social media, search on Google Maps, order things from Amazon, or leave reviews on restaurant sites. Some companies now favor the phrase “digital twin” to describe this doppelgänger—not even our ghost, but our constantly reshaped reflection.

Yet the virtual city is a mirror that distorts as much as it reflects; our virtual shared space remains radically different from our physical one. Offline, our infrastructure is largely public, our movement is still mostly free and without surveillance, and laws govern our interactions. Online, we exist in an entirely privatized world with weak governance, few civil liberties, and an entirely commercial raison d'être. To simply gain access to today's digital environments, we have allowed a degree of control and intrusion—the tracking and storing of every fragment of our online lives—that we would never accept in what we still refer to as “reality.”

Much of the blame for this predicament lies precisely with the nostalgic 1990s idea, implicit in *The Matrix*, that our real and virtual selves are separate. But, as should be obvious by now, they are not. Indeed, our compromises in the digital realm are what allow Google and Facebook to transform our data into supra-governmental economic might in the physical one. While such companies are not powered by anything quite so literal as the hibernating human batteries of the movie's dystopian towers, they do subsist on our humanity—the extracted value of our relationships, ideas, and experiences.

This power is now evident in the shaping of our cities as well. The effects are sometimes subtle, like expanded building lobbies for package delivery or the closed storefronts of local merchants put out of business by online retailers. Sometimes they are more dramatic. When Egyptian activists used Facebook to coordinate protests in Tahrir Square a decade ago, we marveled at the virtual world's ability to reshape civic space. When social media algorithms, optimizing for sustained attention and outrage instead of truth or transparency, helped drive people toward the US Capitol riot of January 6, 2021, the events left their scars in the form of fences around the Capitol.

Compared with such upheavals, the changes to our behavior and environment wrought by something like Google's Live View, which overlays walking directions on the view through your smartphone camera,

may seem mild, or even useful. When Google points us toward the perfect coffee shop or Amazon suggests those just-right mugs or Facebook shows us things that consistently pique our interest (and outrage), it appears to us as coincidence. But what we are actually experiencing is the opposite—the optimization of our attention through surveillance. It exists in contrast to the serendipity we experience as we wander a city, in which boredom, chance, and the ability to inhabit different, unexpected versions of ourselves and our experience are all instrumental. And it is the polar opposite of the anonymity, and opportunity for reinvention, that the city best affords.

Consider, once more, *The Matrix*. Twenty years on, one of the most essential but anachronistic elements of the plot structure is the idea that Morpheus' crew can relatively easily evade surveillance in the virtual world they occupy. The spaces most celebrated by the film—dingy, fabulous nightclubs, stylish down-at-heel neighborhoods—are those of transgression, invention, and remaking of the kind the movie as a whole celebrates. Today, the prevalence of surveillance in our digital lives and the growing use of AI-powered technologies like facial recognition scraped from social media profiles to track our real bodies make the prospect of such easy digital anonymity seem as dated, if charming, as the film's Nokia banana-phones.

In the later Matrix movies, the walls between the real and virtual world collapse, and the human-batteried AI juggernaut comes to its own kind of reckoning. In the fabric of our cities and landscapes, we face a reckoning too. As the infrastructure of the virtual world becomes ever more twinned with our physical reality, will the decisions and compromises we've made in virtual space come to define our physical one? Or will we instead begin to bring some of the principles that have made civic space a public resource into the virtual world?

Today, some of the best prospects for doing so are afforded by activists, researchers, or journalists who use the tools of digital data collection to create graphics and visualizations that render visible that which we tend to overlook in today's urban environments—from the racial and social disparities between neighborhoods to the structures of informal transportation. Such work embraces the prospect that digital data can be a tool for more just, sustainable, and even beautiful cities.

With the third wave of urban infrastructure now upon us, we face a fundamental choice. On the one hand, we could continue to allow the optimization and exploitation of digital space by private companies to define our shared, civic reality. On the other, we could embrace the guiding principles that have best shaped cities across history—equal access, accountability, even anonymity—and demand them of the cities of tomorrow as well.

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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Madeline Ashby

Culture
12.01.2021 06:00 AM

It’s Time to Reimagine the Future of Cyberpunk

In the 20th century, the genre imagined the body modifications and protective streetwear that could save us from our own future. Now it needs to envision humanity anew.
ILLUSTRATION: DEBORA CHEYENNE

Cyberpunk is like cyberspace: instantly recognizable, but so ubiquitous as to be intangible. An aesthetic movement and a commentary on capitalism, it can be a genre, a subjectivity, an adjective, a political approach, a time period. (Though the same could be said of the words *Renaissance* or *Victorian*.) It can tackle artificial intelligence, embodied identity, digital immortality, or simply, in the case of Pat Cadigan's *Synners*, whether a marriage can survive electronic pornography addiction. Like the best fiction, cyberpunk still slips on like a pair of fingerless gloves, even if—in the 21st century, partially situated in the future it imagined—it's hard to see where fiction ends and reality begins.

Despite all of this, cyberpunk often gets reduced to an aesthetic: black leather, mirror shades, implants—pieces of flare that look cool when lit by neon and computer screens. But to define cyberpunk by its look is to do it a disservice, especially since those sartorial choices are the whole point in the first place: armor against a world in collapse. In a future so hostile that no one is fit to survive, those who *do* have been fitted for something new—new brain, new heart, new nerves—perhaps in exchange for a lifetime of indentured servitude. Cyberpunk foretold a desperate world of unlicensed

physicians doing back-alley body modifications, and while so far all they do is perform illegal butt lifts, with Crispr, who knows?

Perhaps the genre gets pigeonholed by its look because, going back to old testaments like *Neuromancer* or *Snow Crash*, it seemed allergic to any talk of feelings. Ideas, sure; sentiment, no. Like the noir fiction with which it so frequently overlaps, cyberpunk is full of wounded characters whose pursuit of physical invulnerability keeps them emotionally unavailable to everyone but the audience. It's telling that people turned against the *Matrix* films when they had the audacity to be lushly, erotically romantic—when climaxes hinged on a hero knowing how to reach inside his partner and touch her just right. Viewers weren't ready for a Wife Guy who wanted to walk away from his messianic power; it was like watching an entire trilogy of *The Last Temptation of Christ*'s final 15 minutes, right down to the long hair and linen.

Still, 40-ish years since its incept date, cyberpunk maintains a vast claim on the aesthetic landscape—one often ironically divorced from the dark, anti-capitalist messages those visuals sought to convey. It has inspired video games like *Cyberpunk 2077* (naturally starring Neo himself, Keanu Reeves), an Urban Decay eye shadow palette characterized by deeply '90s duo chromes, a collaboration between Yohji Yamamoto and Adidas, and roughly 4 million posts on Instagram. For everyone who watched *Stand Alone Complex* on Adult Swim (or, let's be real, a DivX player), there's now a bespoke keyboard aglow with bisexual lighting, a liquid meal plan, or a "smart" vibrator. For everyone else, there's cottagecore.

Here's a fun game: First, check out *Mondo 2000*'s tongue-in-cheek 1993 piece "R.U. a Cyberpunk?" Note the abundance of straps, holsters, and handheld cameras. Then, go look at photos from January 6, 2021, or the bow-and-arrow-wielding protesters who took to Hong Kong's streets in 2019, or MRAPs rolling through Portland. Ask yourself: If a specific future has already happened, what happens to stories about that future? Now that time has caught up with them, are these visions simply contemporary literature, no more speculative than stories about donated kidneys and grown men dating high schoolers?

“Above culture, clothing, and genre, cyberpunk is a lifestyle that blends a combination of ‘low-key living’ with a deep understanding of social fabric backdoors and full access to high-tech gadgets,” fashion writer Mandy Meyer wrote in *The Vou*. Yossy, the founder of Japanese cyberpunk fashion brand Helvetica, has stressed that the clothing should use innovative materials yet be functional, telling Shell Zine it “should strengthen the wearer, like an exoskeleton, and at the same time be comfortable and not too stuffy or formal.” Mostly this means dressing like you live in Seattle, because in cyberpunk it's always raining.

In this regard it's difficult to discern the line between the influence of a genre on design aesthetics and the grudging march of time (and brands) into the endless fires and floods of the 21st century—a context wherein the tactical is practical. Dreams of jetpacks have been replaced by designs for bulletproof backpacks. From a genre perspective, the future resembles science fiction less than it does a murder mystery: A whole planet is dying while its inhabitants argue about who stuck which knife in.

Before cyberpunk was reduced to an aesthetic, it was a philosophy. Whereas earlier generations of science fiction located conflict outside the body, on the battlefield or in the stars, the post-Watergate, post–*Roe v. Wade*, post-Vietnam generation of mostly American sci-fi writers imagined that the next theater of combat would be the human body and mind. Today, when it seems like every Facebook group is a Potemkin village and Texans can put bounties on abortion providers, that suspicion seems well warranted.

The most prescient aspect of cyberpunk was not any one particular innovation, like razor fingernails or brain-machine interfaces or even a ubiquitous metaverse awash in pornography, advertising, and the viruses endemic to both. Instead, it was the genre's focus on the ongoing commoditization of human workers by a narrowing field of multinational corporations. Instead of creating same-jackboot-different-day dystopias like *Logan's Run* or *Make Room! Make Room!*, cyberpunk writers asked, “What if capitalism is the dystopia?”

Some of the most influential texts in the genre are about labor and bodily autonomy. *Blade Runner* is a story about runaway slaves, and *Blade*

Runner: 2049 is about the reproduction of slaves. *Neuromancer* is about a man selling his hacker skills to earn back the full function of his body's nervous system. *Akira* features government experimentation on children's bodies so they can better perform militarized work. *Snow Crash* presupposes a Los Angeles populated with precarious gig workers delivering pizza. *Ghost in the Shell* wonders who truly "owns" a cyborg body if an employer pays for its upkeep. *The Matrix* operates on the premise that all human bodies can be "grown" into batteries whose primary purpose is to keep artificial intelligence functioning.

Writing for Slate, Kelsey D. Atherton summed up cyberpunk's present-day parallels thusly: "Replace the Tyrell Corporation with Amazon and reframe the replicants as 'essential services,' and suddenly you have a world of workers terrified that their jobs are inherently a death sentence—moving straight from fiction to reality." Technology studies scholar Damien P. Williams agrees: "I think cyberpunk is still relevant, but in a different way; rather than a warning about where we're headed, it's a mirror about where we managed to end up."

Not everyone concurs. In the face of a burning planet, the idea of using technology to achieve immortality seems naive at best. Young people in China are "lying flat" instead of working, and refugee children in Sweden have "resignation syndrome"; in a world where despair is a #mood, the desire to extend life indefinitely is a little vampiric, if not simply gauche. "Cyberpunk was relevant and important to boomers obsessed with questions of law and order, and who were determined to avoid the realities of human aging and embodiment. In 2021, we have new and different mass obsessions, making cyberpunk seem quaint," says Hugo nominee and Nebula Award winner Kelly Robson. "In conclusion, fuck cyberpunk."

Considering the world has caught up with, if not surpassed, the genre's imagination, its place in fiction might be limited, or limiting, in the way that rehashing Tolkien might be limiting for a fantasy writer. This is one of the challenges of telling a future-set story: Eventually time catches up, like a rubber band snapping back into shape. And sometimes it stings. Readers often assume that authors are happy when they "predict" future events "correctly," but rarely are we asked about the queasy feeling of watching

one's worst vision come to pass. Describing his debut novel for CrimeReads, Lincoln Michel says, "*The Body Scout* is an attempt to replace the 'cyber' in cyberpunk with flesh and look at what happens when the human body becomes the major realm of technological innovation and corporate control … These days, the greatest dystopian novel might be the evening news."

Just because cyberpunk's history looks like the present doesn't mean it can't point toward the future. Ten years after Bruce Bethke published his 1983 short story "Cyberpunk," Octavia E. Butler released what is arguably one of the most influential novels in science fiction, *Parable of the Sower*. It tells the story of a young Black woman named Lauren Olamina living outside Los Angeles in 2024, watching as an authoritarian president is elected, human rights eviscerated, company towns built, and old neighborhoods destroyed. Lauren does what heroes do: She prepares. She gathers her wits and her seeds and leads her community toward freedom and, ultimately in the book's sequel, the stars. Like most of Butler's novels, it shifted the narrative focus from individual rebellion and success to communal liberation and legacy. If cyberpunk warned about capitalism's cancerous late stages, *Parable* asked, "So what are you doing about it?" And while cyberpunk as a genre took on metaphors for slavery and autonomy, Butler's books examined the actual transatlantic slave trade.

Butler's fiction focused on, among other things, genetic engineering, the embodied experience of aliens and posthumans, what an individual owes to her family and community, power and its uses, terrible sacrifices in the name of survival. Recalling a dinner with her in *Essence*, author and scholar Tananarive Due says Butler expressed the central question of her work as "How can we make ourselves a more survivable species?" Although she is considered the mother of Afrofuturism, her narrative patterns also repeat across all of cyberpunk's genre successors: hopepunk, biopunk, solapunk, and more. She echoes in Nalo Hopkinson's *Midnight Robber*, Premee Mohamed's *The Annual Migration of Clouds*, Louise Erdrich's *Future Home of the Living God*, Nnedi Okorafor's *Lagoon*, Becky Chambers' *The Long Way to a Small, Angry Planet*, Tade Thompson's *Rosewater*, L. X. Beckett's *Gamechanger*, and more. In Toronto, Black Lives Matter activists just purchased a 10,000-square-foot community hub for Black artists and

activists and named it the Wildseed Centre after one of Butler's books. Whether or not any of this qualifies as cyberpunk activity, it's still exemplary of what the movement could look like.

In her notes, Butler said: “The struggle is to hold it together, keep it alive, and teach it to be and do its very best.” She was summarizing Mother Olamina's ongoing mission, but she was also describing the 21st century in searing detail. This is the work of forward-looking science fiction. For better or worse, so much of cyberpunk's android dreams have come true. Now we have to imagine how to build ourselves anew.

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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Jason Parham

Backchannel
12.01.2021 06:00 AM

Yahya Abdul-Mateen II Is Ready to Blow Your Mind

The actor isn’t just the new Morpheus. He’s the future of Hollywood.
Photograph: TSE

Rare is the seer of tomorrows. Yet Morpheus embodies the role deftly. In the *Matrix* films, starved for salvation, he is the Black prophet of Zion's freedom quest. A defender of humanity's legacy. A judicious captain with the disposition of a Buddhist monk. He oozes sophisticated cool—thanks, in large part, to Laurence Fishburne's textured portrayal of him in the original trilogy. Named for the Greek god of dreams, Morpheus is the messenger of better days, of a more imaginative future. Without him, escape from the Wachowskis' world of code and chaos looks hopeless. The machines ultimately win; the Matrix rewrites itself. But through Morpheus' eyes, deliverance is possible.

Yahya Abdul-Mateen II is the ideal actor to take up Fishburne's mantle in *The Matrix Resurrections*: He's a scene-stealer with an uncanny knack for stirring something deep inside the viewer. Born in New Orleans, the 35-year-old ditched a career in architecture to pursue Hollywood, graduating from the Yale School of Drama. Since then, he has played a 1970s Bronx gangster (*The Get Down*), the supervillain Black Manta (*Aquaman*), the genius god-being Doctor Manhattan (*Watchmen*)—for which he won an Emmy in 2020—and Black revolutionary Bobby Seale (*The Trial of the Chicago 7*). Earlier this year, he transformed into Candyman for Nia DaCosta's slasher remake, a horror flick that doubled as a savvy social commentary on the ways cultural theft can make monsters out of us. Abdul-

Mateen infused each of those characters, many of whom were well ingrained in the pop-cultural canon already, with a profound, mesmerizing depth.

But it's never just about the role, Abdul-Mateen says. Every part is a chance to present an uncompromising vision. Because no Black actor is their character alone. When an actor—especially a Black one—is able to bring the kind of full-scale humanness to a role that opens a door into the soul, it becomes a gateway to something even more extraordinary. It becomes a gateway to a future for Hollywood that reflects Black stories and Black storytellers as they should be reflected.

Ultimately, it's about foresight. The need for “images of tomorrow,” as sci-fi author Samuel Delany put it in 1978, remains paramount. At the time, Delany was calling for a Blacker future in fiction. A queerer future. One such image arrived 21 years later, with *The Matrix*. Now, in Abdul-Mateen, we have another. He's helping to usher in a prosperous new era for Black actors that affords them more autonomy, power, and ownership in Hollywood. When we chat—first by Zoom and then, after the connection inevitably glitches out, by phone—he is zipping through the mid-afternoon streets of London in the back seat of a taxi. It's early fall. He's on the move, dashing from one place to the next. But he's eager to talk. He connects. He plugs in. Yahya Abdul-Mateen II is ready to offer the truth, nothing more.

In *The Matrix Resurrections*, Abdul-Mateen steps into Laurence Fishburne’s role as Morpheus. Previously he starred in *Candyman*.

Courtesy of Warner Bros. Pictures

WIRED: What's your first memory of the original *Matrix*?

Yahya Abdul-Mateen II: I might have been 14. I remember trying to lean back, trying to do that move where I'm dodging bullets—trying to grow a hundred arms and move so fast and so slow that I turned into multiple people.

Bullet time. Easily one of the coolest moments in the film.

For me, it was about what could be possible in my own imagination, the different ways I could now go outside and fight, the different superpowers I could imagine I had.

Neo could only do that because he was in a virtual world, of course—a "neural interactive simulation," as Morpheus puts it. Does reality ever feel unreal to you?

[*Laughs.*] Yeah, man. We just came out of a goddamn pandemic. One of the things that makes reality seem a bit strange—like there's a shift in the universe—is change.

What's an example?

One is the way we relate to technology, the way we communicate with other people, the feeling that we can be in multiple places at one time. It opened up this other conversation that people are having about what is real and what is not real, what is necessary in order to experience reality. The more that we have those conversations, the more susceptible we become to the possibility that it might all be a dream or that it might all be a simulation or an alternate reality.

Do you think it's possible to make things meaningful, to live a meaningful life, if the world doesn't feel all that real?

Absolutely. It's not only possible but important to find meaning in everything. You know, a lot of times it takes something, a dream world or a different type of experience, in order to propel you forward into your own quote-unquote "real world." As long as the mind and heart are open, then you'll find meaning in whatever world your mind allows you to be in.

Sounds like you have complicated views about technology.

I'm a hypocrite. I love it when it helps me, and I hate it when it doesn't. Social media, that's an ultimate reality all on its own. It's a real universe. People spend as much time there—it's funny I say "there," because it turns it into a real location—as they do in the real world.

Is that healthy?

You have to respect that reality. One doesn't want to be left behind, but one also doesn't want to be so consumed by that other world, by the world of technology, that you become stagnant in this one. A lot of things still matter in this world—touch and relationships and real conversation and discomfort. Technology is designed toward convenience. It's designed to make things easier, to make life a bit more comfortable. But we need discomfort. We need discomfort in order to grow.

In some ways, that's the message of the original Matrix trilogy. The Wachowskis showed us a largely non-white world of people who, despite being oppressed, are fighting for a better tomorrow. People who don't want to be defined by how the status quo defines them. What's your interpretation of the future they were trying to envision?

I do understand those allegories. For myself, I saw messages about working-class people. I saw messages about people who don't exercise the autonomy they actually have in life. People who are unknowingly stuck on the conveyor belt, whose lives are being lived for them rather than truly being free.

You mention autonomy. What does that word mean to you, as a Black artist?

It means the whole idea of crossover goes out the window. There's an idea —and it's not accepted by everybody—that to really be successful in Hollywood, you need to appease a non-Black market. When you do that, you compromise some of your cultural practices and beliefs. You compromise a part of yourself. When the artist is completely autonomous—when the Black artist is autonomous—then the Black artist is free from that need of acceptance, and what we bring to the table, what we desire, who we are culturally, the way we speak, the music that we listen to, the way we dress, our clothes, our style, the stories that we decide to tell in the way that we decide to tell them—they're automatically the norm. They're automatically accepted. It's only about quality. It's not about finding a large audience to relate to. It's not about making people comfortable. It's not

about sitting inside of a box. It's not about conforming. That's what autonomy looks like.

Is that the ultimate goal for you?

From the beginning of my career, I've focused on freedom—freedom of expression and artistic freedom. It takes courage. It takes a rebellious spirit. It takes some fortitude, but it also takes the support of people around you to uphold and to trust that vision.

Your biggest roles have all been in genre—Black Manta, Doctor Manhattan, Candyman. These are characters we know, characters who have history and backstories. How were you able to make them your own?

You have to relate to the character in a meaningful way. You have to have a reason to say yes to going on that journey that's deeper than the popularity of the character. You can't just do it because it's Morpheus or because it's Doctor Manhattan or Black Manta. That's not going to get you far enough. You find your way in, and you make it your own by having a perspective.

So how do you measure the success of a role, then?

By the time I see or hear anything, I already know how I feel about my work. That's more than enough for me.

Abdul-Mateen has infused each character he's played, from *Watchmen*'s Doctor Manhattan to *Aquaman*'s Black Manta, with profound and mesmerizing depth.

Photograph: TSE

Do you feel any responsibility as a Black actor?

My responsibility is to myself. One thing about where I'm at right now is that I want to have the freedom to do what I want to do, in the way I want to do it. It's interesting, you know, the idea of how Lana [Wachowski] works. That's really the dream—to be able to work how she works.

Talk to me about working with Lana on the new film.

Lana's dope. She's very family-oriented. I probably heard that word more than anything over the course of the film.

What did she mean by it?

She's talking about the family—that includes the actors, that includes the crew, everybody from the top down. She was really all about making sure that this was a family experience. Also, she has a strong sense of vision. She's the only director I've ever worked with who will grab the camera from the DP or from the camera operator and film something herself. She was right there, damn near inside of the movie. She really put her muscle and sweat into it. And talk about somebody who is just whip-smart. To be able to create the world of *The Matrix*, but then to come back 20 years later and make it relevant to her personal story and her journey, and to allow that to be universal, is something that I appreciated. To me, it seems as though she makes her art for an audience of one, which is herself, and then trusts that there will be an appetite for it.

That seems like the purest form of creative expression.

She's not a conformist. Especially with big studio films, a lot of times there's a lot of asks and places to compromise. But her approach was really, really inspiring in terms of seeing an artist take their destiny into their own hands, so to speak.

On the set of *The Matrix Resurrections*, director Lana Wachowski (top) was "very family-oriented," says Abdul-Mateen (below).

Photograph: Murray Close
Photograph: Murray Close

Do you believe we are in charge of our destinies? In one sense, the whole premise of *The Matrix* suggests otherwise.

We have to be. But at the same time, it's important to know you can't control everything. My acting teacher, Evan Yionoulis, said, "Hold on

tightly, let go lightly." It's a balance of controlling what you can control and then gracefully allowing the universe to do its job. It takes a bit of self-reflection and education and belief in oneself. That's a little bit of where I am—probably holding onto the reins very tightly right now. Not really trusting the "let go" part. [*Laughs.*] But I think that's youth and stubbornness. I believe I'm on my way.

Another takeaway from the *Matrix* franchise is that all worlds are not as fixed as we think. What might a more perfect world look like for Black actors?

The groundwork has been done. It's been laid for many years, and now it's being financially rewarded. We just have to keep doing that. Keep on creating those spaces. And then it'll branch outside of acting, and you'll see opportunities in writing and directing. You'll start to see it in the wardrobe department, in the hair and makeup department. Accessibility won't be such an issue. Relatability on large projects won't be such an issue. We need more people to continue to be bold and to stick to their guns.

What do you see as your role in this transformation?

It's all about honesty. That's really what I'm after right now: creating honest moments, honest storytelling. I don't think much about legacy. I mean, I do. For sure, I do. But what's going to get me to a place where I'm satisfied with my legacy—with what my legacy says—is if I stay true to myself. If I work with people who I want to go and have a drink with. If I tell stories about people who look like me, stories about people who might have stopped by at my house when I was growing up. If I bring my full self to my work, then I think my work will speak for itself.

You mentioned grace earlier. Do you think the way you approach your craft is a matter of understanding where to allow for grace?

You have to. Otherwise you drive yourself crazy. An artist has to learn to be both brutal and kind. The brutal is what's going to keep you up at night and what's going to introduce you to honest self-critique. Grace is going to tell you, "OK, you did a good job, it's time to get some rest." You need a bit of both. And if you want to do anything that's worth watching—if you want to

have some real humanity in your work—then you need grace. It won't always be my responsibility to play someone who was kind and did great things in life. Sometimes onscreen, you have to do things that you wouldn't do in your own life. To do that well, you have to have a sense of grace for that character, an understanding and an idea that hopefully—if the page or the script leans that way—you're not just playing pure evil.

Did playing Morpheus reveal anything to you about yourself as an actor, or as a Black man, that surprised you?

No.

Why's that?

I don't even want to bullshit you. It was a good experience to go in and to play this character, to breathe life into him. To pick up the reins and step into something that is seen as iconic. But in terms of my identity as a Black man, it tends to be rooted in other things. And that wasn't really one of the ways that I was inspired on this project. It was cool as fuck, though.

More from WIRED's special series on the impact of the *Matrix* franchise—and the future of reality

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Styling by Jan-Michael Quammie. Styling assistance by Kevin Lanoy. Grooming by Giselle Ali using Pat McGrath. Clothes by Vetements; boots by Alexander McQueen; sunglasses by Prada. This article appears in the December 2021/January 2022 issue. Subscribe now.

Let us know what you think about this article. Submit a letter to the editor at mail@wired.com.

Meghan O'Gieblyn

Ideas
11.29.2021 08:00 AM

My Music App Knows Me Way Too Well. Am I Stuck in a Groove?

WIRED's spiritual advice columnist on predictability, freedom—and the duality of rebellion.
Illustration: Michael Kennedy

One of the streaming music apps I use creates customized playlists for me, and it's scarily good at predicting songs I'm going to like. Does that make me boring?

—Playing It Safe

Dear Playing It Safe,

I once read somewhere that if you want to slowly drive someone mad, resolve, for a week or so, to occasionally mutter, "I knew you were going to say that" after they make some casual remark. The logic, as far as I can tell, is that by convincing a person that their thoughts are entirely predictable, you steadily erode their sense of agency until they can no longer conceive of themselves as an autonomous being. I have no idea whether this actually works—I've never been sadistic enough to try it. But if its premise is correct, we all must be slowly losing our minds. How many times a day are we reminded that our actions can be precisely anticipated? Predictive text successfully guesses how we're going to respond to emails. Amazon suggests the very book that we've been meaning to read. It's rare these days to finish typing a Google query before autocomplete finishes our thought, a

reminder that our medical anxieties, our creative projects, and our relationship dilemmas are utterly unoriginal.

For those of us raised in the crucible of late-capitalist individualism, we who believe our souls to be as unique as our thumbprints and as unduplicable as a snowflake, the idea that our interests fall into easily discernible patterns is deeply, perhaps even existentially, unsettling. In fact, Playing It Safe, I'm willing to bet that your real anxiety is not that you're boring but that you're not truly free. If your taste can be so easily inferred from your listening history and the data streams of "users like you" (to borrow the patronizing argot of prediction engines), are you actually making a choice? Is it possible that your ineffable and seemingly spontaneous delight at hearing that Radiohead song you loved in college is merely the inflexible mathematical endpoint of the vector of probabilities that have determined your personality since birth?

While this anxiety may feel new, it stems from a much older problem about prediction and personal freedom, one that first emerged in response to the belief in divine foreknowledge. If God can see the future with perfect accuracy, then aren't human actions necessarily predetermined? How could we act otherwise? A scientific version of the problem was posed by the 19th-century French physicist Pierre-Simon Laplace, who imagined a cosmic superintelligence that knew every detail about the universe, down to the exact position of all its atoms. If this entity (now known as Laplace's demon) understood everything about the present world and possessed an intellect "vast enough to submit the data to analysis," it could perfectly predict the future, revealing that all events, including our own actions, belong to a long domino chain of cause-and-effect that extends back to the birth of the universe.

The algorithm that predicts your musical preferences is less sophisticated than the cosmic intellect Laplace had in mind. But it still reveals, to a lesser degree, the extent to which your actions are constrained by your past choices and certain generalized probabilities of human behavior. And it's not difficult to extrapolate what predictive technologies might expose about our sense of agency once they become even better at anticipating our actions and emotional states—perhaps even surpassing our own self-

knowledge. Will we accept their recommendations for whom to marry, or whom to vote for, just as we now do their suggestions for what to watch and what to read? Will police departments arrest likely criminals before they commit the crime, as they do in *Minority Report*, tipped off by the oracular predictions of digital precogs? Several years ago, Amazon filed a patent for "anticipatory shipping," banking on the hope the company would soon be able to correctly guess our orders (and start preparing them for dispatch) before we made the purchase.

If the revelation of your own dullness is merely the first stirrings of this new reality, how should you respond? One option would be to rebel and try to prove its assumptions false. Act out of character. When you have an inclination to do something, do the precise opposite. Listen to music you hate. Make choices that will reroute your data stream. This is the solution arrived at by Dostoevsky's narrator in *Notes From the Underground*, who takes up irrational and self-damaging actions simply to prove that he is not enslaved to the inflexible calculations of rational self-interest. The novel was written during the heyday of rational egoism, when certain utopian thinkers believed that human behavior could be reduced to a series of logical rules so as to maximize well-being and create the ideal society. The narrator insists that most people would find such a world intolerable because it would destroy their belief in individual freedom. We value our autonomy over all the comforts and the advantages that scientific determinism offers—so much so, he argues, that we would seek out absurdity or even self-harm in order to prove that we are free. If science ever definitively proves that humans act according to these fatalistic rules, we would destroy ourselves "for the sole purpose of sending all these logarithms to the devil and living once more according to our own stupid will!"

It's a rousing passage, though as predictions go it's not especially prescient. Few of us today appear to be tormented by the comforts of predictive analytics. In fact, the conveniences they offer are deemed so desirable that we often collude with them. On Spotify, we "like" the songs we enjoy, contributing one more shard to the emerging mosaic of our digital personhood. On TikTok, we quickly scroll past posts that don't reflect our dominant interests, lest the all-seeing algorithm mistake our curiosity for

invested interest. Perhaps you have paused, once or twice, before watching a Netflix film that diverges from your usual taste, or hesitated before Googling a religious question, lest it take you for a true believer and skew your future search results. If you want to optimize your recommendations, the best thing to do is to act as much like "yourself" as possible, to remain resolutely and eternally in character—which is to say, to act in a way that is entirely contrary to the real complexities of human nature.

With that said, I don't advise embracing the irrational or acting against your own interests. It will not make you happy, nor will it prove a point. Randomness is a poor substitute for genuine freedom. Instead, perhaps you should reconsider the unstated premise of your query, which is that your identity is defined by your consumer choices. Your fear that you've become boring might have less to do with your supposedly vanilla taste than the fact that these platforms have conditioned us to see our souls through the lens of formulaic categories that are designed to be legible to advertisers. It's all too easy to mistake our character for the bullet points that grace our bios: our relationship status, our professional affiliations, the posts and memes and threads that we've liked, the purchases we've made, and the playlists we've built.

What remains more difficult to predict are the qualities that make you truly distinct: your thoughts and beliefs, your personal history, the unspoken nuances of the relationships that have made you who you are, and the unbounded expanse of moral and imaginative possibilities that constitutes your own mind. Attending to those aspects of yourself is the work of a lifetime—and far from boring.

Yours Faithfully,
Cloud

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This article appears in the December/January issue. Subscribe now.

Virginia Heffernan

Ideas
11.26.2021 08:00 AM

Why Is It So Hard to Believe In Other People's Pain?

People—and groups—who are suffering are often dismissed. Scarry's axiom might help us understand why.
Illustrations by Santos Shelton

Hostile suspicion of others, encompassing everything from the position of their mask to their stance on mandates, has marked this wretched pandemic from the start. Now, in perhaps the unkindest cut, suspicion is aimed at people with long Covid—the symptoms that may afflict as many as a third of those who survive a first hit of the virus. One theory is that Covid infection riles up the body's defenses and can leave the immune system in a frenzy, causing shortness of breath, extreme fatigue, and brain fog. In *The Invisible Kingdom*, her forthcoming book about chronic illness, Meghan O'Rourke reports that doctors often reject these symptoms as meaningless. When medical tests for these patients come up negative, "Western medicine wants to say, 'You're fine,'" says Dayna McCarthy, a physician focused on long Covid.

This is not surprising. Skepticism about chronic conditions, including post-polio syndrome and fibromyalgia, is exceedingly common—and it nearly always alienates patients, deepens their suffering, and impedes treatment. Until researchers can find the biomarkers that might certify long Covid as a "real" disease, the best clinicians can do is listen to testimony and treat symptoms. But the project of addressing long Covid might also be served by a more rigorous epistemology of pain—that is, a theory of how we come to believe or doubt the suffering of other people.

In her 1985 book *The Body in Pain: The Making and Unmaking of the World*, Elaine Scarry makes a profound assertion: “To have great pain is to have certainty; to hear about pain is to have doubt.” Because the claim illuminates both pain and knowledge, and because women rarely attach their names to philosophical assertions, I'd like, belatedly, to dub this elegant proposition “Scarry's axiom.”

The axiom came to mind this fall for two reasons: I was trying to support a friend with long Covid, and I participated in a forum about how the media contends with racism. It was the second experience that illuminated the first and suggested Scarry's axiom as a way to understand the acute distrust that now pervades our pluralistic country.

At the forum, a socialist and a libertarian each lodged complaints. The socialist charged that the media's focus on racism leaves out a more significant battle—the never-ending class struggle. The libertarian argued that the media's focus on race fails to understand the individual, with his or her pressing fear of death and aspirations to art, money, and transcendence. The libertarian then took shots at easily offended undergraduates who put emotion before reason and are forever getting “offended” and needing “safety,” which he said were postures incompatible with education.

This familiar debate ground on. As far as I can tell, no one on any side—and I disagreed with both the socialist and the libertarian—ever budged. But perhaps that's because we kept missing a truth in front of our faces: that we were all dismissing as somehow less than real the pain of others while elevating our own, and that of our confreres, as hard fact.

As Scarry's book makes clear, this dynamic of doubt holds for both emotional anguish and physical pain. Microaggressions toward another tribe? Those can't be so bad. But setbacks to a meritorious individual's fortune-building efforts and attacks by sniveling critics and cancelers? To a libertarian, those represent authentic agony. Rich tech bros who complain of loneliness and despair? These strike socialists as entitled elites, weeping over their dented Teslas while the working class are trapped in debt.

But Scarry's axiom does more than conjure what some call the oppression olympics, the demoralizing squabbles about which demographic deserves a

gold medal for the greatest suffering. By the axiom, it's not that some forms of pain are more acute than others; it's that some pain seems undeniable while other suffering appears fraudulent.

You can see why this renders futile the well-intentioned empathy-building exercise in which students listen while classmates share trying personal experiences. Before we even think of empathizing with others—an advanced psychological operation—we have to confront a deeper problem: We don't even believe them. Paradoxically, the more insistent or dramatic an account of suffering is, the more likely listeners are to fear that they're being manipulated. If that anxiety about coercion is then conveyed as doubt ("I'm not buying it"), the original sufferer may perceive their listener's irritability as nothing but a cover for cruelty or gaslighting. And on it goes. This belief-doubt spiral is especially common in America, or on the internet, where no single idiom exists for the credible expression of pain.

Scarry argues that any response that meets the statement "I am in pain" cannot reflect the same degree of pain (since it's not in the respondent's body), and thus may strike the pained person as insufficiently understanding. The pained person might then decide that the best way to call attention to their affliction (the better to get relief from it) is by inflicting a little pain on the other party: snapping, shouting, crying, or turning away. Two people end up in pain—one with aches, the second with aggravation. Each is suspicious of the other. And each experiences the other as a source of pain instead of a salve for it.

This is on display in American medicine and politics, but it's cartoonishly clear in sports, especially pro soccer, which includes hammy performances of pain that fall outside the usual idiom of American athletics. While Americans love to exaggerate aggression, and consider flexing (trash-talking, posing, menacing an opponent) mostly wholesome, they famously disdain the common European move of exaggerating injury, or flopping. As Eric Levenson wrote in *The Atlantic* in 2014, American athletes fail at "selling their falls" with arias of agony, and try to pass off their refusal to flop as a "moral victory to cling to when they inevitably lose."

Why is this?

The refusal to cry out in pain seems grounded in an entrenched anxiety related to Scarry's axiom: What if all pain is an act, even our own? Seen this way, preserving skepticism about other people's groans and wails may be a shield against guilt. If we believe in another's pain, after all, we may feel obliged to fix it, or take on the blame. Here's where the debate about representations of racism comes in. A case study is the far-right complaint (in dubious faith) that white kids who are taught critical race theory are being guilt-tripped about the suffering of races to which they don't belong. In the unusual quest of Americans to feel no guilt, many of us are quick to forcefully repel claims of pain. We don't only have doubt, as Scarry's axiom has it; we cultivate that doubt and extend it to the suffering of others.

The answer, obviously, is not to stop expressing or acknowledging pain. The speech act known as complaint is not an accusation or a demand for remedy. Rather, it's a plea for witness, a request to be paid the simple courtesy of belief. O'Rourke, who herself suffers from chronic illness, describes the intense loneliness of being doubted. That loneliness is deepened when listeners panic about being manipulated and can't even accept a description of pain as plausible or interesting, lest they spiral into helplessness and self-recrimination.

People who high-handedly dismiss long Covid patients using words like “you're fine” must dial down their anxiety about being tricked or trapped. This pandemic-ridden country has not been fine for a long time, and to recognize that is not to be a fool, but to be sane.

Cecilia D'Anastasio

Ideas
11.04.2021 07:00 AM

The Metaverse Is Simply Big Tech, but Bigger

It’s a rebrand of Silicon Valley's increasing power and reach. And it’s made for companies, not people.
Illustration: Dan Matutina

Like religious prophets, Big Tech luminaries are preaching the coming of the next internet. According to their gospel—blog posts by tech companies and venture capitalists alike—tomorrow’s cyberspace will be empyrean, transcendent, immersive, 3D, and all folded together, the disparate sites and services we live and die by gathered under one love. It will be a super-platform that convenes sub-platforms: social media, online video games, and ease-of-life apps, all accessible through the same digital space and sharing the same digital economy.

Virtual reality companies say you’ll get there through VR headsets, while augmented reality companies say you’ll wear AR smart goggles. And with boyish enthusiasm for science fiction fueling their piety, these preachers are calling this vision the *metaverse*, after Neal Stephenson’s 1992 dystopian novel *Snow Crash*.

Back when Stephenson wrote his book, the web was a smattering of freaky little planets connected only by the gravitational force of server technology. Novice developers built rudimentary websites using HTML and HTTP. Soon, *Friends* fan sites and the Texas Internet Consulting pages hung separately from gaudy GeoCities.coms filled with Broadway lyrics. From

this scattered solar system were born web browsers like Mosaic and then Netscape to solve the problem of sorting and aggregating information.

The metaverse, as originally conceived by Stephenson, is focused around a three-dimensional digital street with virtual real estate, where users' avatars can loiter, party, and do business, finding spaces and each other. It's operated by a company called the Global Multimedia Protocol Group, which makes its money acting as the backbone of 3D cyberspace.

The starry-eyed futurists of the '90s took the idea at face value, incarnating users as avatars in isolated cyberspaces like Activeworlds. The other half of the vision—the important half—was connecting cyberspaces, and this they were not able to do.

A metaverse must be interoperable; digital services associated with it must piece together, quilt-like, to form its fabric. Matthew Ball, a venture capitalist who has written frequently on the metaverse, says, "Interoperation effectively requires companies to release their control over proprietary formats, or otherwise adopt wholly open source ones."

In the early 2000s, a bloom of open source metaverse projects emerged to solve the problem of stitching together existing virtual worlds. If the code were free and accessible to all, any *Snow Crash* fan with some know-how could carve out their own alley in the metaverse. And had the internet stayed frozen in its early form, one could easily imagine the porous, egalitarian metaverse it would have spawned: A 50-year-old in a Barbie avatar walks straight from her Second Life Dream House to Sephora.com's VR boutique, where she purchases digital mascara with gold earned in *World of Warcraft*.

But those open metaverse projects never got off the ground. "There wasn't a lot of enthusiasm around interconnection, partly because there really wasn't a motive for it," says Philip Rosedale, founder of Second Life publisher Linden Lab. "We were, as a company, trying to make some money."

By the mid-2000s, it became clear that the money wasn't in building individual websites; it was in making information sorters, channels,

aggregators, and publishers—open enough to scale with user-generated content, but closed enough to reap enormous profits. “A few online services came to have a truly global user base and in its wake grew a global infrastructure dedicated to optimize its needs,” says Carl Gahnberg, a senior policy adviser at the Internet Society.

This was the evolution from Web 1.0 to Web 2.0. For nearly 30 years, the gravity of consolidation has pulled cyberspace together under the auspices of fewer and fewer corporate titans. The freaky little planets get drawn together, collide, make bigger planets, collide again, make stars, or even black holes. Facebook eats Instagram and WhatsApp; Amazon swallows two dozen ecommerce sites. And you’re left with these few supermassive players controlling and appropriating the celestial motion of billions of users. This is how Big Tech got big.

After interest in those open source metaverses waned, the tech industry spent a decade obsessed with the “total service environment,” one where you spend your morning on Gmail and your afternoon plugging data into Google Sheets, take a break on your Android phone, and then navigate to a new pub with Google Maps or watch YouTube all night next to your Nest smart-home device.

This is the internet the metaverse inherited. Or more precisely, this is the internet Big Tech’s metaverse describes.

The idea of the metaverse has reemerged under a new sky. The current frenzy? It’s simply a succinct way for Big Tech to repitch its extensive lineup of products. The metaverse describes the next state of the internet’s consolidation, a marketing spin on Big Tech’s increasing reach and power. It’ll be Big Tech—just as problem-riddled as now—but bigger.

Meta Platforms (formerly Facebook), which Mark Zuckerberg has vowed will eventually become a “metaverse company,” owns not only four of the top six social media platforms, but also Oculus, which manufactures VR hardware. Virtual reality has been *about* to go mainstream for a decade now but is far from ubiquitous, leaving the company perpetually trying to capitalize on this $2 billion acquisition. What could sell VR headsets more

effectively than the notion that everybody will need one to access the internet of the future—especially if that same internet is Meta's own?

For Microsoft, the metaverse is a sci-fi skin over its manifest destiny aggregation of platforms and products, which include its operating system (Windows), servers (Azure), comms network (Teams), hardware (HoloLens), entertainment hub (Xbox), social network (LinkedIn), and IP (Minecraft). In a May 2021 post, Azure's corporate vice president, Sam George, describes how Microsoft is perfectly positioned to usher in the convergence of "the physical and digital worlds" under the company's "metaverse technology stack." That, George excitedly shares, "is available today."

(Of course, in a total service environment, the user is not literally incarnated as the same catgirl avatar they use in *Final Fantasy XIV* or their Tony the Tiger Second Life body. A total service environment is a metaverse in that it interlocks, subsumes, affords presence with others, and easily funnels those users from one digital property to another. Actually seeing each other's avatars there is what makes the metaverse science fiction.)

Right now, the metaverse lives in the space between these total service environments and their owners' corporate blogs. It's an invitation to work under, not with, tech giants' services.

If the companies dominating cyberspace did decide to collaborate, simultaneously piecing together opposite sides of the quilt to create this digital textile, that would be very polite. But is there a world in which Microsoft, Facebook, Epic Games, Apple, Niantic, Nvidia, et al. combine their most valuable products, Captain Planet–style, to architect the metaverse under open source standards nobody in particular reaps billions from? It's sort of a tall ask—to overhaul your code and collaborate with your competitors. Why would three or four tech giants partner to make a metaverse when they already spent decades and billions constructing their own?

Arguably, the closest property we have to a real metaverse is Roblox, a billion-dollar platform and game development toolkit. Players use Roblox to build a game about adopting pets or a virtual re-creation of their local

church, and 48 million daily users can join them. Roblox hubs together those worlds through a proprietary browser-based search system.

Proprietary is the key word. Players can't port their mini metaverses to *World of Warcraft* or Second Life. What growth looks like for Roblox is more stuff on Roblox. All the same, Roblox's CEO described the company as "shepherds of the metaverse" early in 2021.

If Big Tech's unchecked growth continues, there will be multiple metaverses, if there are any at all. Each will be interoperable under one tech giant's umbrella, the same way Apple is both a walled garden and a convenient, habitable terrarium for its dedicated consumers. Users love the seamlessness of Apple's proprietary operating system, the ubiquity of iMessage. And Apple, presumably, loves the 30 percent commission it can charge those developers who sell apps in iOS through its App Store.

Epic Games CEO Tim Sweeney has been outspoken about the threat of a metaverse—something he considers an inevitability—run like an Apple ecosystem, governed by "one central company" and "more powerful than any government," he once told VentureBeat. His vision for the metaverse, which he shared with *The Washington Post* at length, entails a cyberspace made interoperable through *Fortnite* as a game platform and Epic Games' Unreal Engine.

It was funny, then, when a California judge told Epic, after the company unsuccessfully sued Apple, that "Epic Games seeks a systematic change which would result in tremendous monetary gain and wealth … [The lawsuit] is a mechanism to challenge the policies and practices of Apple and Google which are an impediment to Mr. Sweeney's vision of the oncoming metaverse." Ouch.

Similarly, John Riccitiello, CEO of competing game engine company Unity, agrees that Big Tech's vision for the metaverse is Orwellian. His solution? Everyone should use Unity. "It pulls down the height of the wall of the walled garden," he says.

Who wants a metaverse built the way Web 2.0 was? Who wants a metaverse built for scaling and making money? New open source metaverse

projects seek to combat the inevitability of this next total-service-environment internet. “I think we’ll probably see a Web 2.0 metaverse and a Web 3.0 metaverse—Web 2.0 being all of these Big Tech companies that are closed. They’re not going to give up their server-based models or data collection,” says Ryan Gill, cofounder and CEO of Crucible, an open metaverse project. “We’ll see a much quicker scale of the Web 2.0 metaverse. But the only way to Web 3.0 is decentralization.” The next web, Gill argues, should be architected on open protocols and standards, including blockchain technology. He thinks open source communities will contribute and be rewarded financially.

The Web 3.0 Gill describes looks endearingly like the Web 1.0 of the ’90s—disparate, user-run, decentralized, the web that gave birth to the idea of the metaverse. Somehow, the thinking goes, we got sidetracked into this whole Big Tech thing.

It’s possible that the metaverse idea is too flawed to exist in any incarnation. Connecting services so they can collect our data, track us, and dominate our attention even more completely will likely make the world worse, not better, at least for those of us who aren’t VPs at Meta or Microsoft.

While Big Tech’s marketing teams light up when we commune with their corporate blog posts, the reality may be that any metaverse born of their internet will be unfriendly to people. In truth, today’s metaverse could never be a web of freaky little planets. But it would stay faithful to the source material in at least one way: It would resemble *Snow Crash*’s 3D street if in addition to Amazon acting as landlord, most of the stores were owned by Amazon, too.

Angela Watercutter

Culture
11.02.2021 07:00 AM

Chloé Zhao Upends the Marvel Formula With *Eternals*

Reimagined characters, practical effects, intimate storytelling—the Oscar-winning director wants to alter what fans see in comic book movies.
Illustration: VANESSA SABA

Chloé Zhao was, she admits, nervous.

It was summer 2018, the day before the director was supposed to hit the road to film her next small indie film. Zhao was in a conference room at Walt Disney Studios in Burbank, pitching a Marvel movie. The studio's top brass were there—Kevin Feige, Nate Moore, Louis D'Esposito, and Victoria Alonso—and Zhao was defending her vision like a PhD thesis. Nothing impromptu, lots of visuals. Maybe a bit too formal.

Just in time, the History Channel show *Ancient Aliens* came to Zhao's rescue. Part of her idea for *Eternals* hinged on a saga of extraterrestrial contact on Earth—just like *Ancient Aliens*. That's when Feige, architect of the vast, intertwined Marvel Cinematic Universe, piped up: "I was just watching that the other day!" Spurred on, Zhao hit her groove. She spieled her vision, incorporating not just ancient aliens but also manga, Yuval Noah Harari's book *Sapiens*, and the visual similarities between *Final Fantasy* and the films of warrior-poet Terrence Malick.

In Hollywood parlance, Zhao sold it in the room. "It wasn't until that pitch that we solidified that we were even going to do *Eternals*," Feige says. Zhao just had to go shoot that other movie first—a quiet film with Frances

McDormand called *Nomadland*, which would go on to win the Best Picture Oscar. According to Zhao, “At the end of the meeting, Victoria said to me, ‘Make sure you come back, OK?’”

Fortunately, she did. After a few months in the American West, Zhao returned and started working on *Eternals*, the epic story of a race of immortals sent to protect Earth by cosmic beings known as the Celestials. That may sound like pinnacle popcorn fare, but Zhao aims to move far beyond cinematic junk food. An auteur with an eye for natural settings and a sensitivity for intimate, personal stories, she pushed to make sure her *Eternals* wasn’t just another computer-generated superhero movie full of coiffed crusaders with “Man” in their monikers. She shot much of it on location in England and the Canary Islands. She diversified the mostly white, all-straight cast of the original comic. Moore, a coproducer on the film, says Zhao has deconstructed who gets to be a Marvel hero—and reinvented the Marvel Cinematic Universe.

The myth of the Marvel movie goes something like this: Somewhere deep in the bowels of Disney, a brain trust dreams up the arc of the MCU’s phases. Stand-alone superhero flicks get seeded with the Easter eggs and MacGuffins that will propel them toward big team-up movies like *Captain America: Civil War* or *Avengers: Endgame*. Along the way, the studio gives wildly creative, big-talent-but-not-yet-big-name directors the keys to a race car but keeps strict control of the shape of the track. Feige rejects the notion that they all end up cogs in a Hollywood machine, but let’s be real. There’s a reason MCU movies have made some $9 billion in just the US and Canada. People know what to expect when they walk into the multiplex: sweet-looking suits, the destruction of New York City, guys named Chris.

This time around, though, there’s no infinity-sized punchfest on the horizon. Without an *Endgame* endgame, Marvel’s filmmakers have fewer limits and more paths they can take. Each movie can be different thematically, visually, emotionally. Fans got a taste of this in September with Destin Daniel Cretton’s *Shang-Chi and the Legend of the Ten Rings*, which, yes, had punching, but also more 1970s-style kung fu in its cinematic DNA than any Marvel movie before it.

Eternals ventures even further from the Marvel formula. Once Zhao came on board, she reworked the script and made a plan to shoot it in her style: minimal green screen, lots of location shoots, natural light, wide-angle lenses that can capture both close-up intimacy and vast landscapes within the same frame. (This is where the *Final Fantasy* and Terrence Malick influence comes in. Think *Tree of Life* with swords.) If that sounds like a departure from Marvel's house style, that's why they hired her. "I'm not going to try to do something different for the sake of doing something different—that's not interesting to me," Zhao says. "There's no reason for them to get someone like me just to shoot a movie on a soundstage."

As Moore puts it, hiring Zhao to make a film that looks more like her 2017 modern Western, *The Rider,* than *Iron Man 3* comes with the kinds of changes Marvel always says it wants to make "and then in the crunch of the schedule are the first things to get stripped away." Zhao, he notes, is not dissimilar to her former Sundance Screenwriters Lab classmate Ryan Coogler, director of *Black Panther*, in that they both "challenged our very system as to why we were doing things a certain way."

Instead of shiny, primary-colored razzle-dazzle, *Eternals*, in Zhao's care, occupies more muted, subtle tones. Some Marvel films may need big CGI worlds, but because her movie is about heroes who have been on Earth for 7,000 years, she wanted her cast to be able to interact with real physical spaces. And while *Eternals*' central characters must save Earth from the Deviants (you know, hero shit), according to Moore the film also challenges assumptions about what comic book characters should look like.

When it hits theaters in November, *Eternals* will be the first Marvel movie with a deaf star—Lauren Ridloff as Makkari. It will also feature Brian Tyree Henry's Phastos, one of the MCU's first openly gay superheroes. Several characters are a different race or gender than they were in Jack Kirby's original 1970s comics. Eternals are immortal cosmic beings, Moore notes, not supersoldiers. They don't all have to have six-pack abs. For Zhao, that's the point. Talk of inclusion gets tossed around a lot in Hollywood, but it often devolves into box-checking; she wants to honor her characters' diversity by making their personal identities part of the plot.

“There are many different ways a human being can be heroic,” Zhao says. “I want to explore as many as possible, so that more audiences can see themselves in these heroic moments and feel they can relate.”

This, too, speaks to Zhao’s strengths. Feige likens her to an anthropologist, someone who studies her subjects and then makes films showcasing their abilities. She did it with the real nomads featured in *Nomadland* and the Lakota rodeo cowboy at the heart of *The Rider*. For *Eternals*, she cross-pollinated the tale of human evolution in Harari’s *Sapiens* with Marvel’s own mythology to explore how extraterrestrials would have integrated with humanity over the course of millennia. It’s the kind of thing, Feige says, Marvel has to do to avoid repeating itself. “I told her during some dark, grind-filled days in the middle of production,” he says, “that it was her vision for this movie that made me think that, post-*Endgame*, the MCU could survive.”

It might also be a way forward for Zhao. One of her next projects is a reimagining of the Dracula story that’s being described as “a futuristic, sci-fi Western”—another canon (coffin?) for her to blow up. At one point in our conversation, I ask if she’d ever want to direct a Star Wars movie. Zhao showed up at Comic-Con International a few years ago in a T-shirt emblazoned with a crying stormtrooper and the message “I had friends on that Death Star,” so it seemed likely. She demurs on the question but immediately follows up with a confession: “I’m definitely on the dark side.” That might be exactly what the franchise needs.

Paul Ford

Ideas
10.28.2021 07:00 AM

Climate Stress Was Getting Me Down, So I Made a Clicker Game

In the game, you start as a lowly atmospheric scientist and you have to click “write grant” and wait.
Illustration: Elena Lacey

On cue, a flood came. We had prepared with long plastic gutter extenders that snaked away from the house, but water seeped into the basement anyway. I have a small piece of Wi-Fi-connected wall art that shows in colored LEDs where all the trains are in New York City. We watched as line after line went dark. Then we spent a long night rescuing storage boxes and bailing puddles with a takeout container. When the water wasn't burbling in, we checked Twitter, where you could see the storm in parallel—subway waterfalls, sink geysers, hallway creeks. There was a picture of someone trying to deliver food on a bike in waist-deep water. It all felt very cyberpunk: plastic tendrils coming off the house, social media threading the crisis in real time, gig workers directed into peril by the apps that control their lives, streets turned to liquid. But of course the sun came up.

We wandered around, groggy. Our next-door neighbor said he'd been here 20 years and had never seen this before, which made it a once-in-two-decades kind of event. No one had a sump pump. My shrink, who used to own a house a block away, said he could remember a big flood in the neighborhood maybe 30 or 35 years ago. Could have been longer. So: a three-times-a-century event. (Of course probability doesn't work like that; I was just trying to figure out how weird things might be getting.)

My shrink makes me repeat, many times a day: *I will remain calm no matter what.* And *No matter what happens, I can handle it.* And *I will broaden my expectations*. That's his whole thing. Stuff happens, remain calm, handle it. I started seeing him because I was yelling at my kids about stupid stuff (I've stopped, mostly), but it's not a bad approach for floods, either. We *did* stay calm under (hydrostatic) pressure. Another flood will surely come, though, which means it's time to broaden our expectations.

My wife and I accomplish this through shared spreadsheets. There's a lot to do—for example, I threw away the basement couch when it sprouted mushrooms—but most of the work reduces to the universal unit of home care: the Guy. Gutter guy, floor guy, roof guy, and plumber (there the "guy" is silent). They assume I'm also a guy, but it's my wife who works in construction, so I hide upstairs when they arrive. Later she comes up and draws diagrams on an epaper tablet to explain what's going to happen. I nod and say simple words as questions, like "Pipes?" or "Sewer?" That is our love language.

The spreadsheets are fine for dealing with our basement, but I don't think they'll scale to every basement on Earth. And because, like so many people, I'm obsessing over climate change, I've been looking for software tools that will help all of us plan. A friend recommended Temperate, which seems fine—let's call it a "climate mitigation wizard" for communities, to make sure you've thought about flooding, hurricanes, heat waves, and wildfires. I messed around with the free trial, but I'm not a community. Then I read through toolkit.climate.gov. The problem there is that the government offers around 500 "tools"—some websites, some PDFs—ranging from shareable sunscreen memes to calculators that tell you the pathogen risk at your local beach. It's like browsing the pamphlets in a health clinic. I did find some helpful checklists, but I am not a coastal wetland (yet), so they weren't as useful as they could have been.

Then I decided to make a Gantt chart in Google Docs. Named for its inventor, Henry Gantt, an early-20th-century mechanical engineer, this is a method of scheduling that turns projects into an orderly cascade of dependent tasks. Each task is represented by a bar on the chart, and when you finish one bar you step down to the next one: Dig the basement, then

pour the concrete. It's the go-to tool for what people call the “waterfall approach.”

This strategy is not fashionable in software development. A different methodology, Agile, is in vogue. Agile is a kind of witchcraft wherein a coven of developers form frequent “standups” to commit themselves to evil acts upon a code base, until finally Satan heeds their call and manifests working software. But I figured the waterfall approach is more appropriate for climate. I started to fill in my Gantt chart with big important things, like “incentivize nuclear power” and “educate all the girls.” Beneath those, I added substeps—a whole cascade of solutions!

I would not recommend doing what I did, because you'll quickly see that if we're going to get our act together by, say, 2030, that's a little under 100 months. So every month we need to be 1 percent down the waterfall. If we make 0 percent progress this month, the month we're in right now, then we have to make at least 1.01 percent progress the next month and every month after that. I don't know what you call this. Compound disinterest?

So in mild horror I trashed yet another Google Doc, never to be found again (have you ever tried to find a Google Doc?), and did something I've never done before. I made a game. Specifically, a clicker game. Clicker games started as parodies of MMO in-game grinding; i.e., you click and click to get increasingly ridiculous intermittent rewards. In *Cookie Clicker*, you “bake” cookies; in *Universal Paperclips,* you make more and more paper clips, until the entire universe is made of paper clips. Imagine a spreadsheet where every cell makes you click your mouse 20 times to do the calculation. Sound fun? It's not, really, but it's satisfying to watch a big number get bigger.

In the Gantt chart turned game, your number actually goes down, as carbon leaves the atmosphere. It took me a few weeks and some detours to make that happen, though. I couldn't find a good clicker game library, so I wrote my own. Then I needed to craft Clicker Game Markup Language. Then I didn't know TypeScript, which is the new, more uptight version of JavaScript, so I had to learn that. It's probably easier to take carbon out of the atmosphere than it is to keep a programmer on task (which is why you need Agile to hypnotize us into monstrous compliance).

In my game, as yet untitled, you start as a lowly atmospheric scientist and you have to click “write grant” and wait until you get enough money to earn grad students. Eventually the grad students measure enough temperatures that you get climate models. Finally you make trillions of dollars and use that to de-fossilize the global grid.

I know this game doesn't actually pull any carbon out of the atmosphere. In fact, in real life it adds carbon with every click, although less when I play it on my phone. But it's very calming to see all the enormous tasks in a stack, and it lets me simulate *doing* something. You have to imagine success before you can succeed. And the giant game-configuration file has become a kind of notebook as I learn about the world. When you click to “measure” the atmosphere, the game pulls real variables from climate models, like *air_pressure_at_sea_level* and *moisture_content_of_soil_layer*. It's fun to learn things when you're making something. Excruciating if not.

This is not to say it's a good game, or a fun one, or that it will have any impact in the world. I don't know if I'll release it. It's just a tool for planning, for broadening my expectations. Making things is how I understand the world, which is why I love technology. At a certain point we will have to accept that a very long crisis is just normal life, and if we are here we should keep moving forward, 1 percent this month, and another the next. We can remain calm no matter what. No matter what happens, we can handle it. I guess I should start going to protests.

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The Future Is Bleak. Pondering Pangaea Gives Me Hope

In 200 million years, our far-flung continents may join up again. It reminds us of humans' tiny place in this intergalactic drama.
Illustration: YUKAI DU

The human passion for gouging burnable stuff out of the earth and reducing it to ashes may well be the end of us. But it's not clear who the “us” is. Not you and me, obviously; we'll be lucky to see 2100. But “us” can't just mean our direct descendants, right? Does it have to mean hominids? Maybe humans of the far, far future don't even have to have blood or DNA to count as survivors. Hundreds of millions of years from now, we primates could live on in our component parts: oxygen, carbon, hydrogen, and nitrogen. We could have a kind of immortality of the elements.

Unlike the imperiled biosphere, Earth's crust and mantle, which are charged with many of the baseline ingredients of humans, show no signs of decline. In fact, they're having a heyday—erupting, grinding, migrating, and splintering in unpredictable ways. Recent data also indicates the plates are up to something supremely weird: making a discreet move toward reunification. Like gazing at the stars, contemplating the so-called deep future of Earth with a new supercontinent can take the sting out of bleak climate predictions for the nearer term.

In about 200 million years, our far-flung continents may join up again. Though progress toward the Pangaea Proxima, the next Pangaea, is slow, it is also measurable. Seismologists have found that the Mid-Atlantic Ridge, a

mountain range on the ocean floor that separates North America from Europe and Africa, is expanding about as fast as fingernails grow, broadening the Atlantic Ocean at a rate of some 4 centimeters per year. Meanwhile, the Nazca, a plate off the west coast of Peru, seems to be moving faster, about the speed that hair grows, which may be closing up the Pacific.

Of course, the chance that humans will exist to check the prediction is essentially zero. But to study the deep future is to recognize that flora and fauna, human fauna included, may be bit players in the fathomless intergalactic drama of chemicals.

Eons in advance, then, cartographers and earth scientists are clocking continental drift and fantasizing about new worlds. “Amasia” is the name for a hypothetical supercontinent formed when Asia, Africa, North America, South America, Europe, and Australia all fuse around the north pole. An even deeper-future hypothesis, which might take 250 million years, is called “Aurica,” the coalescence of all seven continents, including Antarctica, around the equator. It will no doubt be useful that the next Pangaeae are named in advance, so the rocks will have something to call themselves.

This past January, British seismologists based at the University of Southampton on England's south coast—Southampton was the illustrious departure port for the *Mayflower* and the RMS *Titanic* (so they care about geological oceanography)—found new ways to observe mantle convection, some 400 miles below Earth's crust and more than a thousand miles from its core. The material there is surging. As plates move apart along the Mid-Atlantic Ridge, material rises to fill the space between them. As the team reported in a paper published in *Nature*, these surges could shove tectonic plates up from below and help push the continents farther apart (meaning, since this is a sphere we're talking about, closer together around the back).

Nicholas Harmon, the lead scientist, succumbed admirably to dad-joke temptation when he announced these findings: “There is a growing distance between North America and Europe, and it is not driven by political or philosophical differences,” he said in a press release. “It is caused by mantle convection!”

And while this convection is brewing, the tip-top of the blue planet is also shifting uneasily. In the past few years, academic geomagnetists who oversee the World Magnetic Model, which maps the Earth's magnetic field and makes possible all navigation from Google Maps to naval systems, have noticed significant mapping errors. It seems that liquid iron sloshing around in Earth's core has driven the north magnetic pole away from Canada and put it on a collision course with Siberia. The speed of this polar migration has increased from 9 miles per year to 34 miles per year during the past two decades. *The north pole. Moving fast.* (A question for political science: Does this mean polarization is increasing or decreasing?)

Plate tectonics is one of the most romantic theories in all of science. Because it incorporates both revelations and hard data, and because its proponents, notably the illustrious American geologist and ocean cartographer Marie Tharp, faced cruel rejection by scientists followed by warm embrace, the theory is often used to exemplify how ideas evolve. It's built on an insight from the so-called golden age of Netherlandish cartography—unforgettable—when mapmaker Abraham Ortelius of the Low Countries spotted the continents' resemblance to pottery shards. The Americas, he wrote in *Thesaurus Geographicus* in the late 16th century, were "torn away from Europe and Africa … by earthquakes and floods."

In 1912, Alfred Wegener, a dashing German meteorologist and record-setting balloonist, concurred, and further suggested that the landmasses once composed a supercontinent, which broke into pieces that drifted apart. *E unus pluribum*. To close his case for what he called "continental displacement," Wegener referred to matching fossils of plants and animals on opposite sides of the Atlantic. He also cut up maps, fit the pieces together, and named the assemblage Pangaea. His insight was savaged as the rantings of a madman. It is now considered patently true.

From Wegener's time until into the 1960s, earth scientists extended Wegener's apprehensions to describe plate tectonics, the motion of the massive components of the Earth's crust and upper mantle—its lithosphere. While deeper spheres have greater plasticity, the lithosphere responds to stress by deforming either elastically or through brittle failure. Stress

deforms and breaks the planet, and produces mountains, volcanoes, and earthquakes.

Perhaps plate tectonics is such a poignant idea because it reminds us that the whole glorious and dangerous topography of the Earth is determined by stress, collisions, upwellings, and ruptures. We're right to dwell on the biosphere, because we dwell *in* it, and it's us. But we also owe our existence to the dynamism under our feet. In the cracking, surging lithosphere, after all, are the primordial ooze, stones, clay, and ashes we're made of—our chemical kin, to whom the planet has belonged all along.
