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Introduction

The Bicycle City

"Every time I see an adult on a bicycle,
I no longer despair for the future of the human race."
—H. G. Wells

In his 1896 book The Wheels of Chance: A Bicycling Idyll, H. G. Wells told the story of a young man learning to ride a bicycle, which was a new invention at the time. After he had spent a day successfully learning to ride, "a new delight was in his eyes, quite over and above the pleasure of rushing through the keen, sweet, morning air. He reached out his thumb and twanged his bell out of sheer happiness."

Freedom, joy, exhilaration, even transcendence. This is the aspirational language of bicycles. Bikes are not just for getting around or for getting exercise; they mediate our experience of places. A bicycle changes how we experience our cities, and in so doing it can help us to unlock the possibilities inherent in the places we live.

The places we live desperately need our help. From small towns to major metropolitan areas, our cities are struggling under the weight of decades of automobile-centric development. We are left with homogeneous and redundant collections of strip malls and parking lots. These places are inequitable, bad for the planet, and bad for our physical and mental health. The places we

live can better suit our needs as humans, but we need to free ourselves from the car. This does not necessarily require banishing cars from cities, but it does mean no longer relying on them. We need to create a *car-lite* urban future, and bicycles can help us get there. This is more than just a narrative—the facts support it. Tracing the Dutch or the Danish approach to bicycle urbanism demonstrates the power of bicycles as change agents.

The conventional wisdom is that change takes time, but time is no longer on our side. If we are to address the climate crisis to preserve a livable planet for today, as well as for future generations, our cities need to change quickly. I wrote this book because I believe that it is possible to transform our cities to meet our needs and those of the planet. We can do it in time to avert the worst effects of global warming. And we can do it with the bicycle.

We are at a unique moment in the history of cities, an inflection point that can determine the fate of the planet, whether through concerted action or continued inaction. In this book, I have tried to capture the moment, the knowledge, the lived experience, and the lessons of right now to chart a path to a brighter future.

Three recent developments demonstrate that today is different and the bicycle is different: (1) the advent of e-bike technology and the ubiquity of shared bicycle mobility, (2) the introduction of an ever-widening range of cargo bikes to fit a range of needs and users, and (3) the demand for a better way to travel in our cities during the pandemic. Bike-sharing systems have been around since the 1960s in one form or another, and the first cargo bikes can be traced to the start of the nineteenth century. But the most recent development in cycling, the widespread introduction of the electric-assist motor, has revolutionized cycling as we know it.

I started this book a year after arriving in Oslo, Norway. Mid-pandemic, my family and I sold most of our possessions and moved from our midwestern home in Lincoln, Nebraska, to the Norwegian capital. We were excited about our new adventure—a new language and culture, a new country known for natural beauty and a commitment to sustainability. The process has not been easy, but it has been rewarding. As someone who has devoted his career to sustainable urbanism, it has given me hope for our future as a species to see how much progress Oslo (alongside so many other European cities) has made

in a few short years. But by far the most surprising aspect of this adventure has been the clarity with which I can look back across the Atlantic and see the possibilities for the future of American cities.

The urban future we need is one in which cities are dynamic and vibrant environments, with convenient access to everything we need, close enough to reach by bike. What might surprise readers is that this future will be less bike centric than we think. Not everyone needs to ride a bike today or in the future, but bikes are a crucial first step to making car-lite living a reality. For example, while Amsterdam might seem like a bicycle utopia, twice as many people walk and take transit to work as ride every day. The success of Amsterdam is that so few people drive, not that so many people ride a bike. The point of bikes is to help us get there. The goal is making cities better with bikes, rather than for bikes.

The bicycle city is a city where bicycles are the catalyst, not the end goal. Making cities better with bikes means decentering bikes from the narrative. Investing in bicycling has immediate effects, like more people bicycling, but that is only the beginning. In the longer term, modest investments in good infrastructure—infrastructure that makes people want to get out of their cars—lead to fundamental changes in the places we live. The changes help to create places that are welcoming to people—vibrant places where people can interact without fear of being run over by cars, where people can spend time, visit friends or make new ones, and support local shops and restaurants. Ideally, these places have housing options and schools nearby. They can in turn be connected to similar places by bike lanes and transit lines.

Not everyone wants to ride a bike, and not everyone is able to ride a bike. Some people might change their mind given the right circumstances, but a significant number of people will likely never choose to ride or be able to ride. This reality is often forgotten (or ignored) in the conversation about bicycles. It is why we need to talk about bicycles as a means and not an end. Fortunately, if done right, investing in bicycles can improve transportation options for everyone.

Accommodating bicycling in a city can make streets safer and more welcoming for all users. By encouraging bicycling, neighborhoods can become denser, more walkable, and more transit friendly. Planning cities at the scale

Øvre Slottsgate, a car-lite street in central Oslo, Norway. It is one of many changed streets resulting from the city's Car-Free Livability Program. (Credit: Terje Elvsaas)

of the bicycle has the exact opposite effect of making cities around cars. To do this, we need to bring bicycles into the mainstream of transportation. Promoting bicycling in the United States has not been very effective because we do not consider it real transportation. This is largely because historically the practicalities of bicycles have been obscured. Bicycles are treated like toys and not tools by our transportation system. In this way, the very real fun of riding a bike (in addition to its practical benefits) becomes a means to discount its benefits for riders and for cities.

In the United States, there has been very little headway in getting people out of cars, and where there has been progress, it has not been equitable. Walkable and bikeable places are often the least affordable. They are also frequently arrived at through gentrification, creating a damaging link between bicycle infrastructure and displacement. The pattern is this: as wealthy, young White gentrifiers move from the suburbs into urban neighborhoods, bike

lanes are seen as a "rolling signifier"[1] of historical disinvestment and racism, as well as of gentrification and displacement of working-class communities and communities of color. While recent research suggests that bike infrastructure tends to come after gentrification and displacement[2] (rather than paving the way for it), bike and pedestrian infrastructure still tends to be the first thing local officials want to talk about (and avoid topics like clean drinking water, overpolicing, or basic accommodations for people with disabilities).

Bicycle urbanism—a loose term for the advocacy movement to foster bicycle-centered cities—has been incredibly successful at reshaping cities to better accommodate biking and walking. But the success of bicycle urbanism, more specifically the way it centers on the *bicycle* part of bicycle urbanism, has made it hard to translate to American cities. There is a far-off, fairy-tale quality to it. The qualitative benefits of the bicycle—the delight that H. G. Wells wrote of—overshadows its quantifiable benefits. The bicycle part of bicycle urbanism becomes the reason it is inapplicable to a big, car-loving country like the United States. It is the result of two cherry-picked narratives, loosely based in history but peppered with myth: the car country narrative and the bicycle urbanism narrative. Revisiting these narratives and looking at them with sober eyes helps us to dispel them.

Car Country

I was a year old when Willie Nelson released "On the Road Again." The song was a fixture on the radio over years of family road trips throughout my childhood. My parents, part of the baby boom generation, grew up in the era of songs like "Little Deuce Coupe" by the Beach Boys (1963) and "Born to Be Wild," performed by Steppenwolf in 1969. This was a time lionized by movies like George Lucas's *American Graffiti* (1973). The songs and movies of the time celebrated the car and all it represented.

We built our cities and lifestyles around cars but, more important, around a dream of what our car-centered life could be: a facade alluding to a dream life, not actually a dream life. In his book *Bicycle Diaries*, David Byrne muses on the aspirational symbolism of modern life. He describes cell phone ringtones as "signs" for "real" music, "music not meant to be actually listened to as music, but to remind you of and refer to other, real, music." He

takes this metaphor further, applying it to the suburbs of the cities he visits, characterizing suburbs as "a visual 'description' of a place, but they are not that place." He sees the suburb as a landscape without the heart or soul of a real, lived space, a perfect landscape that "has retained its surface familiarity, virtually, but the deep reasons for its existence—the social and sensual—have been eliminated."[3]

Car culture was birthed in the United States, but culture is not destiny. With the benefit of hindsight, we can see the Pandora's box we opened by investing entirely in car-focused suburban living. The specter of car culture as American identity is a compelling straw man that has successfully blocked most attempts at improving our lives and our communities by reducing auto dependence. People can and do change their behavior all the time. We have the capacity to adapt to changing environments and circumstances. That adaptability is a prerequisite for our continued health and well-being in the face of the climate crisis.

There is growing momentum for reducing car dependence. Generational shifts are demonstrating that the "heartbeat of America" is just a hollow marketing slogan. Millennials, who grew up spending more time being driven to places by their parents than any previous generation, are now driving less than baby boomers or Gen Xers.[4] It's too early to tell whether this trend will continue with Gen Z, but it's a hopeful sign.

The United States today needs a rapid and comprehensive urban transition. We need to move away from fossil fuels and unsustainable lifestyles. We need to transition to sustainable lifestyles in cities that are built around people and not cars—cities that meet the needs of all their residents in sustainable and resilient ways.

The potential is there, but reality is lagging. According to the National Household Travel Survey, currently only about 1 percent of trips nationally are by bike.[5] According to the American Community Survey, 3–6 percent of people commute to work by bike daily in bike-friendly cities like Portland, Minneapolis, or Washington, DC.[6] This pales in comparison with the world's bike capital, Amsterdam, where about 40 percent of people commute by bike.[7] There is an obvious built environment component to this: European cities are, generally, denser than US cities. Most American cities were built

around cars, whereas most European cities were built long before the invention of the automobile.

There is reason to hope. In the past few decades, the world has done frighteningly little to address the climate crisis in equitable and effective ways. But freeway removal projects from San Francisco to Seoul and Milwaukee to Madrid have slowly demonstrated the benefits of reorienting our cities toward people. And in the years since the start of the COVID-19 pandemic, ideas such as congestion pricing, "15-minute cities" (the idea that everyone in a city should be able to reach everything they need in a fifteen-minute walk or bike ride), and car-free cities have gone from the fringe to the mainstream.

But the conversation about the future of American cities, and American transportation, trends heavily toward technocratic thinking and could probably use some of the anachronistic humanism associated with the bicycle. The future of mobility focuses narrowly on driverless cars, electrification, and car sharing (i.e., ride hailing). All of these approaches have been roundly criticized as doing nothing more than maintaining an unsustainable, car-centric status quo.[8] In contrast, the future for personal mobility—primarily bikes—offers too many potential benefits to count.

Fifty years after the oil embargo that led the Dutch to embrace bicycles, another crisis, the pandemic, has led to a boom in bicycling and a radical rethinking of the future of urban mobility. The possibility of a car-lite urban future is very real.

Bicycle Urbanism

The undisputed capital of bicycle urbanism is Amsterdam. The idea of the bicycle as urban savior features heavily in the origin story of Amsterdam (and the Netherlands in general) as a bicycle paradise. If you have had the chance to visit Amsterdam, you know that it is both truth and marketing. Amsterdam functions for its residents in so many positive ways because of its reliance on the bicycle as a foundation for moving around the city. If you haven't been to Amsterdam, you have almost definitely seen the pictures, videos, memes, and commentary that are so ubiquitous in the media surrounding bicycle urbanism.

Bicycle urbanism in Amsterdam. (Credit: iStock/lechatnoir)

Despite its truth, sometimes the bicycle urbanism narrative does more harm than good. There's a quasi-religious quality to it that can be divisive (i.e., there are bike people, and there is everyone else) and can obscure two important truths: (1) bicycles make cities better for everyone, not just for cyclists, and (2) bicycles can work anywhere, from cities to small towns, and are not just for Europe's metropolitan elite (whatever that means).

Bicycles have inspired devotion because they really are a great invention with a lot of potential. The devotion followed the utility, but sometimes this fact gets lost. The story of Amsterdam as a bicycle paradise illustrates this point.

The story goes that the bicycle has, since its inception, been central to Dutch culture. In the postwar years of the 1950s, as people watched their streets cede space to cars, they organized and fought back. In response to the growing number of people killed by Dutch motorists (3,000 people were killed in 1971, of whom 450 were children), activists started the Stop de Kindermoord (Stop the Murder of Children) movement, demanding better bicycle infrastructure in Dutch cities.[9] Opposition to the car grew throughout

the 1960s, and the 1970s oil crisis pushed the government to act. The Dutch loved their precious bicycles, bikes do not depend on oil, and bike lanes are cheap. At the confluence of culture, organized protest, and the economics of an unprecedented global energy crisis, the bicycle city was born.

As with any story that is told repeatedly, the details blur and the nuance is lost. The root of the aspirational narrative of bicycling may be that the Dutch story is often told backward, confusing correlation with causation. The bicycle holds a special place in Dutch culture, but cultural affinity goes only so far. The Dutch are notoriously direct, analytical, and industrious. The story of a people so in love with a nineteenth-century toy that they rebuilt their cities around it invokes an anachronistic charm that can feel especially appealing in today's increasingly technocratic world but has little basis in reality.

Almost next door to the Dutch (the Netherlands and Denmark don't share a border), the Danes came to similar conclusions about bicycles. Their capital, Copenhagen, has more than kept pace with Amsterdam as a world leader in bicycle urbanism. But there's no historical evidence of any particular love of the bicycle in Danish culture. Copenhagen's tourism website states: "What is it about Copenhageners that makes them take to the bicycle every morning come rain, sleet, or snow? Is the average Copenhagener more eco-conscious than you? Hardly. Is it because they're all a bunch of health freaks? Not a chance. Or maybe because the bicycle is just part of the Danish DNA? Nope. It comes down to three important factors: Infrastructure, infrastructure, and infrastructure."[10]

Despite the world-renowned bicycle pedigree the Dutch are so well known for, the myriad similarities between Denmark and the Netherlands help to create an imperfect natural experiment: when controlled for as many other factors as possible, "bike culture" does not appear significant in jump-starting an urban transition away from the car.

The Dutch and the Danes realized the benefits of bicycles for everyone, not just people on bikes. While they have spent the past fifty years realizing those benefits and refining their unique versions of bicycle urbanism, the United States has continued to obsessively pave more miles of highways. The results of these distinct paths are clear. Bikes support vibrant places and livable streets; cars do not. Bicycle urbanism supports compact and sustainable cities, while

auto dependence precludes sustainability. Bicycle urbanism fosters the kinds of places that require less infrastructure to support and maintain, the kinds of places that encourage community and build social capital. Bicycles are cheap, convenient, and useful. They are safe and efficient and do not inhibit other uses of public streets. Bike infrastructure costs almost nothing compared with wide roads and parking lots, but also compared with public transit.

The benefits of bicycles were also self-evident on the other side of the world, to the Communist government of the People's Republic of China. During the post–World War II era, China was sometimes called a "bicycle kingdom" thanks to the millions of Flying Pigeon bicycles produced and ridden daily over the course of about forty years from 1950 to 1990. The benefits of the bicycle as a cheap and flexible transport mode were clear to a rapidly industrializing country that didn't have money to spend on public transit. Unfortunately, starting in the 1990s, cars began to replace bicycles. Driving became associated with progress.[11] By 2010, more cars were sold in China than in any other country.[12] In 2022, 33 percent of car sales worldwide were in China.[13]

In the late 1960s and early 1970s, Amsterdam and Copenhagen were on similar trajectories toward auto dependence, but a global energy crisis galvanized support for a dramatic course correction in urban development. Looking at the intervening decades, we can trace the urban development trajectories of the Dutch and the Danes and see how they resulted in very different outcomes from that in the United States. Rather than an urban transformation in support of cities for cars, these two nations used the bicycle to transition toward what the Danish architect and designer Jan Gehl calls human-scaled cities.

What happened to the United States? We were not immune to the effects of the 1970s oil crisis, but it inspired a push toward fuel efficiency and a reliance on domestic oil rather than a rethinking of auto dependence. In the intervening decades, we have done little to course correct away from auto dominance, with the exception of some efforts by larger, progressive cities. Because of this piecemeal approach to bicycle urbanism, these efforts resulted in high-priced islands of walkable and bikeable places in seas of suburban auto dependence.[14]

Path dependence helps to explain America's auto addiction: the sheer momentum of a country as big as the United States and an economic and political engine myopically focused on creating the auto age. The auto age began at the start of the twentieth century, and we have not meaningfully strayed from a path of car-centric development since.

The creation and maintenance of auto dependence in the United States is a lot like the massive container ships that maintain global supply chains. These ships, which can weigh a quarter of a million tons when loaded with thousands of containers, are incapable of doing anything quickly. They require hours and miles to speed up, slow down, or turn. Getting something this massive to deviate from its current course and trajectory is not easy.

That's not to say it's impossible to course correct. But the work of reducing auto dependence in US cities is slow going. It is early days yet in the United States' effort to pivot toward human-centered living. Efforts to promote or encourage bicycling often feel like Band-Aids or consolation prizes in American cities or tokens to appease frustrated bike advocates while still maintaining the auto-oriented status quo. Because of this, most Americans have never seen or experienced the very real benefits of bicycles, to individuals or to the community. Or, if they have, they have seen it only in marketing materials to encourage Amsterdam tourism, not viable strategies to improve their own hometowns.

Unlike the Dutch and the Danes, Americans have not put any real effort into using the bicycle as a viable means of transportation. In the 1960s and 1970s, the baby boom kids who grew up riding Schwinn bicycles—heavy, straight-gauge steel behemoths welded by World War II veterans in factories in the Midwest—came of age and were inspired by the environmental movement to change their lifestyle. The bicycle became central to a cleaner, greener way of life.

But larger forces—market forces and policies and planning favoring the car—prevailed. Just as the hippie environmentalism of the 1970s became a caricature of itself, so did the bicycle. To be a cyclist meant embodying all the negative stereotypes of the anachronistic hippie: a child of privilege who had turned on, tuned in, and dropped out, hugging trees and getting high while the rest of world continued on with the serious business of reality. The

bicycle was no longer just a bicycle but a constellation of symbolic identities, including privileged Whiteness, radical environmentalism, and a general incompatibility with modern society. These associations continue to plague bicycle advocacy today and can explain why, for example, national policies for electrifying vehicles can proceed apace while national-level support for electric bicycles languishes, despite the fact that e-bikes are outselling electric vehicles by a wide margin.[15]

Electronic bikes—e-bikes—are simple. Just take a standard bicycle and add a small electric motor and rechargeable battery pack. The crucial difference between an e-bike and a motorcycle or moped is that the e-bike motor engages only when the rider pedals. This distinction has been codified into state legislation in much of the country and was developed to distinguish e-bikes from other forms of motorized transport, such as motorcycles and mopeds, and to provide some clarity for US bicycle manufacturers.

E-assist technology has been integrated into all types of bicycles and increasingly into bikeshare systems. E-assist is available on high-end mountain and road bikes for the spandex crowd. It is especially popular among older people who want to stay active but appreciate the assistance and couples where one person may need the e-assist to keep pace.

But the real explosion in e-bikes has been among commuters, delivery riders, older people, people with disabilities, and others who may not immediately identify as cyclists. It is helped by an expanding range of electric cargo bicycles that can cater to all types of people and needs. Cargo bikes, until recently a niche product, at least in the United States, are suddenly growing in popularity across the country thanks to electric-assist motors. With e-assist, cargo bikes are being adapted for urban freight delivery, family transportation, and a growing range of specialized needs. E-bicycles and e-cargo bikes can meet more needs for more people than standard bicycles ever could. It is a simple innovation that is changing the game.

The Pandemic Bike Boom

We may never know the human cost of the coronavirus pandemic, but there are some important lessons for cities and urban transport that we cannot ignore. The first is that more people than ever before got out on their bikes

when they were stuck at home. The second lesson of the pandemic is that things can change fast—almost unbelievably so. The pandemic bike boom was simultaneously shocking and obvious. While it can be difficult to separate hopes from facts, the lesson is that we have agency to manifest the things we require from our cities.

There's a bad joke in the bike industry (and probably in a dozen other industries): How do you make a little money from a bike shop? Start with a lot. But in the bike industry's case, the pandemic changed everything. Almost immediately after the pandemic began, bike shops were suddenly busy. Surprising everyone, especially those in the bike world, bike shops were busier than they had ever been. It wasn't only shops: the bike industry—from frame builders to parts manufacturers—couldn't keep pace with demand, and that trend continued for at least two years.[16]

The demand for bicycles coincided with a demand for public space tailored to people. Politicians and planners took notice. People needed places to gather while also mitigating the spread of an airborne virus—that is, outdoor spaces. Between parking lots and wide streets, American cities have a lot of underutilized space between buildings. Suddenly, the types of changes for which so many of us have been advocating for years, retaking streets from cars and giving them back to the people who live on them, was not just possible but actually happening.

Almost overnight in March 2020, traffic disappeared from streets and highways. Some people switched to remote work, others lost their jobs, and still others continued to go to work in person. I physically shudder every time I hear the term "new normal," but we all were suddenly, rapidly, confronted with exactly that.

As the initial shock of the pandemic faded and our understanding of the coronavirus evolved, people began coming out into the streets and seeing potential where they once saw only traffic, realizing that being stuck at home didn't have to mean stuck inside. Without a daily commute, people had additional hours per day at their disposal. One study found a 16 percent increase in bicycling in the United States from 2019 to 2020, with most of that additional riding done on weekends.[17] For bike mechanics who worked through the early days of the pandemic, it seemed as if every bicycle in every

garage and basement in the United States rolled through their shop for the first tune-up in years (or ever).

Nationally and globally, urban spaces were reinvigorated. Approximately two hundred US cities changed their streets—for example, by instituting traffic calming and closing car lanes—in an effort to support increased bicycling in their communities.[18] The presence of people and the (relative) absence of cars fundamentally changes a place. Research demonstrates that these places become safer from car crashes and create a positive feedback loop in which the presence of people begets more of the same.[19] And businesses and politicians followed. Street closures for outdoor events, food trucks, and outdoor cafés all contributed to an increasingly bold experiment in urbanism.

But the pandemic bike boom is about more than bicycling; it is about urban resilience—the ability to withstand or recover quickly from shocks. The bicycle just happens to feature prominently as a side effect, a release valve for some of the pressures the pandemic placed on people and places. What happened with bicycling is also a proof of concept for what so many urbanists have been advocating for decades: cities for people.[20]

Deus ex Machina

I started this chapter with a quote from H. G. Wells: "Every time I see an adult on a bicycle, I no longer despair for the future of the human race." I have a complicated relationship with this quote. I find it both inspirational and sanctimonious. On the one hand, it offers hope to the faithful that the bicycle is the answer to all our problems—the simple solution to a complex problem. On the other, it leaves no room for those who are not sold on the dream of bicycle utopia.

I am not saying that riding a bike isn't fun. I count myself as a cyclist, and I have experienced the exhilaration and freedom, the newness of places experienced by bike. But the *whole bike thing* can be exclusionary, sexist, ableist, expensive, and exhausting to a lot of people, negating any potential value of a bicycle for helping to create better, more sustainable, and more inclusive cities.

I advocate for using the bicycle to enable rapid but incremental changes that, to paraphrase the most common definition of sustainability, improve

the conditions of the present while also improving conditions for future generations.[21] That means meeting everyone's needs, not only the needs of those who currently ride a bike or those who could be convinced to do so. Meeting everyone's needs requires thinking beyond bicycle cities and simply striving for high-quality places where cars are unnecessary for most people most of the time. In such places, bicycling is safe and convenient but also transit is clean, efficient, and dependable, and those who do need to use a car, such as people with disabilities, have the ability to do so. High-quality places that meet everyone's needs combine form and function—urban density that is not oppressive, convenient access to destinations, and a range of options for getting there.

This combination of form and function, at a price a normal person can afford, is vanishingly rare in the United States.[22] The challenge is to move from automobile dependence to higher and better uses of our shared urban spaces. Bicycles can get us there. We don't need to wait for Silicon Valley to figure out autonomous vehicle technology. We don't all need to buy electric cars, and we don't need to build a new national grid to charge them. Bicycles are here, and they are proven. I am hopeful that it is not too late.

Almost everyone is familiar with the story of the frog in the pot. As the story goes, if a frog is placed in boiling water it will jump out, but if it is put in tepid water and the temperature is raised slowly, it won't notice and will boil to death. It has become the go-to metaphor for humanity's response, or lack thereof, to global warming. Al Gore used it in his 2006 documentary *An Inconvenient Truth* (in Gore's version, the frog was rescued before it could be harmed). The assumption is that climate change takes place too gradually for us to grasp its severity,[23] and therefore we neglect to act until it is too late.

But the climate is changing fast enough for us all to see. Every year and every decade, we are experiencing new weather extremes and breaking global temperature predictions. The 1990s were the hottest decade on record, then the 2000s, and then the 2010s. Every summer brings new variations of the phrase "This is the hottest summer so far and the coolest summer of the rest of our lives."[24] The most recent report of the Intergovernmental Panel on Climate Change (as of this writing) warns that the window for mitigating the most dire consequences of climate change—by limiting global warming to 1.5°C (2.7°F)—is narrowing.[25]

It's easy (for me, at least) to panic or become paralyzed by the apparent inevitability of global warming, but the reality is that there is no such thing as too late. It is definitely too late for our current climate—the one we know, can trace historically, and understand. Jeff Goodell, author of the book *The Heat Will Kill You First: Life and Death on a Scorched Planet*, makes the point that people tend to assume we can reverse the changes we have caused to our planet, but that is "a profound misunderstanding of the moment that we're in. . . . We are moving into a different world, and we need to grasp that idea."[26]

Goodell likens current thinking about the climate crisis to the American experience with the Clean Air Act, which was extremely effective at reducing air pollution (and its associated health and environmental consequences).[27] Because of the success of efforts such as the Clean Air Act, we tend to think of climate change as reversible. But the nature of the problem is different. Smog and particulate matter—the primary targets of the Clean Air Act—were comparatively simple to clean up and had few lasting consequences for the planet. As Goodell points out, carbon dioxide "is essentially permanent when we put it up there. . . . And the warming will not stop until we stop emitting CO_2 and burning fossil fuels. . . . And even if we stop CO_2, we are stuck with that warming planet for a very long time."[28]

The frog hasn't boiled. Leaving behind the climate of the past and entering an unknown new climate reality is not a reason to give up. Cities have the potential to address the short-term uncertainties of a new climate that will be hotter and less predictable. And if done correctly, those same adaptations can become the long-term solution to stopping emissions and in turn stopping further warming. An urban climate solution is, in turn, a global climate solution.

According to the United Nations Environment Programme, cities are responsible for about 75 percent of global emissions and are home to more than half of Earth's population.[29] The solution starts with changing how we travel and ends with changing our cities. And the bicycle (with or without electronic assistance) is the key to this plan. People need alternatives to the car. Many cities lack the money or political will to invest in transit, but bicycling is cheap and can use existing infrastructure. Development can change to

serve people on bikes; such development is denser and can encourage walking. Urban density is more efficient and sustainable; that is, more people can be served by less infrastructure. Denser places are more resilient because there is less physical space that needs to be maintained and potentially protected from extreme weather. Finally, the additional transportation options associated with denser places mean more flexibility in the case of evacuation, as opposed to having everyone with a car stuck in traffic and everyone without a car stuck in the path of danger.

Cities for Everyone

An effective urban transition starts with people and ends with places. It is easy to lose sight of the fact that we all have had a hand, directly or indirectly, in shaping our cities. Most people don't think about the systems in place in our cities that have created haves and have-nots. The transportation system plays an integral part in feeding an unsustainable and unjust system.

Housing policies that placed the American dream of a house with a yard within reach of so many depended on federal transportation spending on roads and highways to connect cities and suburbs. These same systems—the combination of transportation and development policies and programs—have for generations led to systematic disinvestment in and devastation of marginalized communities and communities of color. The systems that spurred homeownership and intergenerational wealth have resulted in the wealth of White families being ten times that of Black families.[30]

The Black Lives Matter movement has drawn national attention back to inequities in American society. As with the civil rights movement a generation earlier, Black Lives Matter protests were frequently held on roads and highways, blocking traffic as a means to be heard. The streets and freeways employed as a stage for protest also highlight the discriminatory practices, and violent outcomes, that characterize policing in the United States. A 2020 study published in *Nature Human Behaviour* examined racial disparities in traffic stops across the United States and found that Black and Hispanic drivers were stopped and searched more often than White drivers.[31] Furthermore, in 2022, police were more likely to harm or kill people of color in traffic stops, including stops for minor infractions.[32]

Transportation policy rarely addresses the role of automobile dependence in perpetuating violence against people of color, but it is essential that as we transition away from auto dependence, we do not repeat past mistakes. Advocates for healthy and livable cities often cite equity goals alongside sustainability goals—a racial justice version of greenwashing. Bicycle advocacy and promotion, in turn, has a well-documented history of equity and inclusion problems. To be absolutely clear, the bicycle, electric, shared, or otherwise, is not a panacea for society's problems. At its best, the bicycle is a catalyst.

We cannot address the climate crisis in a truly sustainable way without simultaneously addressing the role of transportation in systemic racism, segregation, and gentrification. Doing so via mobility transitions is an indirect and modest solution at best, further social justice greenwashing at worst. But using every tool we have at our disposal to address the immediate inequities in our society is a start. I use the pronoun "we" here purposely because this is not a process that can done without everyone in the room.

Something as simple and utilitarian as an e-bike, when put in the hands of those who need it (via incentives, grants, tax breaks, or shared services), can be a viable car replacement at a fraction of the cost. Flexible housing and zoning programs—the kinds that increase access to homeownership for those who cannot qualify for traditional mortgages—are made more viable without parking requirements. And reducing automobile ownership means not only more space on roads but also more empty garages that can be converted into living spaces, which can be rented out for supplemental income or used by extended family to foster intergenerational living.

This may sound naïve, but it is all well within the realm of possibility. Equitable and flexible housing policies depend on our fundamentally altering our relationship with the car. Reducing city space devoted to cars (and parking)[33] is essential. Momentum for this is growing in the United States and internationally, but people still need to get around quickly and efficiently. They need to be able to travel with family members and with their stuff. Improving public transit is essential to this, as is retrofitting our communities to have more destinations closer.

The first step is to put a viable car replacement within reach of a majority of Americans. Once that is done, we can work our way toward the real goals

of car-lite urbanism. Getting from here (auto dependence) to there (a car-lite urban future) will look different in every community. Creating sustainable, equitable, and livable cities means rethinking transportation as connected to all of the current problems in our cities but also as a key to unlocking the potential of our cities, and quickly.

The challenges and opportunities for our cities span infrastructure, policy, and human behavior. They require us to better utilize the land and resources we have while preserving natural resources, all in sustainable and equitable ways. According to the authors of the Intergovernmental Panel on Climate Change's 2022 report, the path forward for a shared human future can be realized "by involving everyone in planning, attention to equity and justice, and drawing on Indigenous and local knowledge."[34]

We have struggled in the United States to best utilize the tools we have at our disposal to address our most pressing societal problems. In the case of the bicycle, we have been hobbled by the path dependence of a century of auto-oriented planning—a century that has enshrined unhealthy, inequitable, and unsustainable urbanism in our daily lives and the shape of our cities. The introduction of e-bikes has changed the game in bicycle urbanism, broadening the base of support and enthusiasm for changing the way we get around. In light of new technologies, options, and opportunities, we can reenvision the bicycle as a catalyst for urban change. We can harness the post-pandemic bike boom, and the emergence of electric bikes and cargo bikes, to push an urban transition to a future that is not about making cities better *for* bikes but making cities better *with* bikes.

1

The Pandemic and the Bicycle Boom

Cities were hit first and hardest by the initial waves of the COVID-19 pandemic in 2020. Buses stopped running; stores, schools, and offices closed. In New York City, those living near hospitals witnessed in shocking disbelief the arrival of temporary morgues—refrigerated trailers parked outside hospitals, called body collection points by emergency planners.[1]

In what felt like a doomsday situation, lockdowns emptied the streets. The only people going out were medical professionals, service workers, or those with the means to flee the city. The *New York Times* asked, "Can City Life Survive Coronavirus?," in an article posted on March 17, 2020.[2] Anti-urbanism has a long history in the United States, a result of historical perceptions of cities as corrupt and unhealthy, wrapped up in racism and anti-immigrant stereotypes.[3] Unfortunately, in the early days of the pandemic, the picture of a post-coronavirus world was forming as a by-product of fear and confusion, and the image was grim.

Despite having been ranked number one in pandemic preparedness by the World Health Organization before the pandemic, the United States failed across all metrics to control the spread of COVID-19.[4] The US death toll caused by the virus is shocking, estimated by the Centers for Disease Control and Prevention at over one million people as of 2023,[5] and statistics likely underreport the actual number. Those deaths were primarily among

the most vulnerable: those with underlying conditions and poor access to health care.

The pandemic acted as an accelerant, lighter fuel on the myriad already smoldering slow-motion crises in our cities. The tensions boiled over onto streets and into the public realm. Transportation featured prominently in these crises, from a bus driver becoming the victim of an anti-mask attack to anti-Asian violence on city streets and the persistent murders of Black Americans by police during routine traffic stops. Talking about the pandemic in the singular obfuscates the extent of the inequities in its impacts.

COVID-19 disproportionately affected marginalized racial groups, those with less income and wealth, and immigrants. In their interactive COVID-19 Health Inequities in Big Cities Health Coalition (BCHC) Dashboard, researchers at Drexel University documented how Black, Latino, and Native American persons faced a constellation of increased risks during the pandemic, including overrepresentation in high-risk occupations and increased likelihood of living in crowded conditions in underserved areas.[6]

In the wake of so much injustice and tragedy, it can feel dismissive to spotlight the lessons from the increase in biking during the pandemic, and that is not my goal. The bike narrative presented only as a simple, feel-good story of people rediscovering their love of cycling while working from home undercuts the significance of what happened and what it means for cities. My goal is to contextualize the increase in bicycling and draw lessons from the pandemic for making our cities better—more just, more sustainable, and more livable.

The pandemic is certainly not over, but it is already clear that it did not signal the death of cities. As the world adapts to living with COVID-19, we can create a clearer picture of what the pandemic has meant for cities.

Stanford University economist Paul Romer said in 2004 that "a crisis is a terrible thing to waste,"[7] and amid the tragedy, the pandemic holds lessons for improving our cities. As people sought safe ways to socialize and be active, and cities sought ways to support businesses, rates of walking and bicycling began to climb[8] and streets began to change. So-called pandemic street experiments, often temporary changes to streets that occasionally became permanent, began appearing across the United States. For example, New York City

created Open Streets and Open Restaurants programs that gave pedestrians and bicycles priority on some streets and allowed restaurants to use street space for outdoor dining.[9] In California, Berkeley implemented a Healthy Streets program, and Oakland implemented a Slow Streets program—both of which aimed to reduce traffic on residential streets.[10]

Collectively, increases in cycling and efforts by cities to support them are referred to as the pandemic bike boom. Many of those stuck at home, either working remotely or having lost their job because of the pandemic, dusted off their old bicycles (or bought new ones) so they could get outside to exercise, enjoy some fresh air, and socialize while maintaining social distancing.[11] For those who relied on transit and had to continue working in person, bicycles offered a cheap and healthy alternative.[12] Of course, commutes for some people, such as service workers and medical workers, remained unchanged. But with the influx of people on bikes, some cities responded to the needs of new cyclists seeking safe places to ride and businesses seeking ways to stay afloat by experimenting with street spaces now largely devoid of traffic. A survey

Temporary pandemic street experiment in Seattle, Washington. (Credit: SDOT)

of 200 US cities found that about half of them (102 cities) built new bike infrastructure, 72 percent closed streets to cars (creating "open streets"), and 35 percent reduced motor vehicle speed limits.[13]

Improvements to bicycle and pedestrian infrastructure offered a glimpse of how our cities could be, but the future is uncertain. It is not clear what will remain of the actual infrastructure or the political will that made it happen. Of the programs I mentioned that began during the pandemic, New York's Open Streets and Open Restaurants programs remain, but Berkeley's Healthy Streets does not.[14] Oakland's Slow Streets program initially ended after a year, but it was reinstated by popular demand.[15] At the same time, remote work is now an expectation for many, and that has translated to empty downtown offices and packed neighborhood coffee shops. Our cities are functioning differently now. The ebb and flow of movement, the journeys and destinations, and the way these shift throughout the day has changed for so many of us, potentially permanently.

The Pandemic Effect

On March 11, 2020, the World Health Organization officially declared a global pandemic. A day later, most college and professional sports leagues suspended their seasons. A day after that, on Friday, March 13, the United States declared a national emergency[16] and states began implementing an array of shutdown measures aimed at controlling the spread of the virus.

Shutdowns meant that most people didn't go to work or school, and that was reflected on streets and highways. Nationally, traffic dropped by almost 65 percent. Depending on the state, traffic volumes dropped by 40–65 percent at the start of the pandemic.[17] Traffic engineers were stunned. Traffic reductions such as these were unprecedented. They happened basically overnight, as the result of a sweeping policy decision. Nothing new was built. No new lanes were added. It was an important moment of recognition that *we* create traffic, in the ways we structure workdays and locate workplaces far from our homes, requiring cars to get there. Automobile infrastructure in turn destroys and isolates neighborhoods, contributes to food deserts, and increases air pollution and heat island effects. We can thus adjust the settings in such a way as to eliminate traffic and mitigate its consequences.

The standard toolbox for dealing with traffic congestion includes building new roads, widening roads, implementing tolls, and optimizing traffic signals. All of these take time and money. Because of induced demand,[18] these tools actually worsen congestion in the long run. They fail because they are based on a narrow understanding of the causal mechanisms behind the amount, the supply, of traffic on our roads. They are based on the assumption that there will always be traffic because there will always be a need, a demand, to travel. Historically, traffic engineers have always assumed that the demand and the corresponding amounts of traffic will grow. Pandemic shutdowns forced a reevaluation of the assumptions underlying traffic, namely, what if no one needs to go anywhere?

For those lucky people who were able to work remotely and remain safe at home, the pandemic initiated a reevaluation of daily activities and travel.[19] Some people realized that the act of commuting, particularly by bike, had qualitative benefits beyond simply getting to work. In its absence, "fake bike commutes"[20] gained popularity, becoming a coping mechanism for some. For others, simply going for a bike ride, without calling it anything else, helped to mitigate the stress of the pandemic. Nationally, bicycling increased by an estimated 16 percent from 2019 to 2020.[21] New York's Department of Transportation reported a 50 percent increase in bicycle traffic, and Philadelphia reported an increase of 150 percent.[22]

The data suggest that most of the pandemic bike boom can be attributed to increased recreational riding, that is, riding without a clear destination and therefore riding for a purpose other than *getting somewhere*. This is in contrast to commuting or utilitarian travel, in which there is a clear destination that implies a reason for leaving the house. When broken down into weekday versus weekend travel, there was a 10 percent increase in bicycling on weekdays but a 29 percent increase on weekends (a similar pattern was found in European data). Additionally, bicycling increased on recreational trails and in the afternoon and evening hours. The number of cyclists dropped on streets and in commercial areas and during typical commute times.[23]

It's easy to dismiss the significance of recreational riding, but that is a mistake. We value utility, efficiency, and productivity in transportation systems, and therefore anything recreational is by definition antithetical to those

values. The fact that the pandemic bike boom was largely measured in terms of recreational activity is an artifact of circumstance. We count bicycle traffic as one or the other, when what is important is the total amount of traffic. The raw numbers, regardless of why a person is riding, give an idea of how many people could be riding on our streets and in our cities. These could be people commuting to work, picking up groceries, getting some exercise, or meeting friends at a coffee shop, given the right circumstances. Vibrant and human-scaled urbanism does not depend on why people are out of their cars, but it does depend on how many people are.

Whatever that total number is serves as a baseline for latent demand for riding—the potential for bicycling right now. That baseline potential tells communities that if they provide the right circumstances (mostly remove the fear of being hit by cars), a significant number of people will be willing and able to get out on two wheels. That is what the so-called recreational riding numbers recorded during the pandemic provide, and it is why they shouldn't be dismissed as *just* recreational trips. It is an imperfect measure, but it's the best measure we have. That increase in riding offers a glimpse at an alternative reality. We arrived at this view from global tragedy, but it is a critical data point for understanding the speed and extent of change that is possible.

Traffic

"When a situation feels dangerous to you, it's probably more safe than you know; when a situation feels safe, that is precisely when you should feel on guard." Tom Vanderbilt wrote this about traffic safety. In his 2009 book *Traffic: Why We Drive the Way We Do (and What It Says about Us)*, he tells the story of how Sweden switched from driving on the left to driving on the right, to bring driving practice in line with that of neighboring countries. After a year of preparation, planning, and outreach, in the early morning of Sunday, September 3, 1967, Sweden made the switch. Despite fears of an increase in crashes, crash rates dropped dramatically and did not rise to pre-switch levels for two years. The improved safety is widely attributed to the fact that people felt unsafe and thus drove more carefully.

This effect, this glitch of human cognition, explains why places with more cycling and walking are safer and why a higher number of bicycles

passing through an intersection improves safety for everyone crossing that intersection: when there is a lot going on, drivers need to be more aware, and that results in safer places.

Unfortunately, the opposite is also true. As Vanderbilt goes on to say, "Most crashes, after all, happen on dry roads, on clear, sunny days, to sober drivers." This is exactly what happened during the pandemic. According to the US Department of Transportation's National Highway Traffic Safety Administration, in the first half of 2021 traffic fatalities increased by nearly 20 percent,[24] resulting from the few remaining drivers, taking advantage of empty roads, driving more dangerously and paying less attention.[25]

In the United States, we use laws and enforcement to try to make our roads safer. The rationale is that if people are scared of penalties (like tickets, fines, and possibly prison time), they will drive more safely. While enforcement plays a part in any approach to traffic safety, it cannot be the primary approach. But in the United States, we do just that. We design our streets to move as many vehicles as possible as quickly as possible. Safety is secondary in the design process. We instead focus on traffic laws and enforcement to ensure road safety. This approach is misguided and ineffective. All available evidence demonstrates that it serves only to exacerbate racist overpolicing.[26]

The most effective solution for road safety is to take a systems approach to the problem: that is, change the system to lessen the likelihood and severity of crashes. The traditional approach to road safety, through enforcement, assumes that people can be trained to behave in safer ways. Instead, a systems approach recognizes that people inevitably make mistakes, but we can redesign our transportation system to anticipate those mistakes. In turn, we can lessen their likelihood and severity through better street design and infrastructure, safer vehicles, and policies. Promoting safety through design is much more effective than enforcing traffic rules.[27] This forms the backbone of the Vision Zero movement (the movement to reduce traffic deaths to zero), which started in Sweden in the 1990s. Whereas Vision Zero is orthodoxy in Scandinavia, and has been for decades, it has struggled to gain traction in the United States,[28] where we design for speed and not safety. Crashes are a feature, not a bug. Because we expect crashes, we design roads in a forgiving way. The goal is to limit the damage from a crash, not reduce the possibility of a crash.

When it comes to mobilizing policy to effect change, another part of the problem is that a systems perspective of traffic safety is a relatively abstract concept. It is difficult to explain without context but easy to understand when experienced firsthand. Prior to the pandemic, most people had very little time to take a walk or go for a ride in their neighborhood, either alone or with their families. Pandemic shutdowns forced this experience on millions of Americans.

The pandemic bike boom brought about a massive role reversal on US streets. Rather than being the driver speeding through the neighborhood to get to work, people suddenly became the walker or person on a bike, many for the first time. It's a nerve-racking experience. When a six-thousand-pound sport utility vehicle passes within a few feet of someone on a bike, it's a minor inconvenience for the driver. But for the cyclist, it's a visceral experience: it is loud, it is shocking, and the force of the air pressure alone can shake even experienced cyclists. It can be terrifying if you're new to cycling and even more terrifying if you are looking out for your kids as well.

Instead of being annoyed with bicyclists, bike lanes, and crosswalks as a driver, when walking or bicycling for the first time, many Americans found themselves wishing for more of these exact types of basic accommodations. The pandemic jump-started a conversation, owing largely to a public demanding that leaders do better to provide safe and welcoming public places. That meant utilizing the newly cleared streets and parking lots in cities under some version of pandemic shutdown.

I doubt many people out riding a bike for the first time thought much about how we tend to characterize cyclists in the United States. In movies, characters who ride bikes generally fall into one of three categories: the oddball, the athlete, or the scofflaw. A string of movies from the 1970s and 1980s illustrate the types. Pee-wee Herman in *Pee-wee's Big Adventure* (1985) is probably the best example of the weirdo. *Breaking Away* (1979) and *American Flyers* (1985) showcase the athlete. And Kevin Bacon's starring role as a bike messenger in *Quicksilver* (1986) showcases the scofflaw stereotype.

The stereotype endures; for example, Steve Carell's portrayal of the titular character in *The 40-Year-Old Virgin* (2005) and Mark Wahlberg's performance in *I Heart Huckabees* (2004) are more recent examples of the oddball.

The (animated) *Triplets of Belleville* (2003) satirizes the athlete, while *Premium Rush* (2012) updates the scofflaw stereotype. The commonality among them all is that they are all weird. They are out of step with normal people and normal society.

The Scofflaw Cyclist

Scofflaw cyclists are careless, unpredictable, and dangerous. They ride wherever they want, whenever they want, ignoring traffic laws and other road users. The scofflaw cyclist is a lawless, pedal-powered speed demon set on terrorizing good, wholesome, and honest drivers everywhere. The scofflaw cyclist stereotype is invoked anytime a bike project is proposed in a city. The logic from the anti-bike crowd is that investing in bicycling is using public funds to support these crazies.

Everyone breaks traffic laws, usually minor ones, and usually without consequence. Almost everyone has jaywalked or driven slightly over the speed limit. These behaviors are technically illegal but are generally considered acceptable. But when bicyclists break traffic laws, it's a different story. The vitriol and anger, mostly from drivers, is extreme. Before the pandemic, some colleagues and I sought to understand the rage aimed at cyclists who break minor traffic laws. Our hope was that we could understand the roots of the rage against scofflaw cyclists, to break down barriers to investing in cycling in our cities.

We created an online survey to ask people about how they rode. We asked people how much they walked, rode, or drove, how many (and what kinds of) laws they broke, and why they did so. We also included a series of hypothetical scenarios, with pictures and descriptions of different scenarios.

When analyzing the data, we first looked at lawbreaking in general and found that everyone is a criminal: 100 percent of those who took the survey reported breaking traffic laws, whether riding a bike, walking, or driving a car. In the hypothetical situations we presented in the survey, 95.87 percent of bicyclists, 97.90 percent of pedestrians, and nearly all drivers (99.97 percent) selected responses that would be considered illegal.[29]

We weren't all that surprised to find that everyone breaks minor traffic laws, but what surprised us was why: the reasons varied according to whether

someone was walking, riding a bike, or driving a car. When cycling, the most common reason for doing something illegal was a concern for *personal safety*. The next most common reasons were *saving energy*, followed by *saving time*. In contrast to why people broke laws when cycling, the most popular reason for lawbreaking when driving and walking was to save time (i.e., speeding and jaywalking). This makes sense if you have ever tried to ride a bike in the United States. Our cities lack good bicycle infrastructure, so cyclists have to do their best while navigating systems that were not designed to accommodate them. This could mean running a red light to get ahead of cars or riding on the sidewalk to avoid interacting with cars entirely.

Cyclists weren't breaking traffic laws any more than anyone else, but they did so because they were scared.

Next, we looked at what contributes to drivers getting so angry at scofflaw cyclists, asking people to explain why. Some people were angry at scofflaw cyclists out of a sense of injustice; for example, one commenter wrote, "If they want to use the roads, they need to obey the highway rules EXACTLY the same as anyone driving" (emphasis his). But others were angry because they thought that scofflaws were making other cyclists look bad. One person commented that "it hurts biking in general." Others got mad at scofflaw cyclists because they didn't behave in the way the driver expected them to; that is, they didn't break laws properly. One person wrote, "If it (lawbreaking) is done with some sense and reasoning and not for the sake of not obeying I am fine with it."[30]

But reasonable lawbreaking is totally subjective. In the words of another commenter regarding scofflaw cyclists, "Don't be an asshole and we'll do just fine." This comment in turn suggests the underlying power imbalance on roads. If a driver wants to enforce their idea of appropriate behavior, they have a few thousand pounds of steel to do so. This theme came up a lot in our survey, with people writing things like "They think they are above the law" and "It's like they dare you to hit them."

What we learned was that bicyclists are stuck in a no-win situation on our roads. Without infrastructure in place to dictate appropriate behavior or to separate traffic and bicyclists, bicyclists are at the mercy of drivers. It is a common problem on streets.[31] If you have lived in the Northeast, you may be

(continued...)