Introduction

The Smartest Horse in the World

At the end of the nineteenth century, Europe was captivated by a horse called Hans. "Clever Hans" was nothing less than a marvel: he could solve math problems, tell time, identify days on a calendar, differentiate musical tones, and spell out words and sentences. People flocked to watch the German stallion tap out answers to complex problems with his hoof and consistently arrive at the right answer. "What is two plus three?" Hans would diligently tap his hoof on the ground five times. "What day of the week is it?" The horse would then tap his hoof to indicate each letter on a purpose-built letter board and spell out the correct answer. Hans even mastered more complex questions, such as, "I have a number in mind. I subtract nine and have three as a remainder. What is the number?" By 1904, Clever Hans was an international celebrity, with the *New York Times* championing him as "Berlin's Wonderful Horse; He Can Do Almost Everything but Talk."[1]

Hans's trainer, a retired math teacher named Wilhelm von Osten, had long been fascinated by animal intelligence.

Von Osten had tried and failed to teach kittens and bear cubs cardinal numbers, but it wasn't until he started working with his own horse that he had success. He first taught Hans to count by holding the animal's leg, showing him a number, and then tapping on the hoof the correct number of times. Soon Hans responded by accurately tapping out simple sums. Next von Osten introduced a chalkboard with the alphabet spelled out, so Hans could tap a number for each letter on the board. After two years of training, von Osten was astounded by the animal's strong grasp of advanced intellectual concepts. So he took Hans on the road as proof that animals could reason. Hans became the viral sensation of the belle époque.

But many people were skeptical, and the German board of education launched an investigative commission to test Von Osten's scientific claims. The Hans Commission was led by the psychologist and philosopher Carl Stumpf and his assistant Oskar Pfungst, and it included a circus manager, a retired schoolteacher, a zoologist, a veterinarian, and a cavalry officer. Yet after extensive questioning of Hans, both with his trainer present and without, the horse maintained his record of correct answers, and the commission could find no evidence of deception. As Pfungst later wrote, Hans performed in front of "thousands of spectators, horse-fanciers, trick-trainers of first rank, and not one of them during the course of many months' observations are able to discover any kind of regular signal" between the questioner and the horse.[2]

The commission found that the methods Hans had been taught were more like "teaching children in elementary schools" than animal training and were "worthy of scientific examination."[3] But Strumpf and Pfungst still had doubts. One finding in particular troubled them: when the questioner did not know the answer or was standing far away, Hans rarely gave the correct answer. This led Pfungst and Strumpf to con-

Wilhelm von Osten and Clever Hans

sider whether some sort of unintentional signal had been providing Hans with the answers.

As Pfungst would describe in his 1911 book, their intuition was right: the questioner's posture, breathing, and facial expression would subtly change around the moment Hans reached the right answer, prompting Hans to stop there.[4] Pfungst later tested this hypothesis on human subjects and confirmed his result. What fascinated him most about this discovery was that questioners were generally unaware that they were providing pointers to the horse. The solution to the Clever Hans riddle, Pfungst wrote, was the unconscious direction from the horse's questioners.[5] The horse was trained to produce the results his owner wanted to see, but audiences felt that this was not the extraordinary intelligence they had imagined.

The story of Clever Hans is compelling from many angles: the relationship between desire, illusion, and action, the business of spectacles, how we anthropomorphize the nonhuman,

how biases emerge, and the politics of intelligence. Hans inspired a term in psychology for a particular type of conceptual trap, the Clever Hans Effect or observer-expectancy effect, to describe the influence of experimenters' unintentional cues on their subjects. The relationship between Hans and von Osten points to the complex mechanisms by which biases find their ways into systems and how people become entangled with the phenomena they study. The story of Hans is now used in machine learning as a cautionary reminder that you can't always be sure of what a model has learned from the data it has been given.[6] Even a system that appears to perform spectacularly in training can make terrible predictions when presented with novel data in the world.

This opens a central question of this book: How is intelligence "made," and what traps can that create? At first glance, the story of Clever Hans is a story of how one man constructed intelligence by training a horse to follow cues and emulate humanlike cognition. But at another level, we see that the practice of making intelligence was considerably broader. The endeavor required validation from multiple institutions, including academia, schools, science, the public, and the military. Then there was the market for von Osten and his remarkable horse—emotional and economic investments that drove the tours, the newspaper stories, and the lectures. Bureaucratic authorities were assembled to measure and test the horse's abilities. A constellation of financial, cultural, and scientific interests had a part to play in the construction of Hans's intelligence and a stake in whether it was truly remarkable.

We can see two distinct mythologies at work. The first myth is that nonhuman systems (be it computers or horses) are analogues for human minds. This perspective assumes that with sufficient training, or enough resources, humanlike intelligence can be created from scratch, without addressing the

fundamental ways in which humans are embodied, relational, and set within wider ecologies. The second myth is that intelligence is something that exists independently, as though it were natural and distinct from social, cultural, historical, and political forces. In fact, the concept of intelligence has done inordinate harm over centuries and has been used to justify relations of domination from slavery to eugenics.[7]

These mythologies are particularly strong in the field of artificial intelligence, where the belief that human intelligence can be formalized and reproduced by machines has been axiomatic since the mid-twentieth century. Just as Hans's intelligence was considered to be like that of a human, fostered carefully like a child in elementary school, so AI systems have repeatedly been described as simple but humanlike forms of intelligence. In 1950, Alan Turing predicted that "at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted."[8] The mathematician John von Neumann claimed in 1958 that the human nervous system is "prima facie digital."[9] MIT professor Marvin Minsky once responded to the question of whether machines could think by saying, "Of course machines can think; we can think and we are 'meat machines.'"[10] But not everyone was convinced. Joseph Weizenbaum, early AI inventor and creator of the first chatbot program, known as ELIZA, believed that the idea of humans as mere information processing systems is far too simplistic a notion of intelligence and that it drove the "perverse grand fantasy" that AI scientists could create a machine that learns "as a child does."[11]

This has been one of the core disputes in the history of artificial intelligence. In 1961, MIT hosted a landmark lecture series titled "Management and the Computer of the Future." A stellar lineup of computer scientists participated, including

Grace Hopper, J. C. R. Licklider, Marvin Minsky, Allen Newell, Herbert Simon, and Norbert Wiener, to discuss the rapid advances being made in digital computing. At its conclusion, John McCarthy boldly argued that the differences between human and machine tasks were illusory. There were simply some complicated human tasks that would take more time to be formalized and solved by machines.[12]

But philosophy professor Hubert Dreyfus argued back, concerned that the assembled engineers "do not even consider the possibility that the brain might process information in an entirely different way than a computer."[13] In his later work *What Computers Can't Do,* Dreyfus pointed out that human intelligence and expertise rely heavily on many unconscious and subconscious processes, while computers require all processes and data to be explicit and formalized.[14] As a result, less formal aspects of intelligence must be abstracted, eliminated, or approximated for computers, leaving them unable to process information about situations as humans do.

Much in AI has changed since the 1960s, including a shift from symbolic systems to the more recent wave of hype about machine learning techniques. In many ways, the early fights over what AI can do have been forgotten and the skepticism has melted away. Since the mid-2000s, AI has rapidly expanded as a field in academia and as an industry. Now a small number of powerful technology corporations deploy AI systems at a planetary scale, and their systems are once again hailed as comparable or even superior to human intelligence.

Yet the story of Clever Hans also reminds us how narrowly we consider or recognize intelligence. Hans was taught to mimic tasks within a very constrained range: add, subtract, and spell words. This reflects a limited perspective of what horses or humans can do. Hans was already performing remarkable feats of interspecies communication, public perfor-

mance, and considerable patience, yet these were not recognized as intelligence. As author and engineer Ellen Ullman puts it, this belief that the mind is like a computer, and vice versa, has "infected decades of thinking in the computer and cognitive sciences," creating a kind of original sin for the field.[15] It is the ideology of Cartesian dualism in artificial intelligence: where AI is narrowly understood as disembodied intelligence, removed from any relation to the material world.

What Is AI? Neither Artificial nor Intelligent

Let's ask the deceptively simple question, What is artificial intelligence? If you ask someone in the street, they might mention Apple's Siri, Amazon's cloud service, Tesla's cars, or Google's search algorithm. If you ask experts in deep learning, they might give you a technical response about how neural nets are organized into dozens of layers that receive labeled data, are assigned weights and thresholds, and can classify data in ways that cannot yet be fully explained.[16] In 1978, when discussing expert systems, Professor Donald Michie described AI as knowledge refining, where "a reliability and competence of codification can be produced which far surpasses the highest level that the unaided human expert has ever, perhaps even could ever, attain."[17] In one of the most popular textbooks on the subject, Stuart Russell and Peter Norvig state that AI is the attempt to understand and build intelligent entities. "Intelligence is concerned mainly with rational action," they claim. "Ideally, an intelligent agent takes the best possible action in a situation."[18]

Each way of defining artificial intelligence is doing work, setting a frame for how it will be understood, measured, valued, and governed. If AI is defined by consumer brands for corporate infrastructure, then marketing and advertising have

predetermined the horizon. If AI systems are seen as more reliable or rational than any human expert, able to take the "best possible action," then it suggests that they should be trusted to make high-stakes decisions in health, education, and criminal justice. When specific algorithmic techniques are the sole focus, it suggests that only continual technical progress matters, with no consideration of the computational cost of those approaches and their far-reaching impacts on a planet under strain.

In contrast, in this book I argue that AI is neither *artificial* nor *intelligent.* Rather, artificial intelligence is both embodied and material, made from natural resources, fuel, human labor, infrastructures, logistics, histories, and classifications. AI systems are not autonomous, rational, or able to discern anything without extensive, computationally intensive training with large datasets or predefined rules and rewards. In fact, artificial intelligence as we know it depends entirely on a much wider set of political and social structures. And due to the capital required to build AI at scale and the ways of seeing that it optimizes AI systems are ultimately designed to serve existing dominant interests. In this sense, artificial intelligence is a registry of power.

In this book we'll explore how artificial intelligence is made, in the widest sense, and the economic, political, cultural, and historical forces that shape it. Once we connect AI within these broader structures and social systems, we can escape the notion that artificial intelligence is a purely technical domain. At a fundamental level, AI is technical and social practices, institutions and infrastructures, politics and culture. Computational reason and embodied work are deeply interlinked: AI systems both reflect and produce social relations and understandings of the world.

It's worth noting that the term "artificial intelligence"

can create discomfort in the computer science community. The phrase has moved in and out of fashion over the decades and is used more in marketing than by researchers. "Machine learning" is more commonly used in the technical literature. Yet the nomenclature of AI is often embraced during funding application season, when venture capitalists come bearing checkbooks, or when researchers are seeking press attention for a new scientific result. As a result, the term is both used and rejected in ways that keep its meaning in flux. For my purposes, I use AI to talk about the massive industrial formation that includes politics, labor, culture, and capital. When I refer to machine learning, I'm speaking of a range of technical approaches (which are, in fact, social and infrastructural as well, although rarely spoken about as such).

But there are significant reasons *why* the field has been focused so much on the technical—algorithmic breakthroughs, incremental product improvements, and greater convenience. The structures of power at the intersection of technology, capital, and governance are well served by this narrow, abstracted analysis. To understand how AI is fundamentally political, we need to go beyond neural nets and statistical pattern recognition to instead ask *what* is being optimized, and *for whom,* and *who* gets to decide. Then we can trace the implications of those choices.

Seeing AI Like an Atlas

How can an atlas help us to understand how artificial intelligence is made? An atlas is an unusual type of book. It is a collection of disparate parts, with maps that vary in resolution from a satellite view of the planet to a zoomed-in detail of an archipelago. When you open an atlas, you may be seeking specific information about a particular place—or perhaps

you are wandering, following your curiosity, and finding unexpected pathways and new perspectives. As historian of science Lorraine Daston observes, all scientific atlases seek to school the eye, to focus the observer's attention on particular telling details and significant characteristics.[19] An atlas presents you with a particular viewpoint of the world, with the imprimatur of science—scales and ratios, latitudes and longitudes—and a sense of form and consistency.

Yet an atlas is as much an act of creativity—a subjective, political, and aesthetic intervention—as it is a scientific collection. The French philosopher Georges Didi-Huberman thinks of the atlas as something that inhabits the aesthetic paradigm of the visual and the epistemic paradigm of knowledge. By implicating both, it undermines the idea that science and art are ever completely separate.[20] Instead, an atlas offers us the possibility of rereading the world, linking disparate pieces differently and "reediting and piecing it together again without thinking we are summarizing or exhausting it."[21]

Perhaps my favorite account of how a cartographic approach can be helpful comes from the physicist and technology critic Ursula Franklin: "Maps represent purposeful endeavors: they are meant to be useful, to assist the traveler and bridge the gap between the known and the as yet unknown; they are testaments of collective knowledge and insight."[22]

Maps, at their best, offer us a compendium of open pathways—shared ways of knowing—that can be mixed and combined to make new interconnections. But there are also maps of domination, those national maps where territory is carved along the fault lines of power: from the direct interventions of drawing borders across contested spaces to revealing the colonial paths of empires. By invoking an atlas, I'm suggesting that we need new ways to understand the empires of artificial intelligence. We need a theory of AI that accounts for the states and

corporations that drive and dominate it, the extractive mining that leaves an imprint on the planet, the mass capture of data, and the profoundly unequal and increasingly exploitative labor practices that sustain it. These are the shifting tectonics of power in AI. A topographical approach offers different perspectives and scales, beyond the abstract promises of artificial intelligence or the latest machine learning models. The aim is to understand AI in a wider context by walking through the many different landscapes of computation and seeing how they connect.[23]

There's another way in which atlases are relevant here. The field of AI is explicitly attempting to capture the planet in a computationally legible form. This is not a metaphor so much as the industry's direct ambition. The AI industry is making and normalizing its own proprietary maps, as a centralized God's-eye view of human movement, communication, and labor. Some AI scientists have stated their desire to capture the world and to supersede other forms of knowing. AI professor Fei-Fei Li describes her ImageNet project as aiming to "map out the entire world of objects."[24] In their textbook, Russell and Norvig describe artificial intelligence as "relevant to any intellectual task; it is truly a universal field."[25] One of the founders of artificial intelligence and early experimenter in facial recognition, Woody Bledsoe, put it most bluntly: "in the long run, AI is the *only* science."[26] This is a desire not to create an atlas of the world but to be *the* atlas—the dominant way of seeing. This colonizing impulse centralizes power in the AI field: it determines how the world is measured and defined while simultaneously denying that this is an inherently political activity.

Instead of claiming universality, this book is a partial account, and by bringing you along on my investigations, I hope to show you how my views were formed. We will encounter

well-visited and lesser-known landscapes of computation: the pits of mines, the long corridors of energy-devouring data centers, skull archives, image databases, and the fluorescent-lit hangars of delivery warehouses. These sites are included not just to illustrate the material construction of AI and its ideologies but also to "illuminate the unavoidably subjective and political aspects of mapping, and to provide alternatives to hegemonic, authoritative—and often naturalized and reified—approaches," as media scholar Shannon Mattern writes.[27]
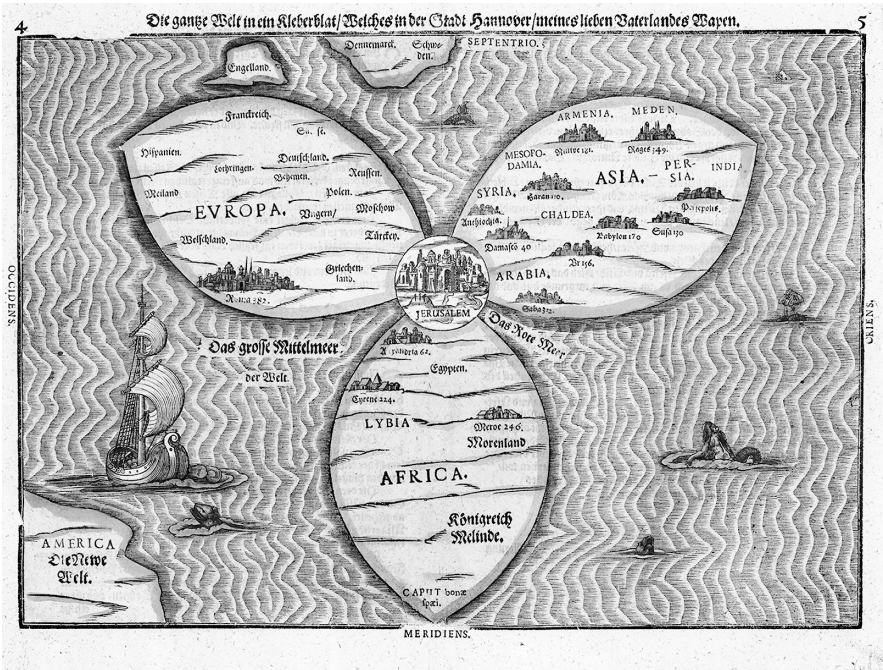
Models for understanding and holding systems accountable have long rested on ideals of transparency. As I've written with the media scholar Mike Ananny, being able to *see* a system is sometimes equated with being able to know how it works and how to govern it.[28] But this tendency has serious limitations. In the case of AI, there is no singular black box to open, no secret to expose, but a multitude of interlaced systems of power. Complete transparency, then, is an impossible goal. Rather, we gain a better understanding of AI's role in the world by engaging with its material architectures, contextual environments, and prevailing politics and by tracing how they are connected.

My thinking in this book has been informed by the disciplines of science and technology studies, law, and political philosophy and from my experience working in both academia and an industrial AI research lab for almost a decade. Over those years, many generous colleagues and communities have changed the way I see the world: mapping is always a collective exercise, and this is no exception.[29] I'm grateful to the scholars who created new ways to understand sociotechnical systems, including Geoffrey Bowker, Benjamin Bratton, Wendy Chun, Lorraine Daston, Peter Galison, Ian Hacking, Stuart Hall, Donald MacKenzie, Achille Mbembé, Alondra Nelson, Susan Leigh Star, and Lucy Suchman, among many others. This book

benefited from many in-person conversations and reading the recent work by authors studying the politics of technology, including Mark Andrejevic, Ruha Benjamin, Meredith Broussard, Simone Browne, Julie Cohen, Sasha Costanza-Chock, Virginia Eubanks, Tarleton Gillespie, Mar Hicks, Tung-Hui Hu, Yuk Hui, Safiya Umoja Noble, and Astra Taylor.

As with any book, this one emerges from a specific lived experience that imposes limitations. As someone who has lived and worked in the United States for the past decade, my focus skews toward the AI industry in Western centers of power. But my aim is not to create a complete global atlas—the very idea invokes capture and colonial control. Instead, any author's view can be only partial, based on local observations and interpretations, in what environmental geographer Samantha Saville calls a "humble geography" that acknowledges one's specific perspectives rather than claiming objectivity or mastery.[30]

Just as there are many ways to make an atlas, so there are many possible futures for how AI will be used in the world. The expanding reach of AI systems may seem inevitable, but this is contestable and incomplete. The underlying visions of the AI field do not come into being autonomously but instead have been constructed from a particular set of beliefs and perspectives. The chief designers of the contemporary atlas of AI are a small and homogenous group of people, based in a handful of cities, working in an industry that is currently the wealthiest in the world. Like medieval European *mappae mundi,* which illustrated religious and classical concepts as much as coordinates, the maps made by the AI industry are political interventions, as opposed to neutral reflections of the world. This book is made against the spirit of colonial mapping logics, and it embraces different stories, locations, and knowledge bases to better understand the role of AI in the world.

Heinrich Bünting's *mappa mundi,* known as *The Bünting Clover Leaf Map,* which symbolizes the Christian Trinity, with the city of Jerusalem at the center of the world. From *Itinerarium Sacrae Scripturae* (Magdeburg, 1581)

Topographies of Computation

How, at this moment in the twenty-first century, is AI conceptualized and constructed? What is at stake in the turn to artificial intelligence, and what kinds of politics are contained in the way these systems map and interpret the world? What are the social and material consequences of including AI and related algorithmic systems into the decision-making systems of social institutions like education and health care, finance, government operations, workplace interactions and hiring, com-

munication systems, and the justice system? This book is not a story about code and algorithms or the latest thinking in computer vision or natural language processing or reinforcement learning. Many other books do that. Neither is it an ethnographic account of a single community and the effects of AI on their experience of work or housing or medicine—although we certainly need more of those.

Instead, this is an expanded view of artificial intelligence as an *extractive industry.* The creation of contemporary AI systems depends on exploiting energy and mineral resources from the planet, cheap labor, and data at scale. To observe this in action, we will go on a series of journeys to places that reveal the makings of AI.

In chapter 1, we begin in the lithium mines of Nevada, one of the many sites of mineral extraction needed to power contemporary computation. Mining is where we see the extractive politics of AI at their most literal. The tech sector's demand for rare earth minerals, oil, and coal is vast, but the true costs of this extraction is never borne by the industry itself. On the software side, building models for natural language processing and computer vision is enormously energy hungry, and the competition to produce faster and more efficient models has driven computationally greedy methods that expand AI's carbon footprint. From the last trees in Malaysia that were harvested to produce latex for the first transatlantic undersea cables to the giant artificial lake of toxic residues in Inner Mongolia, we trace the environmental and human birthplaces of planetary computation networks and see how they continue to terraform the planet.

Chapter 2 shows how artificial intelligence is made of human labor. We look at the digital pieceworkers paid pennies on the dollar clicking on microtasks so that data systems can seem more intelligent than they are.[31] Our journey will take us

inside the Amazon warehouses where employees must keep in time with the algorithmic cadences of a vast logistical empire, and we will visit the Chicago meat laborers on the disassembly lines where animal carcasses are vivisected and prepared for consumption. And we'll hear from the workers who are protesting against the way that AI systems are increasing surveillance and control for their bosses.

Labor is also a story about time. Coordinating the actions of humans with the repetitive motions of robots and line machinery has always involved a controlling of bodies in space and time.[32] From the invention of the stopwatch to Google's TrueTime, the process of time coordination is at the heart of workplace management. AI technologies both require and create the conditions for ever more granular and precise mechanisms of temporal management. Coordinating time demands increasingly detailed information about what people are doing and how and when they do it.

Chapter 3 focuses on the role of data. All publicly accessible digital material—including data that is personal or potentially damaging—is open to being harvested for training datasets that are used to produce AI models. There are gigantic datasets full of people's selfies, of hand gestures, of people driving cars, of babies crying, of newsgroup conversations from the 1990s, all to improve algorithms that perform such functions as facial recognition, language prediction, and object detection. When these collections of data are no longer seen as people's personal material but merely as *infrastructure,* the specific meaning or context of an image or a video is assumed to be irrelevant. Beyond the serious issues of privacy and ongoing surveillance capitalism, the current practices of working with data in AI raise profound ethical, methodological, and epistemological concerns.[33]

And how is all this data used? In chapter 4, we look at

the practices of classification in artificial intelligence systems, what sociologist Karin Knorr Cetina calls the "epistemic machinery."[34] We see how contemporary systems use labels to predict human identity, commonly using binary gender, essentialized racial categories, and problematic assessments of character and credit worthiness. A sign will stand in for a system, a proxy will stand for the real, and a toy model will be asked to substitute for the infinite complexity of human subjectivity. By looking at how classifications are made, we see how technical schemas enforce hierarchies and magnify inequity. Machine learning presents us with a regime of normative reasoning that, when in the ascendant, takes shape as a powerful governing rationality.

From here, we travel to the hill towns of Papua New Guinea to explore the history of affect recognition, the idea that facial expressions hold the key to revealing a person's inner emotional state. Chapter 5 considers the claim of the psychologist Paul Ekman that there are a small set of universal emotional states which can be read directly from the face. Tech companies are now deploying this idea in affect recognition systems, as part of an industry predicted to be worth more than seventeen billion dollars.[35] But there is considerable scientific controversy around emotion detection, which is at best incomplete and at worst misleading. Despite the unstable premise, these tools are being rapidly implemented into hiring, education, and policing systems.

In chapter 6 we look at the ways in which AI systems are used as a tool of state power. The military past and present of artificial intelligence have shaped the practices of surveillance, data extraction, and risk assessment we see today. The deep interconnections between the tech sector and the military are now being reined in to fit a strong nationalist agenda. Meanwhile, extralegal tools used by the intelligence community

have now dispersed, moving from the military world into the commercial technology sector, to be used in classrooms, police stations, workplaces, and unemployment offices. The military logics that have shaped AI systems are now part of the workings of municipal government, and they are further skewing the relation between states and subjects.

The concluding chapter assesses how artificial intelligence functions as a structure of power that combines infrastructure, capital, and labor. From the Uber driver being nudged to the undocumented immigrant being tracked to the public housing tenants contending with facial recognition systems in their homes, AI systems are built with the logics of capital, policing, and militarization—and this combination further widens the existing asymmetries of power. These ways of seeing depend on the twin moves of abstraction and extraction: abstracting away the material conditions of their making while extracting more information and resources from those least able to resist.

But these logics can be challenged, just as systems that perpetuate oppression can be rejected. As conditions on Earth change, calls for data protection, labor rights, climate justice, and racial equity should be heard together. When these interconnected movements for justice inform how we understand artificial intelligence, different conceptions of planetary politics become possible.

Extraction, Power, and Politics

Artificial intelligence, then, is an idea, an infrastructure, an industry, a form of exercising power, and a way of seeing; it's also a manifestation of highly organized capital backed by vast systems of extraction and logistics, with supply chains that wrap

around the entire planet. All these things are part of what artificial intelligence is—a two-word phrase onto which is mapped a complex set of expectations, ideologies, desires, and fears.

AI can seem like a spectral force—as disembodied computation—but these systems are anything but abstract. They are physical infrastructures that are reshaping the Earth, while simultaneously shifting how the world is seen and understood.

It's important for us to contend with these many aspects of artificial intelligence—its malleability, its messiness, and its spatial and temporal reach. The promiscuity of AI as a term, its openness to being reconfigured, also means that it can be put to use in a range of ways: it can refer to everything from consumer devices like the Amazon Echo to nameless backend processing systems, from narrow technical papers to the biggest industrial companies in the world. But this has its usefulness, too. The breadth of the term "artificial intelligence" gives us license to consider all these elements and how they are deeply imbricated: from the politics of intelligence to the mass harvesting of data; from the industrial concentration of the tech sector to geopolitical military power; from the deracinated environment to ongoing forms of discrimination.

The task is to remain sensitive to the terrain and to watch the shifting and plastic meanings of the term "artificial intelligence"—like a container into which various things are placed and then removed—because that, too, is part of the story.

Simply put, artificial intelligence is now a player in the shaping of knowledge, communication, and power. These reconfigurations are occurring at the level of epistemology, principles of justice, social organization, political expression, culture, understandings of human bodies, subjectivities, and identities: what we are and what we can be. But we can go further. Artificial intelligence, in the process of remapping and

intervening in the world, is politics by other means—although rarely acknowledged as such. These politics are driven by the Great Houses of AI, which consist of the half-dozen or so companies that dominate large-scale planetary computation.

Many social institutions are now influenced by these tools and methods, which shape what they value and how decisions are made while creating a complex series of downstream effects. The intensification of technocratic power has been under way for a long time, but the process has now accelerated. In part this is due to the concentration of industrial capital at a time of economic austerity and outsourcing, including the defunding of social welfare systems and institutions that once acted as a check on market power. This is why we must contend with AI as a political, economic, cultural, and scientific force. As Alondra Nelson, Thuy Linh Tu, and Alicia Headlam Hines observe, "Contests around technology are always linked to larger struggles for economic mobility, political maneuvering, and community building."[36]

We are at a critical juncture, one that requires us to ask hard questions about the way AI is produced and adopted. We need to ask: What is AI? What forms of politics does it propagate? Whose interests does it serve, and who bears the greatest risk of harm? And where should the use of AI be constrained? These questions will not have easy answers. But neither is this an irresolvable situation or a point of no return—dystopian forms of thinking can paralyze us from taking action and prevent urgently needed interventions.[37] As Ursula Franklin writes, "The viability of technology, like democracy, depends in the end on the practice of justice and on the enforcement of limits to power."[38]

This book argues that addressing the foundational problems of AI and planetary computation requires connecting issues of power and justice: from epistemology to labor rights,

resource extraction to data protections, racial inequity to climate change. To do that, we need to expand our understanding of what is under way in the empires of AI, to see what is at stake, and to make better collective decisions about what should come next.

Crawford, K. (2021). The atlas of ai : Power, politics, and the planetary costs of artificial intelligence. Yale University Press.
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