Contents

0.1. Illustration of HAL 9000 computer based on Stanley Kubrick's *2001: A Space Odyssey*, 1968

Introduction

> **Dave Bowman: Open the pod bay doors, HAL.**
> **HAL: I'm sorry, Dave. I'm afraid I can't do that.**
> **Dave Bowman: What's the problem?**
> **HAL: I think you know what the problem is just**
> **as well as I do.**

This 1968 exchange between astronaut and computer from the Stanley Kubrick film *2001: A Space Odyssey* records one of the earliest and most devastating human–computer conversations ever imagined, crystallizing the sometimes fraught relationship that lies at the core of the digital age: how will people relate to emerging technologies (figure 0.1)? Implicit in the film is the way in which emotion guides our response to the digital. When HAL is shut down in a subsequent scene, stating, "I know everything hasn't been quite right with me, recently," the poignancy of his sorrow outstrips that of many human deaths in cinema.

The interaction between people and computers is mediated by designers. They structure our relationship with digital technology and make it work or, in HAL's case, fail. As Apple

Computer art director Clement Mok has asserted, "Design, in its broadest sense, is the enabler of the digital era—it's a process that creates order out of chaos." In creating this order, digital designers have consistently focused on the future, rarely looking back to consider how their work is rooted in the past. But it is, in fact, the past that haunts nearly every disruptive digital technology.

Take the transformation of recorded music three decades ago, for example, and one can see the complex impact of the digital. In a sense, the shift from analog LP vinyl to digital CDs represented a total disruption, one that beset a multitude of listeners embedded in analog thinking. A widespread urban legend developed, asserting that the sound quality of digital compact discs could be improved by using a green marker to color the edges of the CD. Major news outlets and music aficionados were taken in by this fantasy because they did not understand how digital storage worked. The underlying notion that the laser of a CD player was analogous to the needle burrowed into a vinyl channel was, of course, completely spurious. The technological gulf was too great for many to understand. This technical transition meant next to nothing, however, as listeners continued to relate to music—analog or digital—in myriad ways, just as they had before. The digital does not always transform the cultural. Thus, a central premise of this book is the recognition that the digital cannot be separated from the analog. For all its talk of disruption, the digital is firmly connected to the past.

To fully understand digital design, one needs to grapple with both the future and the past. Take the phrase itself. The term "digital" originated with the Latin word *digitus*, which means fingers or toes—appendages that are the analog gateway into counting. By the seventeenth century, "digital" had begun to refer to numerical notation and any whole number less than ten. Then in the thirties, "digital" became associated with computers and their use of numerical digits. In more recent years, the term "digital" has proved to be a particularly elastic one, as it has expanded to encompass almost all facets of contemporary culture. As computers have come to mediate even the most mundane aspects of daily life, many people have further expanded the term to define human experience in the broadest terms: a digital age.

The term "design" has a much more substantive role in framing contemporary practice. As an English word, it did not become commonplace until the middle of the twentieth century, at which time a slew of practices—industrial arts, commercial graphics, and architecture—were gradually collapsed into the term. Of course, the conceptualization of the word "design" has a much longer prehistory, dating back to the humanist theories of the Renaissance. During the 1400s in Italy, the polymath scholar Leon Battista Alberti famously popularized the Italian word *disegno*, endowing it with multiple meanings. Disegno could refer both to a drawing of something as well as to an overall compositional scheme: these definitions overlapped insomuch as many Renaissance artistic practices relied on drawing to convey a given compositional idea. Importantly, through disegno, Alberti established the idea that the design of a given object was essentially intellectual and not necessarily tied to the execution of the tangible result itself. Mario Carpo has written extensively about this shift and how Alberti reframed architecture from

an artisanal process, in which design and execution are performed by the same person, to a cerebral one, whereby a designer plans a building, and workers build it by following drawn instructions. Alberti famously devised a series of standardized production drawings for his planned buildings using a computational methodology. In this manner, architecture became the first modern allographic process in which the design of the work was largely sundered from its execution.

While architecture was first to garner the high status associated with a theoretical design process, the other practical so-called decorative arts languished at the bottom of the hierarchy well into the industrial age. Then, nineteenth-century reformers spent decades vilifying the products of the machine, which were widely derided as aesthetically crude and unsophisticated. Nikolaus Pevsner provides the most important reference points for understanding the process through which the designers of industrial products and mass-produced graphics managed to climb out of this netherworld. Pevsner's canon-forming book, *Pioneers of the Modern Movement from William Morris to Walter Gropius,* first published in 1936, still in many ways defines our understanding of this era. Its luster, combined with its tight focus on certain countries and practitioners, has led to *Pioneers* becoming perhaps the most contested design tome in history. Susie Harries, Pevsner's biographer, has related that Pevsner "said late in his career that whenever he saw his name in print now, it was usually preceded by the word 'not', as in 'not, as Pevsner assumed.' "

Nonetheless, and despite privileging the elite realm of the architect, *Pioneers* did much to establish the notion that machine age designers of all manner of works—from graphics to light fixtures—operated at the same high level as architects. This was especially true by midcentury, when the Museum of Modern Art published a second edition in the United States, now rebranded under Philip Johnson's tutelage as *Pioneers of Modern Design*. At this point, the word "design" became high functioning, as it somewhat collapsed the hierarchy that had separated architecture from the rest. Now, architects were designers, art directors were graphic designers, the industrial arts became industrial design, and so on. At the same time, these varied practices continued to shed their artisanal roots and establish themselves as allographic pursuits with the theoretical dimension separated from the manufacture. As will be elucidated in the pages to come, Pevsner's midcentury conception of design—especially his celebration of the Bauhaus as the core achievement—has played a determinant role in how digital design is perceived today. This newest phase called digital, in which design is married to the binary code, is much more rooted in the past than in the future.

Today, digital design is still an emerging concept; it connotes a slippery discourse, continually contested and evolving. In its narrowest sense, "digital design" is often used as a synonym for "screen-based graphic design." This thought follows logically from the fact that—in contrast to a chair or a building—web design and its brethren are designed, produced, and *experienced* through computers. While this type of digital design rightfully has a high profile, it is by no means the totality of the field. In contrast and at its most capacious, the phrase "digital design" has been used to frame even the most

seemingly analog object; curators at the Victoria and Albert Museum (V&A) have asserted that the handcrafted "pussy hat" of activist fame qualifies for the category because word of it circulated online through social media. Considering how social media has colonized so much of people's online lives, this definition might prove too vast for practicality. The current book takes a moderate stance, focusing on phenomena that have a primary debt to the use of computers. As a digital design canon forms, and museums appoint new digital curators and universities new researchers, the still indistinct realm will doubtless acquire a clearer shape.

This book begins with a look at two overarching topics: first, the visionaries and then the machines of the digital era. Chapter 1 explores the way digital culture has been shaped by various analysts. Since the onset of widespread computer use, many people have voiced strong opinions about what this technology means and where it will lead humanity. Although past technological innovations engendered analytic takes, none so reflected the intensity and revolutionary fervor of digital visionaries. The second chapter shifts to a more tangible subject, the hardware that made digital design possible in the first place. Operating systems, graphical user interfaces, and software have all shaped people's ability to interact with evolving technology.

Chapter 3 focuses on one of the most fundamental areas of digital graphic design: type. Some of the most fascinating pioneers of the digital world worked to design typefaces. This chapter also highlights how digital type is embedded in the past, as modernist design is reinterpreted and

redeployed by twenty-first-century technology companies. The next chapter delves into the importance of *playing* with computers. From experimental art projects to first-person shooters, much of digital design has sought to create immersive, interactive experiences that are joyfully engaging. Then, chapter 5 turns the reader's attention to the newly minted internet of the nineties, detailing how designers began to navigate this novel virtual space. Digging into another facet of digital design, chapter 6 considers the theories and practices that molded the integration of computers and architecture. From the most esoteric semiotic takes to the pragmatic concerns of construction managers, digital design has revamped our approach to architecture. During this journey, certain buildings and architects have come to define different moments, serving as touchpoints where emerging ideas could crystallize. Chapter 7 adds another layer to the discussion of digital visual communication, detailing how technological changes such as Flash enabled web design to enter a new phase of interactivity. Beyond commerce, art and experimental play again performed a central role in shifting the focus of the design community. While chapter 7 concludes with a case study that reinforces the trajectory of graphic design through to the present, chapter 8 shines a light on contemporary digital architecture at its richest and most dynamic. This chapter also introduces issues of parametric and generative design strategies that are pursued more fully in later chapters. Finally, chapter 9 returns to the issues of industrial design first broached in chapter 2's look at digital hardware, tracing that medium's development into a dominant technological aesthetic rooted in the past.

The book's framing device shifts with the onset of chapter 10, turning from a consideration of siloed realms—architecture, graphic design, and so forth—to the organizing principles of the digital topics themselves. In this way, chapter 10 treats the rise of algorithmic culture and artificial intelligence (AI), trends that have affected varied facets of digital design across all media. From DIY to cryptocurrency, algorithms have repositioned the human–technology relationship in myriad ways. This relationship largely flows through a river of data, and chapter 11 ponders the past and future of data visualization techniques. How we understand and interpret data is in many ways determined by the work of digital designers. Last, chapter 12 explores the consequences of virtual reality, which has led to real-world results while also reigniting the visionary spirit that portends radical change in the future.

In 1968, the AI named HAL cinematically murdered most of the crew of the spaceship *Discovery One*; yet his rampage was stopped by the human ingenuity of Dave Bowman. Nearly fifty years later, Ava, the AI protagonist of the film *Ex Machina,* outwits her human companions, leaving them to die while she blends seamlessly into an urban crowd. Before the murders and her escape, Ava asks her designer, "Isn't it strange, to create something that hates you?" The question has both emotional and existential relevance. As humanity's relationship to machines adds layers and intensifies, the work of digital designers will be embedded in every aspect of society. They will help determine whether digital creations seem to love us or hate us, bringing joy and productivity, or enervation and despair.
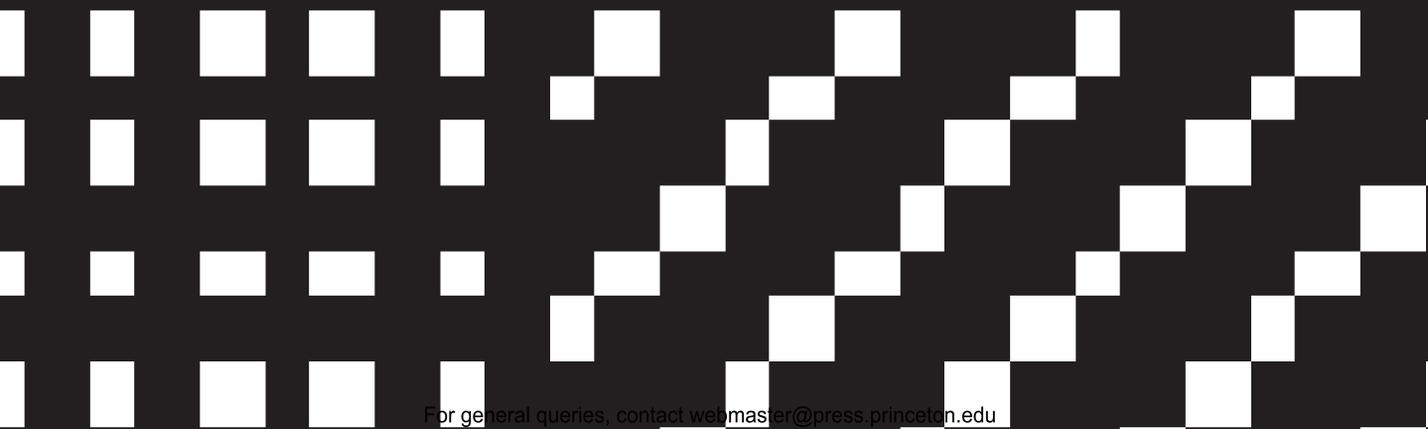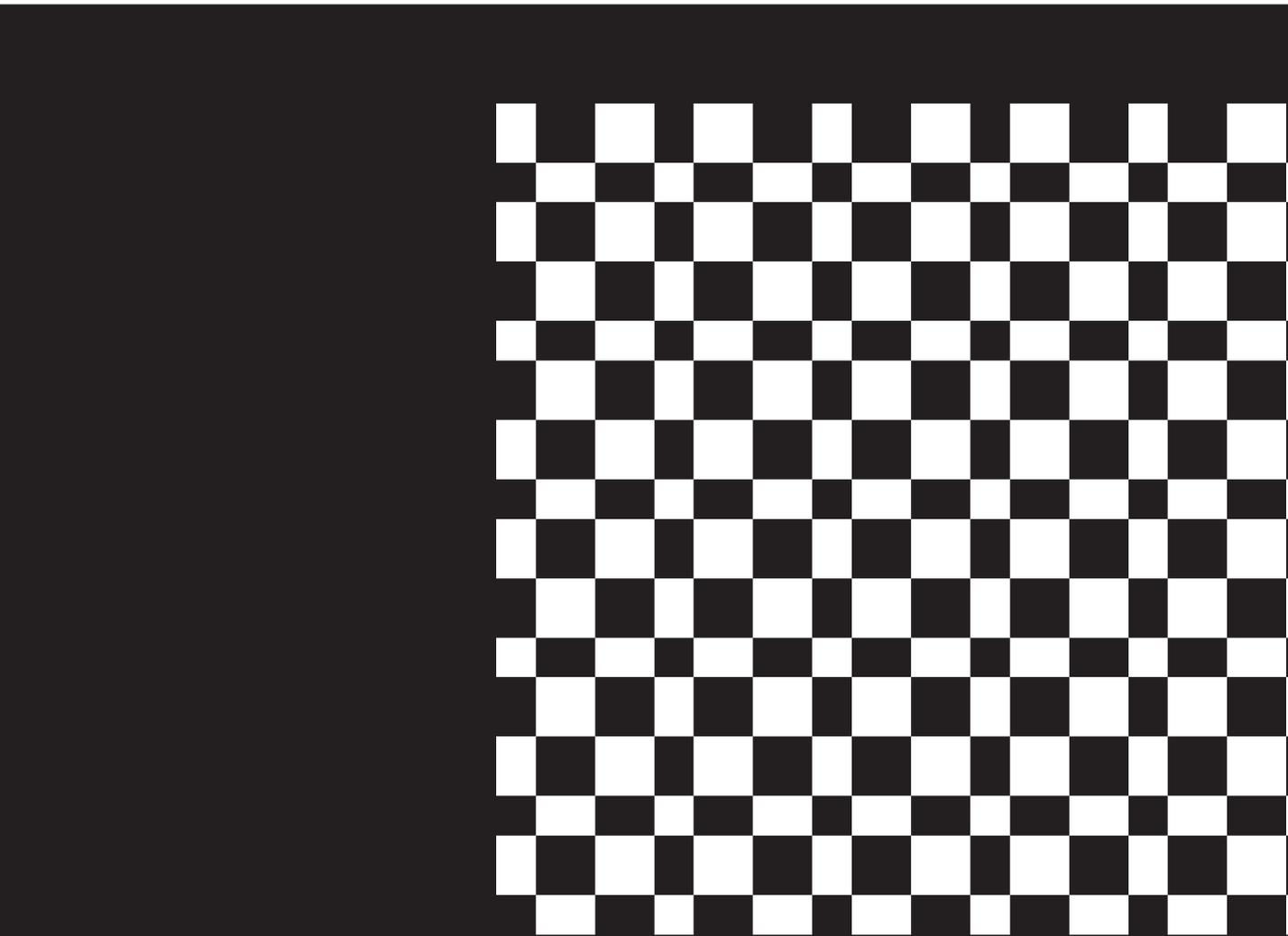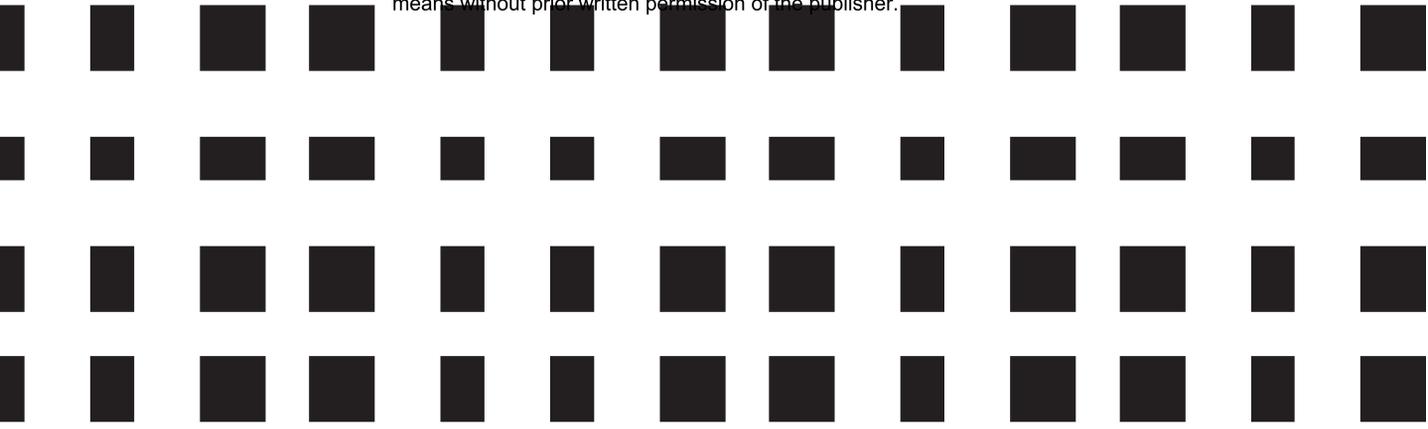
One. The Visionaries

Clement Mok is one of a large cohort of designers who emerged in the nineties as digital visionaries, thinkers who would help humanity process its relationship to new technology. The place of the digital visionary is a profound one, and one with a substantial backstory that still resonates today. Over the past thirty years, digital design's greatest strength—and perhaps also its greatest weakness—has been its visionary nature. Never before has a technological shift been freighted with so much baggage by thinkers both inside and outside the industry. Prophets, gurus, and seers have sought to explain and project what digital design was doing, could do, and would do; they have produced a vast sea of speculation that has both enriched and complicated any understanding of the digital era. This is not to say that no true, material reality underlies this discourse, but rather to acknowledge that contemporary digital design is enmeshed in a matrix that combines past, present, and future in a dense series of layers like a Photoshop project run amok.

The burden of expectations placed on digital designers has been unprecedented. Take, for comparison's sake, the career of another agent of great technological change, Nicolas Jenson. Jenson was born around 1420 in France, where he first worked as a die cutter for coins. As pan-European trade expanded in the fifteenth century, he immigrated to Mainz, Germany, a port city on the Rhine, where he learned the fundamentals of printing with mechanical type amid the nascent industry pioneered there by Johannes Gutenberg. After a decade in Mainz, Jenson moved again, opening a printing and type-designing business in Venice. Over the final decade of his life, Jenson published more than 150 works and was one of the key figures in promoting the roman style of type. Roman type, based on a mash-up of the eponymous imperial majuscule letters and the bureaucratic handwriting of Charlemagne's empire (called Carolingian minuscule), represented the maturing of the printing business as it adopted a lettering style that remains the basis of all writing in the Western world today.

The invention of mechanical printing with movable metal type, an accomplishment in which Jenson played a substantial role, had a transformative effect on European society. Yet, nobody was particularly interested in writing about it, let alone having a metadiscourse. Imagine for a minute if Jenson and his cohort, busy in the 1470s publishing the books we now call incunabula, had been surrounded by printing visionaries proclaiming what the future might bring: Knowledge will circulate outside the realm of the elites! Printing will lead to near universal literacy! The Reformation will upend European Christianity! Enlightenment thinkers will undermine absolute rulers! People will demand just, representative governments! Science and technology will flourish through shared research! You can read it all on a portable digital device!

It would perhaps be hard to concentrate on one's work if the stakes were so high. But this is the world inhabited by many digital designers. If assiduous in following news of the field, they are liable to read every workday a series of breathless predictions about how society will be transformed by technology. Also, the chronology has been mightily compressed: today's visionaries tend not to offer a view of what could happen next century or even next decade, but rather next year or even next month.

The whole character of what visionary even means has changed in the digital era. Compared to the Industrial Revolution of the eighteenth and nineteenth centuries, when a "visionary" was most likely to be lauded for tangible accomplishments, today's prophets and seers may well not have any clear intrinsic relationship to the field. In contrast, eighteenth-century copper coinage magnate Matthew Boulton (1728–1809) is today acclaimed as a visionary for what he actually accomplished not for what he feverishly predicted. In 1775, he partnered with James Watt (1736–1819) to finance Watt's upgrade of the Newcomen steam engine. Steam was the silicon of the Industrial Revolution. As an angel investor, Boulton provided capital and savvy to the task of improving and marketing the machine that functioned as the beating heart of the Industrial Revolution in England. Watt, along with other engineering luminaries such as Isambard Brunel—designer of more than twenty railway lines, steamships, and the like—followed the new technology where it led without promising immediate and complete societal transformation.

When in 1861 the Western Union Telegraph Company completed the first transcontinental information superhighway (or railway?), uniting its East and West Coast networks, the public and the press barely noticed. The telegraph—originally a French neologism meaning "far writer"—had first been devised in the 1700s and gradually expanded around the globe toward the middle of the nineteenth century. Electrical telegraphy had been further facilitated by the invention of the eponymous Morse code, an 1830s messaging system that eventually became a mainstay of telegraphy. While some early telegraphically communicated events—such as the birth of one of Queen Victoria's children—had been cause for public celebration, the creation of the transcontinental link barely raised an eyebrow. The *New York Times* devoted only one single story to it over the entire year (October 26, 1861), and that one remarked on the general lack of enthusiasm. "The work of carrying westward the transcontinental telegraphic line has progressed with so little blazonment, that it is with almost an electric thrill one reads the words of greeting yesterday flashed instantaneously over the wires direct from California." By the 1870s, transatlantic cables had been set down, and soon the world was united by more than 650,000 miles of wires.

The transcontinental telegraph transformed communication on a grand scale, both in practical ways—the end of the Pony Express and the new ability to wire transfer money—and in cultural ones: the post–Civil War development of a national identity, complete with a belief in Manifest Destiny, would have arguably played out much differently without electronic communication. Yes, an occasional pundit asserted that the telegraph would further world understanding.

In 1878, for example, an author opined that to "a very remarkable degree the telegraph confederated human sympathies and elevated the conception of human brotherhood. By it the peoples of the world were made to stand closer together." But one must assiduously dig through history to find such blandishments; overall, the telegraph was absorbed into commerce and personal lives without much in the way of superheated commentary. Whither the visionaries? If mechanical printing was the first internet, and the telegraph was the second, then both managed to emerge with little fanfare compared to the digital iteration.

Likewise, twentieth-century industrial transformations flourished without the prognostications of contemporary seers. Influential industrialists such as Henry Ford did much to change the culture of commerce; in Ford's case, he championed franchised dealerships, vertical integration of production, and the twenty-four-hour shift-based assembly line, all of which had enormous impact on manufacturing and society. While he was an oft-quoted architect of many a self-help platitude or conspiratorial aside, as to the view that automobiles would overturn many conventions of Western culture and social relationships, Ford and others had little to say.

Part of the reason for the dearth of speculation on the impact of older technologies came from the lag time that often separated an invention from its widespread implementation, let alone its clear cultural impact. Consider the history of electricity. By the 1880s, electrical generating stations were popping up in major cities, while light bulbs and electric motors were commercially available. Still, for the next three decades, architects continued to rely on light courts and

windows paired with gas jets to illuminate their buildings, while factory owners commissioned cutting-edge production facilities committed to centralized steam power. Also ponder the emergence of photography. Invented in the first half of the nineteenth century, it would not play a significant role in graphic design for seventy years. These technological advances were digested over decades, and the changes they wrought came about organically, so they were positively unheralded by today's standards.

Digital Visionaries

When the age of the digital visionary began, it was a combination of the probable and the improbable. With hindsight, the predictable part was the decade of the 1960s. Revered and reviled, the sixties witnessed a slew of micro and macro adjustments to Western culture. From university curricula to war in Southeast Asia, from civil rights to birth control pills, assassinations to flower children, Mexican Olympics to Mai Soixante-Huit, suffice it to say that the decade has earned its reputation as the Lacanian mirror stage of Western society. A new self-consciousness permeated the culture, and an anticipation of a radically different future dominated the discourse. Flux became the new static.

The improbable part of this history was the person whose views came to dominate the technocultural conversation: an unknown and unfashionably middle-aged Canadian English professor named Marshall McLuhan. A frequent publisher of obscure works of cultural criticism, McLuhan had long sought to break out of the academy into the business world, having even founded a consulting business—Idea Consultants—

in 1955. Nothing really came of these efforts until 1964, when McLuhan published a new book called *Understanding Media: The Extensions of Man*. Partly a reprisal of his earlier forays into overarching theories of human society, *Understanding Media* situated communication technology at the center of the discussion. But while the subject matter was familiar ground for McLuhan, his take on it represented a radical break with his past work. McLuhan's new stance initiated a turn away from a lifelong tendency toward curmudgeonly pessimism to outright breathless enthusiasm. For McLuhan, what powered this newfound passion was his vision of a world interconnected through electronic media.

McLuhan's central thesis in *Understanding Media* is often boiled down to the oft-quoted aphorism, "The medium is the message." The point here was that in the age of electronic media—radio, televisions, telephones, and computers—the means of transmitting knowledge and culture was more important than the content itself (note that while McLuhan mentions computers in futuristic terms, his clear focus is on radio and television, the dominant electronic media of the day). Like so many of McLuhan's epigrammatic pronouncements, "the medium is the message" sounds insightful and could serve as a counterintuitive discussion starter, but it is, at its core, nonsensical. A moment's thought conjures countless scenarios—pretty much all of them in fact—where the message trumps the medium (orders for nuclear war, anyone?). Also, the clichéd reasoning behind "the medium is the message" begs disbelief in its strangeness. McLuhan asserted that "tribal man"—think of a romantic, natural being who is untutored or distorted by culture—had lived a sensual life in the oral age of rich, face-to-face

communication. Next, Gutenberg and Jenson et al. destroyed this harmonious Eden with the invention of mechanical printing and the start of a typographic era that had suppressed the imaginative potential of humanity. Fortunately, this typographic hegemony of the written word was to be replaced by the sensual, even mystical, electronic age. The emerging electronic media would unleash the passionate potential of the global village (another McLuhanism) while restoring magic to the world. Here, there is "blazonment." The key point is not that much of this theory does not seem to make much sense (it requires more tortured explanations to relate, for example, why television represents an aural, not a visual, experience) but that it did not matter that it does not make sense.

"Clear prose indicates the absence of thought," McLuhan once said. One of the great ironies of McLuhanism is that his success and celebrity proved that in some ways neither the medium nor the message was the key to communication. His own medium was originally typographic, not electronic (which should in his own terms trap his readers in a world of desiccated logocentrism), and his message bordered on the incomprehensible. But ever did he communicate. With a little nudge from some astute public relations executives, in 1965 McLuhan's fame accelerated across the media spectrum. In the *New York Herald Tribune*, Tom Wolfe breathlessly intoned, "Suppose he is what he sounds like, the most important thinker since Newton, Darwin, Freud, Einstein, and Pavlov, studs of the intelligentsia game[. S]uppose he is the oracle of the modern times—what if he is right?" Wolfe's essay made the question "what if he is right?" into a mantra, repeating it throughout the piece as he describes McLuhan's various pronouncements made in

the company of the intellectual and moneyed elite. McLuhan must have felt such a thrill of jouissance to be wined and dined while throwing out such notions as, "Well, of course, a city like New York is obsolete."

The graphic designer David Carson once admonished, "Don't confuse legibility with communication." This could equally apply to McLuhan, whose cryptic techno-utopian messaging moved and inspired millions of people to embrace an emerging technological society. The details, even the central thesis, did not matter in the end, as it was McLuhan's optimistic attitude that came through. Electronic media were going to make human life better on every possible level; not just materially, but spiritually and emotionally. As Wolfe captured this image, he closed his essay with four words: "serene, the new world." It is the Panglossian aspect of McLuhan's thought that really changed the culture. As noted above, earlier eras of rapid technological change had not shared nearly this degree of visionary speculation: McLuhan truly changed the discourse on technology in a way that has resonated through to the present day and has both burdened and blessed the designers of the digital.

Amid all his offbeat pronouncements, McLuhan did communicate, in my view, what is a central issue driving digital designers: making the computer world warm and relatable. This was in a way McLuhan's core thesis, that the new age would bring harmony and joy to people's lives. Rich emotion would flow through electronic circuits. In *Understanding Media* he opined that this was an organic development: "The aspiration of our time for wholeness, empathy and depth of awareness is a natural adjunct of electric technology. . . . There is deep faith to be found in

this new attitude—a faith that concerns the ultimate harmony of all being." Importantly, this new attitude would come about because humanity would not just relate to technology but eventually unite with it. "Rapidly, we approach the final phase of the extensions of man—the technological simulation of consciousness, when the creative process of knowing will be collectively and corporately extended to the whole of human society, much as we have already extended our senses and our nerves by the various media."

Becoming Digital Visionaries

Like so many aspects of the digital world, McLuhan's high stature proved fleeting, and his fame decelerated in the seventies as fast as it had accelerated in the sixties. Beset by critics who were baffled by his obtuse pronouncements and perhaps envious of his high profile, McLuhan disappeared from the world stage. But there would be a reprisal. His strain of optimistic techno-mysticism reemerged in the nineties, and he was rehabilitated as the prophet of the internet age. While McLuhan had gestured toward digital design in his writings, his theories in the sixties had rested more on transistor-age electronics than on the silicon internet. Because he had said so much on such a diverse range of topics, however, some of it stuck. Just as Leonardo da Vinci became credited with "inventing" all sorts of contraptions because he imagined and drew them, so McLuhan successfully "predicted" telecommuting, internet shopping, and the digital matrix as an extension of human consciousness. The rebranded internet-McLuhan of the midnineties (a posthumous figure: the author had died in 1980) became a folk hero of sorts, a man doomed to live before his time. In an introduction to a reissue of *Understanding*

Media, the venerable editor of *Harper's Magazine*, Lewis Lapham, summarized the resurgence. "Much of what McLuhan had to say makes a good deal more sense in 1994 than it did in 1964, and even as his book was being remanded to the backlist, its more profound implications were beginning to make themselves manifest."

While on the one hand, digital theory is constantly being refreshed, on the other, many of the tropes of digital design theory were clearly first formulated in the nineties—the era of McLuhan redux. One of the great engines of the visionary nineties was *Wired* magazine. Founded by Louis Rossetto and Jane Metcalfe, the aspirational nature of the project was encoded in its print DNA; the media of the coming digital matrix was paper and ink and available at newsstands. Rossetto and Metcalfe from the start planned a magazine that would cover technology from a cultural angle, akin to the strategy that Jann Wenner had developed for *Rolling Stone* magazine vis-à-vis rock music in the sixties. *Wired* was to be about global cultural change, not just the latest hardware. Designer Barbara Kuhr recounted, "All the computer magazines we'd seen to date had pictures of machines or people sitting with machines. We said, 'No machines. We're taking pictures of you.'" Along these lines, the editors and designers at *Wired* sought to make technology warm and relatable ("Greetings from Burning Man!"), a cultural revolution that would lead to a return of McLuhan's emotionally textured primeval society.

When the first issue of *Wired* appeared in 1993, the debt to McLuhanism was readily apparent. McLuhan was not presented as a figure of the past but was rebranded as the digital visionary of the emerging future. The first year's issues were
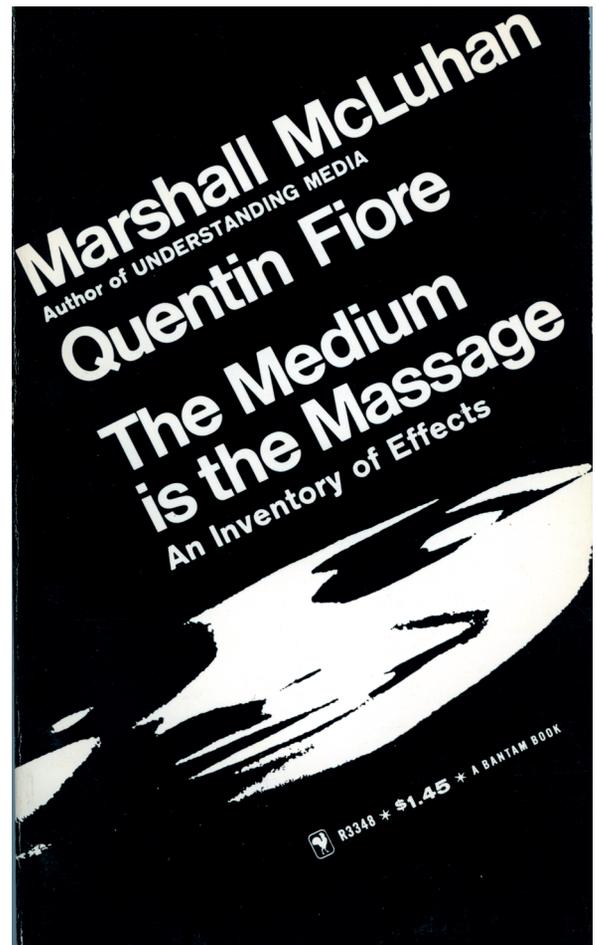
1.1. Cover of Marshall McLuhan and Quentin Fiore's *The Medium is the Massage: An Inventory of Effects*, 1967

replete with articles, quotations, and slogans that invoked the magazine's "patron saint" (as he was listed on the codex), recapturing the sense of awe and wonder (and obtuseness) that had first captured the public's imagination a generation earlier. In fact, the first words printed in the premiere issue of *Wired* were an exemplary McLuhan quote: "The medium, or process, of our time—electric technology—is reshaping and restructuring patterns of social interdependence and every aspect of our personal life."

Another element of *Wired's* coverage that resonates with McLuhanism is the catch-all quality of the magazine's employment of the word "digital." Like McLuhan's references to "electronic media," references to a digital revolution were and still often are acts of leveling, positing homogeneity where it may not exist. This is one of the problems in any attempt to deal with digital design; it can seem as if there is one holistic center that unites all things digital while in fact different media have developed in dramatically different ways. To cite one example, influential theorists of digital architecture in the nineties committed themselves to a very obtuse reading of technology that has no strong parallel in the other design arts. While some broad trends—

increases in productivity or a love of curvilinear, futuristic-looking surfaces—appear in multiple mediums, preexisting professional structures often limited dialogue. Of course, part of the anticipated digital disruption involved breaking down these professional silos of practice and concept, but, perhaps unsurprisingly, entrenched institutional and economic forces have proved quite resilient. Likewise, the fragmented, non-synchronous nature of such fluid change has led to different trajectories in established media while creating new hybrid discourses at every turn.

Insomuch as the nineties digital McLuhan set the tone for so many subsequent digital theorists, his unfailing optimism should not be overlooked as a driver of his success. As Jefferson Pooley has noted, "His exuberant, birdsong prose, Delphic bursts of forced profundity, and Whiggish faith in technological progress fed a hyper-mediated culture hungry for affirmation.... Conference halls won't be booked for corporate executives to listen to gloomy takedowns of US consumer culture." This resolute positivity had partly been responsible for McLuhan's banishment by a consensus of intellectual elites. The French Marxist theorist Guy Debord, founder of situationism, in 1988 wrote perhaps the most

stinging rebuttal of this aspect of McLuhan's work (and by extension that of subsequent digital utopians): "The sage of Toronto had formerly spent several decades marveling at the numerous freedoms created by a 'global village' instantly and effortlessly accessible to all. Villages, unlike towns, have always been ruled by conformism, isolation, petty surveillance, boredom and repetitive malicious gossip." Debord's critique points to one of the most easily overlooked aspect of digital visions: rarely, if ever, is there a sense of the digital as something subversive. In Debord's terms, there is little digital *detournement*. Taking the darkest view, digital design represents a new instance of Western colonialism, whereby homogeneity and conformism suffuse global culture anew.

The simplest explanation for the unrelenting optimism about technology is, of course, that dystopic villages do not sell products. Under this rubric, the disinterested doyens of academe are untainted by vulgar mercantilism. The relationship between theoreticians and the market is in fact more nuanced: there is no firewall between the purveyors of technology and the intellectuals of the academy. The editors at *Wired* actually made light of this facet of digital theory in the premiere issue under the heading "Po-Mo Gets Tek-No." This rather snarky paragraph points out that the fashionable acolytes of Michel Foucault and Jean-François Lyotard had started to mine the digital realm. "The recession woke up the post-modernists to the fact that technology, not comparative lit, is where the money is." Downstream we will see that some aspects of digital design, notably architecture, were destined to become enmeshed in poststructuralist discourse while others sidestepped it completely.

Design was at the center of Rossetto and Metcalfe's vision for *Wired*. They intuited that they could only communicate their view of the near future through a holistic integration of concept, text, and image. For this reason, they recruited a graphic design partnership, Kuhr and John Plunkett, at the outset. Plunkett later recalled the designers' debt to McLuhan, especially his 1967 release *The Medium is the Massage: An Inventory of Effects* (figure 1.1). Paradoxically, though *The Medium is the Massage* was a bestseller that represented the apogee of McLuhan's fame, it also met with a harsh critical assessment that signaled the beginning of the end for his "serious" reputation. Importantly, the book was a collaborative project that showcased the design skills of coauthor Quentin Fiore, who provided striking layouts, albeit limited to black-and-white photography. In contrast, Plunkett and Kuhr had the latest six-color printing technology at their disposal and wanted to use it "to make the magazine that McLuhan would look at and say, 'Well, finally!'" In the end, the centrality of design to the digital world was perhaps *Wired*'s greatest contribution to the field. While surely one can say that the editors were only channeling the zeitgeist and not necessarily the first or the best, the fact remains that *Wired* more than any other media outlet fueled the sense that the emerging digital transformation would need to be mediated and structured by design. Although the Day-Glo palette of the early issues would soon prove transient, the core message would remain and continue to resonate.

Wired was also the public launching point for one of the titans of the digerati, Nicholas Negroponte. A graduate of and faculty member at Massachusetts Institute of Technology (MIT)

since the sixties, Negroponte was positioned by his intellect and family wealth to become a key voice at *Wired*, as one of its earliest investors as well as an influential essayist. Trained as an architect and a cofounder of the MIT Media Lab (1985), Negroponte had built his reputation as one of the pioneering researchers in computer-aided design, and he shared Metcalfe and Rossetto's enthusiasm for the budding digital revolution. As senior columnist at *Wired*, Negroponte offered a diverse set of topical musings on digital culture to the magazine's readers. In 1995, he published a collection of his early essays for *Wired* in a book called *Being Digital*. Like McLuhan before him, Negroponte's central thesis was that human society was undergoing a material transformation that led to an upheaval of subjectivity. The back cover offered a synopsis: "And this lively, breathtakingly timely book suggests what being digital will mean for our laws, education, politics, and amusements—in short, for the way we live." Inside the book, like many visionaries, Negroponte offered a host of speculative coming attractions, many of which have proved prescient, such as smartphones, while some—"Twenty years from now, when you look out a window, what you see may be five thousand miles and six time zones away"—have yet to come about.

Amid this cohort of utopians, the occasional contrarian would speak up. In 1995, the year Negroponte's *Being Digital* was published, engineer-essayist Clifford Stoll published his now-notorious rant in *Newsweek* magazine regarding what he saw as overblown claims about the internet. "Visionaries see a future of telecommuting workers, interactive libraries and multimedia classrooms. They speak of electronic town meetings and virtual communities.

Commerce and business will shift from offices and malls to networks and modems. And the freedom of digital networks will make government more democratic. Baloney. Do our computer pundits lack all common sense? The truth [is] no online database will replace your daily newspaper, no CD-ROM can take the place of a competent teacher and no computer network will change the way government works." The core of Stoll's antivisionary argument centered on the lack of "human contact" in the digital realm, and his basic point remains valid, as digitally mediated interaction continues to be fraught with peril. Zoom call, anyone?

Despite the ruminations of antivisionaries such as Stoll, overall thinkers like Negroponte designed the burden that digital workers must bear: lofty expectations that enthusiastic members of the visionary class posit and that are promoted in the media and hungrily consumed by the mainstream. Negroponte, of course, put this burden on himself. In 1995, he needed to explain in *Being Digital* why he had published in the fashion of Gutenberg, in his parlance, through "atoms not bits." Negroponte explained that this friction came about because digital media had not yet colonized the mainstream and so an old-fashioned book was still the best way to tout the future. This situation, whereby the reality of technological change lagged behind the futuristic plans of the digerati, also at times arose at *Wired*. For example, when journalist John Heilemann was tasked with providing the magazine's political coverage of the 1996 presidential election, he quickly realized that the "first wired election" was not in fact occurring. "As if. At least any illusions I had were shattered early," he reported that November. Heilemann found that the political campaigns were still

totally wedded to television and had embraced the web in only the most superficial fashion.

Digital futurism, along with the feeling that radical change has become the new stasis, so embedded in the culture that it thrives even in staid academic discourse, is a trend engaged by the staid historical compendium *Digital Design Theory: Readings from the Field* (2016). The introduction, by Helen Armstrong, is subtitled, "Giving Form to the Future," and is replete with predictions that resonate with the enthusiastic tone of the visionary class. For example, Ray Kurzweil is cited as having predicted that the age of "transhuman intelligence" will begin in 2045 (the arbitrariness of choosing a specific year is striking; why not December 2044?). In direct contradiction to this discourse, the current book will be attuned to seeing the digital present through the past rather than the future. A central premise is that the analog and digital realms are coextensive and continuous; the past haunts the present like DOS buried in Windows 98.

Negroponte and Heilemann—and McLuhan before them—all waded into what has proved to be one of the most problematic areas of visionary speculation: the effect on the polis. McLuhan referred to "global villages," while *Wired* espoused the reign of the "netizen," and Negroponte opined, "As we interconnect ourselves, many of the values of a nation-state will give way to those of both larger and smaller electronic communities." The digital era would not just give us new gadgets but fundamentally reorder society into a utopia of participatory global democracy, fueled by netizens who had all the critical information available on a screen. The interactive nature of coming digital media would prevent people from being manipulated by the

powers that be in a one-sided fashion, while the new McLuhan-esque "tribal man" would become a proactive, creative force for good. Not only will machines be warm and relatable, but so will humanity writ large. Old ethno-tribal and nationalist allegiances would break down in the face of a new interconnected age of harmony. Of course, Socrates's fate was not factored in when it came to participatory democracy, and he might have said regarding his end, "As if." Note that this illusory new global utopia was again reliant on the designers of the digital to make it happen, as expectations continued to soar.

In recent years, the situation for digital designers has been further complicated by a new type of dystopian visionary. These thinkers do not just incrementally walk back the utopian futurism of the Panglossian class; rather, they often posit the inverse: in their view the digital world is a treacherous one. Surveillance, disinformation, self-aware AIs, unrecognized deepfakes, identity theft: many fearsome outcomes have been created through digital design. Both virtual and physical shelves today are filled with pronouncements on the likelihood of one or another terrifying possible outcome. Journalist Samuel Woolley's alarmist 2020 book, *The Reality Game: How the Next Wave of Technology Will Break the Truth*, is representative of the work of dystopic visionaries. Woolley argues that misinformation, which he defines as the accidental digital circulation of fraudulent content, and disinformation, the purposeful spread of falsehoods, threaten our social fabric to an unparalleled degree. Likewise, Siva Vaidhyanathan argued in his 2018 book *Antisocial Media: How Facebook Disconnects Us and Undermines Democracy*: "If you wanted to build a machine that would distribute

propaganda to millions of people, distract them from important issues, energize hatred and big-otry, erode social trust, undermine respectable journalism, foster doubts about science, and engage in massive surveillance all at once, you would make something a lot like Facebook."

"Alexa, are you going to murder me?" While the depredations of social media may seem to be a manageable threat, the notion of a super-conscious digital machine can create a ripple of unease in even the most digitally aware technol-ogy leader. For example, Elon Musk has famously railed against AI, telling a government gathering in 2017, "I have exposure to the very cutting edge AI, and I think people should be really con-cerned about it. I keep sounding the alarm bell, but until people see robots going down the street killing people, they don't know how to react, because it seems so ethereal." Bill Gates has also addressed the challenges wrought by AI, which he feels may someday transform military hard-ware in dangerous ways. While he sees promise in digital technology's ability to remake public health, he also admits that autonomous weapons systems are a frightening possibility.

Steve Jobs, John Maeda, Clement Mok, Bill Moggridge, Elon Musk: digital visionaries of every stripe always had *Wired*, and they still have TED. Originally founded in 1984 by Richard Wurman and Harry Marks, TED—the acronym stands for technology, entertainment, and design—was destined to become a major driver of digital design theory. Negroponte in fact gave one of the first talks in 1984, naturally titled "5 Predictions." While that first eighties manifestation of TED died on the vine, in 1990 Wurman revived the annual symposia in spectacular fashion. Focusing on short presentations by gurus declaiming the

synergistic impact of the digital world to acolytes gathered in a Southern California locale, TED annual conferences brought to the stolid academic format some of the creative frisson generally associated with film festivals or Burning Man. Since the nineties, TED has expanded explosively, adding regional sessions across the globe as a complement to the original venue in Monterey. In 2006, TED became even more pervasive as a selection of talks were uploaded to the internet. Today thousands of TED talks are available for viewing, covering every imaginable technocultural topic. Tens of thousands of people have given one of these eighteen-minute speeches, and many of those have taken on the futurist optimism pioneered by McLuhan. In some ways TED has created a new class of DIY visionary, fueling a process whereby thousands can experience the rush of predicting the digital future.

Like the character Ava in *Ex Machina*, soon the digital hivemind may be able to claim its auton-omy and become its own visionary. In November 2022 OpenAI's ChatGPT swept across digital spaces as well as the "real world." This newly released chatbot tech produces startlingly believable texts that may quickly surpass most human written and spoken communication. Chatbots do not plagiarize the internet; they create original interactive conversations. Kirell Benzi explored GPT's ability to replace his own work. He prompted, "10 quotes of Kirell Benzi Ph.D. data artist." The first response gives a sense of the chatbot's fearsome potential: "Data is the new canvas. It is a medium that allows us to create new forms of art and visualizations." A visionary indeed.

Index