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EVERSION

> Cyberspace, not so long ago, was a specific elsewhere, one we visited periodically, peering into it from the familiar physical world. Now cyberspace has everted. Turned itself inside out. Colonized the physical.
>
> (William Gibson 2010)[1]

The eversion of cyberspace, or the shift in perception it metaphorically describes, has actually been going on for some time, now. When Gibson coined the term cyberspace in 1982–1984, it was a metaphor for the global information network, but, in the decade that followed, it made a material difference in technology and culture, and in the perceived relation between the two. Now, as Gibson and others have recently noted, the term has started to fade like an old photograph, to sound increasingly archaic.[2] In a Twitter exchange on November 27, 2011, @scottdot asked "Who the hell says 'cyber'-anything anymore?" and in a few minutes Gibson himself (@GreatDismal) responded: "I have said that myself, many times." The notable exceptions, perhaps significantly enough, are uses of the term by the military and governments, as in cyber-attack and cyber-warfare, and in the analogous case of cyber-bullying. In all of these cases, one might imagine that there's a resistance to acknowledging the (frightening) breakdown of the distinction, the interpenetration of what had been conceived of as separate worlds. Even in this case, the Department of Homeland Security Deputy Secretary Jane Holl Lute began her testimony before a congressional committee on cybersecurity in March 2013 by observing that "cyberspace is woven into the fabric of our daily lives," and she has said repeatedly (in a paradoxical-sounding metaphor) that cyberspace "functions as the very endoskeleton of modern life."[3] No longer a place apart (some other "space"), it's now seen as the infrastructure inside the "body" of everyday

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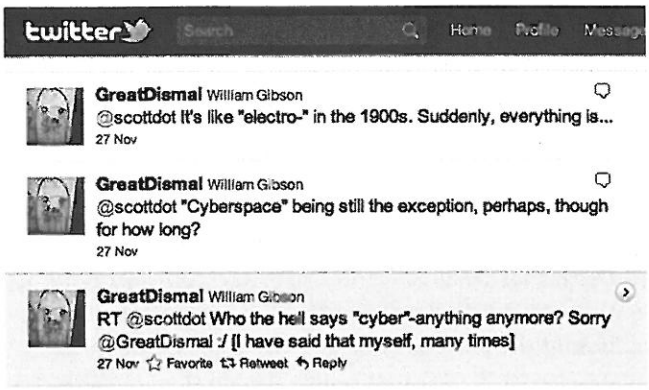

FIGURE 1.1 Twitter conversation, Gibson

existence. For some years now, Gibson has been pointing out that "cyberspace is everywhere now, having everted and colonized the world. It starts to sound kind of ridiculous to speak of cyberspace as being somewhere else."[4] Although she continues to use the term, Secretary Lute would agree with Gibson that cyberspace has everted, turned inside out (and outside in).

In one sense, Gibson is just overwriting his own earlier metaphor (cyberspace) with a newer one (eversion). But, despite his claim that "cyberspace is everywhere, now," in fact, as one of his characters says in the 2007 novel, *Spook Country*, there never was any cyberspace, really. It was just a way of understanding the culture's relationship to networked technology, in other words, a metaphor. As that relationship changed, so did the metaphor. Of course, most of the time people don't go around measuring in figurative terms their shifting attitudes toward technology. Everyday technology is experienced in more literal, concrete terms. For increasing numbers of people, networked technology is becoming an integral part of everyday life they take for granted—and that's the point. The metaphor of eversion is particularly resonant, particularly useful, because it articulates a widely experienced shift in our collective understanding of the network during the last decade: inside out, from a world apart to a part of the world, from a transcendent virtual reality to mundane experience, from a mysterious, invisible abstract world to a still mostly invisible (but real) data-grid that we move through every day in the physical world.[5] If cyberspace once seemed a transcendent elsewhere, someplace other than the world we normally inhabit, that relationship has *in*verted as the network has *e*verted. In a 2009 interview, Gibson described the eversion in this way:

> The ubiquitous connectivity that we're all taking very much for granted, and are increasingly depending on, has become our Here. And the disconnected space, you know, when you can't get your WiFi to link up, or when your cellphone won't work, that's become our There.[6]

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The network is no longer normally imagined as a place you jack into in order to upload your disembodied consciousness, a place you "visit" as if it were another planet. It's right here all around us, the water in which we swim. Moreover, we made it, or at least we contribute our own data to it daily, whether fully aware or fully consenting or not.

The term *eversion* is unusual, with medical and surgical associations appearing early (in which inner surfaces—of the eyelid, for example—are turned inside out), and as the term for a rhetorical figure in the seventeenth century (also called *eparedos*), in which a sequence of words or phrases is turned around and repeated in reverse order (according to the *Oxford English Dictionary* (OED)). Gibson himself first used a form of the term in print in a poem published in 1992, "Agrippa" (as we'll see in Chapter 3). There it simply described an umbrella turned inside out by the wind in Japan ("umbrella everted in the storm's Pacific breath"). It's perhaps interesting, however, that Gibson's initial use of the word was to describe a physical object out in the weather. By 2007, he used it as a metaphor for the digital network's turning-out into the physical, out into the world.

In 1999, Marcos Novak, who is a theorist and practitioner of "virtual architecture," used the term eversion in roughly the same way as Gibson later would.[7] Novak begins with the premise that "we are tending toward a culture of ubiquitous virtuality," a state beyond cyberspace and VR. Novak argues, however, that the concept of immersion by itself is incomplete, that it "lacks a complementary concept describing the outpouring of virtuality onto ordinary space" (309, 311). That missing concept is eversion—"the obverse of immersion" (311). Novak's anticipates Gibson's use of the term in a number of ways, even before the implications of newer networked technologies in the new millennium were fully evident. He uses the same spatial metaphor, for example: "Eversion . . . signifies a turning inside–out of virtuality, a casting outward of the virtual into the space of everyday experience" (311). And Novak grasps what will become in the 2000s the crucial point of the eversion of cyberspace—the shift of focus to the everyday and to physical space: "the phenomena we are familiar with in cyberspace will find, indeed are finding, their equivalent, everted forms in ordinary space" (312).

For Novak, at the time, the shift was primarily conceptual. He had not yet seen the eversion embodied in the banal ubiquity of mobile technology, or even of widespread and free, or inexpensive, fast wireless Internet connections. As a visionary architect, however, Novak was used to modeling and thinking with imaginary objects, design fictions, including in his case hyperspatial or multi-dimensional structures that figure eversion in graphical terms. Furthermore, he was interested in design based on metaphors, and in what he calls the "poetics of new technologies" (309). For Novak, eversion is a concept for *more precisely imagining* "the cultural and poetic circumstances brought about by the exponential growth of information technology" (312). Since those early speculations, in a 2008 exhibit for example, Novak has explored the idea "that we live in a new

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sort of space, encompassing the actual and the virtual, and using the invisible as a bridge and interface between the two"—a formulation that sounds much like the mixed-reality state of the eversion as I'll be characterizing it.[8] Again, as an architect working in an auspicious time, Novak connects that experience to objects in space, what he calls "turbulent topologies," and a sense of being surrounded by "strange geometries." I'll come back in the next chapter to that sense of the eversion as exposing weird, heretofore hidden dimensions of experience, and to the seemingly contradictory sense that the network is mundane, a fact of life all around us, but somehow still redolent of an otherness associated with its former existence as cyberspatial. This double sense is what characterizes our moment of transition, of the eversion still in the process of working itself out and becoming more widely distributed.

In fact, William Gibson is often credited with saying that the future is already here, it just isn't evenly distributed.[9] There's a way in which what Novak sensed with his future-oriented theoretical antennae around the turn of the century took a few years to be experienced by a preponderance of users. And that process continues. But I think we can roughly date the watershed moment when the preponderant collective perception fundamentally changed to 2004–2008. At about that historical moment, the quintessential virtual world, Second Life, arguably peaked. It was more or less taken for granted just as it began to decline, in terms of number of users and—more importantly—in terms of the publicity surrounding it as *the* paradigm platform for the future of the Internet as a whole.[10] At around the same time, the idea that the network itself was essentially a virtual world, a *second* life, lost some of its power, as network technology became increasingly intertwined with everyday activities. The MMORPG (massively multiplayer online role-playing game) *World of Warcraft* was taking off at the same time as a mainstream entertainment, but the interface for that game was decidedly video gamelike in its mixed menus, chat, and 3D graphics. The experience of playing it for many people, with their headsets on, talking to their guild, was closer to using social-network software than to immersive VR as it had been imagined in the era of cyberspace during the 1990s.

Speaking of games, at about the same time, Nintendo's motion-control Wii was introduced (2006), helping to usher in an era of mixed-reality casual gaming, matched only by the rapid rise of mobile gaming. The same massive increase in the use of mobile technologies contributed to the success of the so-called Web 2.0 social-network platforms introduced at the time, especially Facebook. As I pointed out in the Introduction, Facebook first appeared around 2004 (MySpace had preceded it by about a year), but it came into its own, reaching a mass user base, in 2006–2007—just in time to be joined by the microblogging platform Twitter in 2006. Geolocative social-network platform Foursquare, in which users check in to real-world locations using GPS, debuted in 2009. Indeed, as the work of Jason Farman (among others) has shown, the rise of mobile computing is in itself another way to characterize the shift I'm calling the eversion.[11] Farman sees

the rise of mobile media as a significant "cultural shift" and a force that produces and reconfigures "social and embodied space"; his work focuses on "the embodied and spatial actions to which our devices contribute" (1, 5, 2). The timeline of eversion, therefore, is marked by the appearance of Apple's iPhone, for example, which was previewed in 2006 and introduced in January 2007; the Android OS and phones followed within a year.

Early in 2007, William Gibson's novel *Spook Country* was published, in which he first articulated the eversion of cyberspace.[12] Set in 2006, its story is based on the rise of mobile network access (though everyone in the book still flips their cell phones open and closed, rather than poking at a multitouch interface, a telling detail that dates the writing to the just-pre-iPhone era), and on the related confluence of AR, locative art, viral marketing, pervasive surveillance, and the total security state. Like what happens in the novel (and the one that preceded it in the trilogy, *Pattern Recognition*), the novel itself is an act of "coolhunting," a report from the interface of culture and networked technology. Characters in the novel execute works of art (and a direct-action protest) by leveraging the cellular data networks, GPS satellite data, and the mobile and wireless Web to tag or annotate the physical world, overlayering locations with data of various kinds, including surreal 3D artists' images. The novel presents a media landscape in which the mundane trumps the transcendent, but it's a mundane with a difference, and the difference is distributed and mobile networked data. In *Spook Country*'s vision of 2006, already there isn't any cyberspace out there, because the network is down here, all around us. The book is about streets and buildings, shipping containers and remote-control drone aircraft, pills, guns, and religious fetish objects, objects of all kinds, because that's where the network lives, now, as data and sensors and connections, built into and surrounding the myriad physical objects that make up the ambient world.

This condition, what Gibson calls the eversion of cyberspace, corresponds to a shift noted by a number of media-studies specialists working in different disciplines, what Katherine Hayles, for example, has identified as a fourth phase in the history of cybernetics (which began in its modern form with information theory in the mid twentieth century), from "virtuality" to "mixed reality," to "environments in which physical and virtual realms merge in fluid and seamless ways."[13] This is the most recent shift in what Hayles sees as the history of cybernetics: moving from homeostasis (1943–1960), to reflexivity (1960–1985), to virtuality (1985–1990s), and now, to mixed reality: "A decade or two ago there was much talk of virtual realms as 'cyber' locations distinct from the real world," she says, as embodied in the VR helmet of the 1980s. Such rigs have been replaced, now, by the graphical user interfaces (GUIs) of computers of various form-factors, increasingly experienced via the "pervasiveness, flexibility, and robustness of ubiquitous media."

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> information and functionalities onto physical locations and actual objects. Mobile phones, GPS technology, and RFID (radio frequency identification) tags, along with embedded sensors and actuators, have created environments in which physical and virtual realms merge in fluid and seamless ways. This fourth phase is characterized by the integration of virtuality and actuality that may appropriately be called mixed reality.
>
> (Hayles 2010, 148)

The history of cybernetics, for Hayles, began with information being separated from its material "body," being treated as a mathematical abstraction. This has had the effect of a general emphasis on disembodiment that Hayles' earlier work explicitly addressed. The mixed-reality model, however, emphasizes the role of human and machine within complex environments "though which information and data are pervasively flowing" (149). In other words, like Gibson, she recognizes in this 2010 essay that what was once imagined as a realm apart is now discovered all around us in the physical world, as information and data are seen as complexly material phenomena, everywhere embodied.

To cite another example: In 2006, at the time that Gibson was writing *Spook Country* (just before it was published, although excerpts had appeared on his blog), Adam Greenfield used terms much like Gibson's to describe what he called the condition of "everyware," a "paradigm shift" around 2005 to ubiquitous or pervasive computing.[14] This new distributed network offers a radical alternative to "immersing a user in an information-space that never was"—and amounts to "something akin to *virtual reality turned inside out*" (73; my emphasis). Writing from the point of view of technology design, Greenfield cites *Neuromancer* for the earlier paradigm. In cyberspace, he says, the "nonspace of the interface" made it feel as though "each of our boxes [personal computers] [was] a portal onto a 'consensual hallucination' that's always there waiting for us" (72). By contrast, so-called everyware works by "instrumenting the actual world, as opposed to immersing the user in an information-space that never was" (73). Moreover, the new everyware network "happens out here in the world" and is a social phenomenon (16). Science fiction like Gibson's still plays an important role. Greenfield notes, "in everyware pop culture and actual development have found themselves locked in a co-evolutionary spiral," and he cites, for example, movies and science fiction novels, as well as literary fiction, such as work by David Foster Wallace and Don DeLillo, as imaginative representations of ubiquitous computing of the kind actually being developed in the 2000s (93–95). Recognizing this effect doesn't require subtle cultural-studies methods. As he reminds us, sometimes audience members of imaginative films representing technology, for example the interfaces of *Minority Report*, "go on to furnish the world with the things they've seen"; in that way, the "fantastic" is quite literally "made real" (95). In fact, as I'll argue in the chapters to come, the central role of fictional designs or deliberate "design fictions," together with their closeness to being translated into actual,

physical prototypes, is one of the features of the eversion, one of the ways the (imagined) virtual and physical are linked; not dual, separate realms, but two possibility states, always already available.

In a Foreword to Beth Coleman's *Hello Avatar*, Clay Shirky praises her analysis of the network as finding a "means to escape the seeming incommensurability of two competing models"—the network as cyberspace and the network as a medium for social communication in the real world.[15] Her preferred framing concept, which sets aside or avoids the presumed dualism, is "x-reality," "x-media," or "cross-media," a "landscape" held together for us by our construction of identities (avatars), and, as Shirky says, it "crosses from the real to the mediated world and back" (xiii). In her own words, Coleman declares that she sees "an end of the virtual and the acceleration of the augmented," due to "the growing phenomenon of pervasive media engagement" (2–3). Augmented or "x-reality," Coleman says, "traverses the virtual and the real" (3).

One more important example is the public writings by sociology student Nathan Jurgenson (a PhD candidate in sociology at the University of Maryland), who in the past few years has argued in various venues against what he calls "digital dualism," the fallacy that "the digital and the physical are separate," and in favor of recognizing instead that "the digital and physical are increasingly meshed" in AR.[16] Jurgenson's arguments about the network overlap with my own in many ways. He writes in response to what he sees as "the fetishization of the offline," which he associates with retro fashions for analog media, and a persistent ideology of cyberspace as a place apart.[17] Against the analog backlash based on digital dualism, Jurgenson asserts that:

> Our lived reality is the result of the constant interpenetration of the online and offline. That is, we live in an augmented reality that exists at the intersection of materiality and information, physicality and digitality, bodies and technology, atoms and bits, the off and the online.
>
> ("The IRL Fetish")

This argument by Jurgenson (and others at the Cyborgology blog in particular) attracted the criticism of Nicholas Carr, author of *The Shallows: How the Internet Is Changing the Way We Think, Read and Remember*, who wrote his own blog post February 27, 2013 against what he called the "digital dualism denialism."[18] Carr equates offline existence with a pre-technological, more natural way of life: "We should celebrate the fact that nature and wilderness have continued to exist, in our minds and in actuality, even as they have been overrun by technology and society." The constructedness of the idea of "nature" for the past 200 years—especially in reaction to the industrial revolution—and the presence in the "wilderness" of machines and technologies of various kinds for much longer than that are glossed over in Carr's account, revealing the very kind of idealization of "offline" life Jurgenson was addressing in the first place. But Carr's call for

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"thinking more deeply about people's actual experience of the online and the offline and, equally important, how they sense that experience" is, I think, useful. It's true that, at times, Jurgenson's rhetoric can sound like simple debunking rather than deconstruction, as if it's merely a matter of exposing digital dualism as a silly illusion. He has, I think rightly, said that "the clear distinction between the on and offline, between human and technology, is queered beyond tenability" ("IRL Fetish"). But, as with other forms of queering, that doesn't mean that the relational constructions of digital and physical suddenly come to an end and are resolved into a unity, now that they are less stable, fixed, or natural categories. It certainly doesn't mean that *people no longer experience them as mutually co-constructed*, as defined by differences that cannot quickly be resolved into easy unities. In one marginal note to one of the essays I've been citing, Jurgenson qualifies his own polemic: "To be clear, the digital and the physical *are not the same*, but we should aim to better understand the relationship of different combinations of information, be they analog or digital" ("The IRL Fetish"). Agreed. In this book, I'm deeply interested in pursuing that kind of better understanding of the relationship of digital and analog, in part by looking (as Carr suggests) at how people "sense" their experience of this relationship. I begin by reading the metaphorical significance carried in expressions of digital dualism, and by interpreting the *shift* from one dominant metaphor (cyberspace) to another. That shift characterizes the eversion for me, the move toward what Jurgenson calls enmeshed or AR, what Coleman calls x-reality, what Greenfield calls everyware, and what Hayles calls mixed reality. So, as I further explain in the next chapter, I'm less interested in debunking cyberspace as a transparent illusion than I am in exploring what, after having had such a profound cultural influence, cyberspace's dissolution and ongoing eversion might mean, now, for culture and the humanities. If cyberspace was a "consensual hallucination," then that consensus was widespread (and remains in effect for some people), and the eversion therefore represents a significant but still unfolding shift in the collective imagination. Such a shift calls for interpretation.

I think the changes observed by authors such as Jurgenson, Coleman (and Shirky), Greenfield, Hayles, and others, all writing from different disciplines and different perspectives, reflect a broader cultural change whose effects we are still experiencing, a multi-platform shift in the nature of the collective experience of networked technologies. My focus is on that shift, as an ongoing process, and on its significance as a context for understanding the emergence of the digital humanities. It's not that (to borrow a phrase from Virginia Woolf) on or about December 2006, say, the character of the network changed. Nothing that sudden and clear cut took place, of course. But I do think that, between about 2004 and 2008, the cumulative effect of a variety of changes in technology and culture converged and culminated in a new consensual imagination of the role of the network in relation to the physical and social world. In other words, the network was everting.

At about that same moment, the digital humanities rather suddenly achieved a new level of public attention, as I sketched out in the Introduction, emerging out of a decades-long tradition of humanities computing and marked by the term "digital humanities" itself—which seems to have been coined in 2001 but reached a kind of critical mass, in terms of public awareness and institutional influence, ranging from the publication of the influential *Companion to Digital Humanities* (2004), to notices in the press, to the establishment of an Office of Digital Humanities (ODH) at the NEH, between 2004 and 2007.[19] While the earlier established practices of humanities computing continued, the new-model digital humanities emphasized new methods and new media, the analysis and visualization of large datasets of humanities materials, for example, including for the purposes of what Franco Moretti named "distant reading" (2005); it continued to engage in building digital tools and Websites and archives, but also began to experiment with using 3D printers and making wearable processors and other devices; and it responded to the geospatial turn across the disciplines.[20] The new digital humanities also increasingly turned its attention to new media, including born-digital media, and, to a greater extent than has been fully recognized, began to study game theory and even to build video games and alternate reality games (ARGs). So the concurrent eversion of cyberspace and the rise of the new DH was no mere coincidence. In one sense, the new digital humanities—the product of the same changes marked by the eversion—is arguably humanities computing everted.

In its newly prominent forms, DH is both a response to and a contributing cause of the wider eversion, as can be glimpsed in the substitution performed at a crucial moment (by John Unsworth and Andrew McNeillie, in titling a collection of essays) from *digitized* to *digital* humanities: from implying a separation between the stuff of the humanities—manuscripts, books, documents, maps, works of art of all kinds, other artifacts—and computing, to more of a mixed reality, characterized by two-way interactions between the two realms, physical artifacts and digital media.[21] Instead of only digitizing the archives of our cultural heritage in order to move them out onto the network (though that work continued of course), many practitioners began to see themselves putting the digital into reciprocal conversation with an array of cultural artifacts, the objects on which humanistic study has historically been based, as well as new kinds of objects, including born-digital artifacts. In new media, this kind of reciprocal interaction between data and artifacts, algorithm and world, has been effectively modeled for decades in video games. So, throughout this book, I'll cite games as the best examples of some of the problems of new media that are especially relevant to the rise of DH.

Transcendent Network, Mundane World

First, to revisit cyberspace: Combining "cybernetics" and "space," William Gibson coined the term in a 1982 short story, "Burning Chrome," as an imaginary

brand name for a network device set in
1984 cyberpunk novel *Neuromancer*. He
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ing "cybernetics" and "space," William
story, "Burning Chrome," as an imaginary

brand name for a network device set in the 2030s, but it became famous in his 1984 cyberpunk novel *Neuromancer.* He later said that his vision of cyberspace—a disembodied virtual reality, a transcendent other world made up of "clusters and constellations of data. Like city lights receding"—was inspired by watching arcade video game players as they leaned into their machines, bumping the cabinets and hitting the buttons (in the novel, a fictional documentary says that the "matrix," the network, "has its roots in primitive arcade games").[22] Gibson, who, significantly, was not himself a gamer, imagined that the gamers were longing to be immersed in, and to disappear into, the virtual world on the other side of the screen, longing to transcend the body in physical "meat space" and be uploaded as pure consciousness into the digital matrix of cyberspace.[23] Thus, Norbert Wiener's 1948 use of cybernetics, which was etymologically about "steerage" or human control of machines, was mutated by Gibson in 1984 to suggest a willing relinquishment of the bodily and the material in order to go to another place, another plane.[24] In fact, the Other Plane was Vernor Vinge's term for the 3D virtual world he imagined a few years before Gibson's *Neuromancer* introduced the world to cyberspace, in the novella *True Names.*[25] Vinge based his imagined Other Plane on his experiences logging on to a PDP-11 in 1979 through a dial-up connection; creating the virtual world was a matter of "scaling up from that and imagining consequences" (Frenkel, 16, 18).

> One of the features of *True Names* is the notion that a worldwide computer network would be a kind of *place* for its users. I needed a word for that place, and the best I came up with was "the Other Plane." Alas, that is a lightning bug compared with the lightning bolt that is "cyberspace."
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> (Frenkel, 20)

(Vinge is referring to an idea he attributes to Mark Twain, that "the difference between the right word and the almost right word is the difference between lightning and a lightning bug.") Both Vinge's and Gibson's metaphors had to be spatialized. As Katherine Hayles has said, Gibson created cyberspace by "transforming a data matrix into a landscape"—a place apart from the physical world—"in which narratives can happen."[26] This newly 3D imagined place, which Gibson characterized from the beginning in idealist terms as "a consensual hallucination," looked like a glowing abstract grid, as seen in 1982's TRON, for example, where, as in Plato's world of the Forms, the contingencies of material reality and the body have been burned away, sublimated into green and amber phosphor.

This notion of cyberspace informed general perceptions of the Internet and of the user's experience of digital media for most of the decade that followed. In 1996, *Wired* magazine's style guide defined cyberspace as "information space. The ether. The place between phones, between computers, between you and me," before citing Gibson in *Neuromancer.*[27] The *Wired* style guide was already calling

"cyber" a "terminally overused prefix for all things online and digital," while itself serving as further evidence of that overuse. The idea of cyberspace carried with it a series of assumptions about the real network for which it served as a metaphor. For example, it was often taken for granted that the ultimate goal of users interfacing with the network was total immersion, meaning the loss of body-consciousness as one disappeared into the digital world on the other side of the screen. Only imperfect technology stood in the way. This assumption owed much to 1980s and 1990s experiments in VR, in which a helmet or wraparound goggles replaced your physical sensorium, as you literally buried your head in cyberspace. Some of these early environments were in turn directly inspired by Gibson's vision of cyberspace. Katherine Hayles has said that his novels "acted like seed crystals thrown into a supersaturated solution," causing inventions of user interfaces and VR applications to crystallize.[28]

However, in the first decade of our new century, as I've said, Gibson overwrote his own metaphor, first and most explicitly in *Spook Country*. Over 20 years after inventing cyberspace, he imagines in the novel a scene in which a journalist, a curator, and a locative artist are sitting in a booth in the restaurant of the Standard Hotel in Los Angeles, discussing art and new media and observing that, in 2006 (when the story is set), cyberspace "is everting," turning itself inside out and flowing out into the world (20). Significantly, the artist dates the beginning of the change from May 1, 2000, when the United States government turned off selective availability to GPS satellite data, making a larger set of those data available to the general public, not just the military, for the first time. Google Maps (for which the API was released in June 2005) and better automobile navigation systems were the most immediate and widely experienced results, but the implications were profound. In the decade that followed, with the marked increase in the use of mobile devices and other pervasive processors and sensors, a cluster of activities emerged, circulating from artists' and hackers' subcultures to mainstream awareness and back again, practices that first came to prominence about six years ago but are still evolving: geocaching, hyperspatial tagging or spatially tagged hypermedia, locative installation art based on AR, all overlapping with a larger trend, the pervasive use of embedded RFID tags and other markers such as QR codes, as well as cheaper sensors, in and on everyday physical objects. This amounts to the beginnings of an infrastructure for the kind of widespread AR many people first became aware of when Google announced Project Glass, an AR application using a field-of-vision lens supported by a glasses-like frame and with location-aware networking technology. As I write it's still in developer prototype stage, but reportedly it will contain a GPS chip and connection through WiFi to Google services, and Bluetooth connection to a cell phone, though not its own cellular radio receiver, and will provide access via touch and voice control, with voice as well as visual feedback—a hands-free, heads-up AR display.[29] Marketing has stressed the ability to capture and then upload video and photos from a first-person perspective, all with voice commands, but has also

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shown AR features such as real-time location-aware data from various Google services. These developments emerged from long-pursued work in ubicomp (ubiquitous computing) or the Internet of Things. The larger trend involves bringing together the data grid with the physical and social world—not leaving the one behind to escape into the other, but deliberately overlayering them, with the expectation that users will experience data (and data-enriched media) anywhere, everywhere, while moving through the world—and mobility is a key feature of the experience. By definition, such technologies afford dynamic hybrid experiences, taking place at the literally shifting border, where digital data continually meet physical reality as the user moves through the world and its everyday objects. Although Gibson has characterized this as the colonization of the physical by the digital, this would *seem* too pervasive a vision of the network in our lives, now, too mundane a reality to be experienced with a dark cyberpunk *frisson*. It's just how increasing numbers of people move around in and inhabit the world. In *Spook Country*, a GIS-trained hacker who facilitates locative art projects explains that, once cyberspace everts, "then there isn't any cyberspace," and that, in fact,

> there never was, if you want to look at it that way. It was a way we had of looking where we were headed, a direction. With the grid, we're here. This is the other side of the screen. Right here.
>
> (64)

As mundane as this new networked reality might seem, in the next chapter, I'll explore some signs and metaphors that suggest that it is still haunted by a lingering sense of the uncanny, of contact with a hidden dimension ("the digital") that we once consensually experienced as cyberspace—and the status of which, as reality or hallucination, we remain unsure.

The Emergence of the (New) Digital Humanities

It's the *process* of moving from one dominant metaphor to another, a direction or trajectory, from cyberspace out into the data-saturated world, that characterizes our sometimes tense and ambiguous relationship to technology at the moment. That's why I value Gibson's figure of eversion, a term for a complex process of turning. As a metaphor, eversion calls attention to the messy and uneven status of that process—the network's leaking, spilling its guts out into the world. The process remains ongoing, and the results continue to complicate our engagements with humanities archives *and* new media. It's an often disorienting experience, like looking at a Klein bottle, affording a sense of newly exposed overlapping dimensions, of layers of data and cultural expression combining with the ambient environment via sensors and processors, with a host of attendant risks to privacy and civil liberties. This complex sense of promise and risk also applies to the

changing infrastructural networks of traditional as well as new digital humanities practices. New-media scholar Ian Bogost has challenged the humanities to turn itself outward, toward "the world at large, toward things of all kinds and all scales,"[30] and, indeed, I think that's the trajectory of the digital humanities in the past few years, as the infrastructure of humanities practices, from research on various fronts, to teaching, to publishing, peer review, and scholarly communication, is increasingly being exposed to the world, turned inside out. In that sense, the larger context of the eversion itself provides a hidden (in plain sight) dimension that helps to explain all the fuss—first documented for many outside the field of DH in William Pannapacker's 2010 declaration in his *Chronicle of Higher Education* blog that the digital humanities was "the next big thing," or in the coverage in *The New York Times* of "culturomics" and new digital humanities work in the "Humanities 2.0" series (2010–2011).

The eversion provides a context, as well, for some debates within digital humanities. This book will be concerned with one such debate in particular: If the eversion coincides with the rise of the digital humanities in the new millennium, the increased emphasis on layerings of data with physical reality can, I believe, help us to distinguish some aspects of the new-model digital humanities from traditional humanities computing. The two are clearly connected in a historical continuum, but the changes in the past decade open up a new range of activities and new problems for digital humanities research. It's not a question of accepting the 1990s opposition between humanities computing and new media, but of recognizing the new imperatives emerging from changes in network technologies and cultural responses to those changes.[31] Digital humanities scholars have responded to the eversion as it has happened (and continues to happen). This is reflected on many fronts, including work with (relatively big) data, large corpora of texts, maps linked to data via GIS, and the study and archiving of born-digital and new-media objects. These were various responses on the part of the digital humanities to the changes of the eversion, but the forms they took were also often *effects* of the wider eversion, were in the air, as they say, at the very moment the digital humanities emerged into public prominence. A series of simple juxtapositions is suggestive: Franco Moretti's influential book, *Graphs, Maps, Trees: Abstract Models for a Literary History*, was published in 2005, the same year that the Association of Digital Humanities Organizations was founded—and the same year the Google Maps API was released. The open-access online journal, *Digital Humanities Quarterly* (DHQ), first appeared in 2007, the year of the iPhone, the publication of Gibson's *Spook Country*, and the completion of Kirschenbaum's award-winning *Mechanisms* (published 2008). The NEH office dedicated to the field (the ODH) and its funding was established in 2008 after a two-year staged development process. So Brett Bobley and others were working on establishing the ODH at the very moment Gibson was writing about the eversion and Kirschenbaum was applying his digital-forensics methods to, among other objects, Gibson's earlier artist's book (and harbinger of the eversion),

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Agrippa. Also in 2008, the first THATCamp (The Humanities And Technology Camp) "unconference" was sponsored by the influential Center for History and New Media at George Mason University. I could go on. But I want to stress that these juxtapositions have nothing to do with technological determinism. They're just meant to demonstrate that the emergence of the new digital humanities isn't an isolated academic phenomenon. The institutional and disciplinary changes are part of a larger cultural shift, inside and outside the academy, a rapid cycle of emergence and convergence in technology and culture.

Father Roberto Busa, S.J., who is frequently cited as the founder of traditional text-based digital humanities for his work with computerized lexical concordances, wrote in his 2004 Foreword to the groundbreaking *Companion to Digital Humanities* that humanities computing "is precisely the automation of every possible analysis of human expression . . . in the widest sense of the word, from music to the theater, from design and painting to phonetics."[32] Although he went on to say that its "nucleus remains the discourse of written texts," a qualification still being debated by digital humanities scholars, the capaciousness of "every possible analysis of human expression" should not be overlooked, especially in the context of the moment in which it was published (xvi). Rather than divide the methodological old dispensation from the new in ways that reduce both (such as opposing humanities computing to studies of new media, or merely "instrumental" to more truly "theoretical" approaches), I'll suggest throughout this book that we'd do better to recognize that changing cultural contexts in the era of the eversion have called for changing emphases in digital humanities research, some of which have surely effected changing cultural contexts in turn.

It seems clear to me that some of the newer forms of supposedly practical or instrumental digital humanities, which are central to the field, were produced in the first place by younger scholars working with a keen awareness of the developments I'm grouping under the concept of the eversion, and with a sense of what these meant at the time for various technology platforms of interest to humanists. Leading digital humanities scholars had their ears to the ground, and some worked as programmers or designers in technology industries or new media, or in what are now called "alt-ac" (alternative academic) positions within the university, often in collaboration with researchers and vendors in advanced sectors of IT. Influence, like an infection, spreads among people. In the era of social networks, casual gaming, distributed cognition, AR, the Internet of Things, and the geospatial turn, one segment of new digital humanities practitioners were early adopters and observers of these new developments and, often deliberately, brought them into their university research centers and projects. This is largely the reason for the central role of a hands-on, practical turn in the new digital humanities ("more hack, less yack," as the notorious THATCamp motto goes), a spirit borrowed from the vernacular Maker movement. But this practical turn, arguably based on theoretical insight, was often, I think, a kind of deliberate rhetorical gesture—a dialectical countermove to the still-prevailing idealisms

associated with the cyberculture studies of the 1990s. Much of the practical digital humanities work during the decade that followed, which formed an important core of the newly emergent field of activity, was undertaken, not in avoidance of theory or in pursuit of scientistic instrumentalism, but against disembodiment, against the ideology of cyberspace. The new digital humanities often aimed to question "screen essentialism," the immateriality of digital texts, and other reductive assumptions, including romantic constructions of the network as a world apart, instead emphasizing the complex materialities of digital platforms and digital objects. New digital humanities work, including digital forensics, critical code studies, platform studies, game studies, not to mention work with linguistic data and large corpora of texts, data visualization, and distant reading, is a collective response by one segment of the digital humanities community to the wider cultural shift toward a more worldly, layered, hybrid experience of digital data and digital media brought into direct contact with physical objects, in physical space, from archived manuscripts to Arduino circuit boards.

In this context, the digital humanities looks less like an academic movement and more like a transitional set of practices at a crucial juncture, on the one hand moving between old ideas of the digital and of the humanities, and, on the other hand, moving toward new ideas about both. The new DH starts from the assumption of a new, mixed-reality humanities, complicated and worldly, mediating between the physical artifacts and archives on which humanities discourse has historically been built, and the mobile and pervasive digital networks that increasingly overlay and make those artifacts into data-rich, tagged and encoded, sensor-enhanced things, what author Bruce Sterling (Gibson's friend and collaborator) calls spimes.[33] From its origins in the early modern era to today, the humanities has been, in part, a collective effort by scholars and others to discover, edit, archive, interpret, and understand our cultural heritage as it has been transmitted—which is to say in the forms of inherited material objects, stone tools, runes, artifacts and works of art, manuscripts and books, new media and software. Encoding and decoding, augmenting, commenting on and interpreting the layers of data that surround those objects and make them culturally significant have historically formed the agenda (or call it the calling) of the humanities. Within the past decade, humanities work and cultural heritage itself have been digitized, just as the larger, collective understanding of everything that digitization means has undergone a major conceptual and practical shift. This process isn't over yet, and the outcome remains uncertain, as anyone following news about Google Books (and HathiTrust), or shifting policies at Apple's App Store, or traditional publishing in the e-book era, will recognize. As William Gibson remarked in one recent interview, "the eversion continues to distribute itself, and here we are."[34] That distribution itself is inevitably uneven and not always well understood. One job for the *digital* humanities going forward might be consciously to engage with, to help make sense of, and to shape the dynamic process of that ongoing eversion (and its distribution) out in the world at large. The digital humanities should be

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The Example of Video Games

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erling (Gibson's friend and collaborator)
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ving news about Google Books (and
le's App Store, or traditional publishing
William Gibson remarked in one recent
distribute itself, and here we are."[34] That
nd not always well understood. One job
might be consciously to engage with, to
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at large. The digital humanities should be

about this work, as I'll argue in the rest of this book, because the digital humanities is, in fact, the humanities everted.

The Example of Video Games

As I've said, in almost every chapter of this book, I'll cite video games as examples. For one thing, given the role of games in the history of computing, it would be surprising if I didn't. Humanities computing and digital humanities work have often involved games and gamelike environments, from early multi-user dungeons (MUDs) and MOOs, to the experimental *Ivanhoe* game developed at the University of Virginia (the work of Johanna Drucker, Jerome McGann, Bethany Nowviskie, Stephen Ramsay, and Geoffrey Rockwell, among others), to Matthew Kirschenbaum's inclusion of video games among the objects of his digital-forensics approach (2008), including the project on Preserving Virtual Worlds.[35] This is not to mention explicit video-game studies by specialists in information studies, new media and digital media, or electronic literature—not all of whom always see themselves as working in digital humanities, but whose work has unquestionably contributed to the field.

For another thing, video games are simply the most prominent and influential form of new media today, and so it should not be surprising that they help to illuminate the larger culture's relationship to technology. Unfortunately, anxiety about treating games as a serious academic subject, and the need of a newly emergent field such as digital humanities to be taken seriously by administrators and the public, have meant that the study of games is often situated at the very far end of the spectrum from more traditional, text-based humanities computing. My own interest in games met with resistance from some anonymous peer reviewers for the program for the DH 2013 conference, for example (though in the end, the enthusiasm of positive reviews won the day). I think it's safe to say that games are at least recognized by many digital humanities scholars as belonging in the continuous spectrum of their area of practice. Again, I want to assert: As a medium, video games are significant cultural expressions, worthy of study in their own right. But I also believe that digital humanities approaches, alongside approaches from other fields and disciplines, have much to contribute to that study. And, to turn the relationship around, computer-based video games embody procedures and structures that speak to the fundamental concerns of the digital humanities. They are based on much-tested forms of creative, algorithmic, formally sophisticated systems, many recent examples of which model in interesting ways the general dynamics of the eversion. Games are designed to structure the fluid relationships between digital data and the game world, on the one hand, and between digital data and the player in the physical world, on the other hand. A number of recent fictional works in various media have explored the ways in which video games model the multidimensional relationships between data and the world, including, for example, David Kaplan and Eric Zimmerman's

short film *PLAY* (2010), Ernest Cline's novel *Ready Player One* (2011), and Neal Stephenson's novel *Reamde* (2011), along with theoretical game studies by Jane McGonigal, Ian Bogost, or Mary Flanagan, for example. McGonigal, the creator of several of the most influential cross-platform ARGs—played collectively across the Internet, phone landlines and cell-phone networks, television, other media, and in real-world settings, as well, using GPS coordinates to locate clues revealed on Websites, on TV, in trailers to films, etc.—has argued that we should apply the structures of games to real-world personal and social problems. As a result, she has been accused of indirectly abetting the "gamification" trend, most notoriously associated with Facebook games such as Zynga's *Farmville*, which critics see as colonizing players' everyday lives for commercial profit by reductive, exploitative, and addictive games blatantly designed according to principles of operant conditioning. Gamification is bullshit, as Bogost says, a transparent kind of "exploitationware," based less on persuasion than on outright manipulation.[36] But even this trend has unwittingly responded to larger changes in media and culture. It's significant that the underlying premise shared by both McGonigal's idealistic, world-saving games and the most crass kind of gamification—and shared as well by critics of gamification—is that video games are now "busting through to reality" as never before (as Jesse Schell said in one notorious talk),[37] crossing over from the game world to the player's real world. In its own unwitting way, gamification is yet another sign of the eversion.

Cyberspace was always gamespace in another guise, gamespace *dis*placed. Not only was Gibson inspired by arcade gamers when he came up with the concept, he interpreted the gamers' desires in terms of popular misconceptions about the motivations and effects of playing video games, in an example of what Katie Salen and Eric Zimmerman have called the "immersive fallacy," the assumption that the goal of any new media experience is to transport the user into a sublime and disembodied virtual world.[38] On the contrary, Salen and Zimmerman argue, most gaming has historically taken place at the interface of player and game, the boundary of physical space and gamespace, where heads-up displays (HUDs), controllers and peripheral devices, and social interactions are part of the normal video-game experience. Salen and Zimmerman see a "hybrid consciousness," a sense of being simultaneously in the game world and in physical reality, as the norm, not the supposed "pining for immersion" that many assume is driving the experience (458, 451–55). However deeply engaged players become, however riveted their attention, the experience of gameplay has always been more mixed reality than VR. In other words, the relation of gamer to game world is more cybernetics than cyberspace, literally more mundane, more in the (physical) world than has been imagined by many, especially many non-gamers.

In the past six or seven years, a major development in gaming has borne out this multilayered view of gaming and has undermined the cyberspatial ideology of total immersion: what game theorist Jesper Juul calls a "casual revolution."[39] Though we now often associate the idea of casual games with mobile platforms, Nintendo's Wii console, introduced in 2(tapping into the mass market of first-tin attention by design from the rendering (the physical and social space of the playe the mixed-reality experience of using a s peripherals, connected in feedback loops spilling it out into the living room, creati embodied gameplay. It's that hybrid, ev takes place—with a coffee table at the n people playing along, as well as various pe console—not some imaginary world on Microsoft's Kinect appeared in 2010, it transparent version of a somatic motior however, by taking the sensor system's (from under her feet) and placing them up room. In practice, Kinect play is a lot lik body and the physical space in which she' homebrew applications for Kinect have, a VR machine, but as a system for connec via the embodied player.

In this regard, the Wii and Kinect, an re-emphasized a fundamental aspect of all adventure games and interactive fiction examples of computer games, Nick Mon components of such games are the world environment of the IF and the things in "that part of the program that accepts na processes it."[41] Although he is careful no in general, it offers an important general the productive relationship of algorithmic models—which include representations o pons, tools, other inventory). One plays other players, non-player characters (NP(is the overall design of the game, negotia At the same time, one plays from an e world. That betweenness is the condition sciousness" that Salen and Zimmerman re immersive game world, whether realist rendered (*Minecraft*), is *played* between w back and forth in feedback and feedforwarc maps and inventories and statistics of va gaming persist—not to mention discussio articles, and other paratextual materials s

novel *Ready Player One* (2011), and Neal
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st Jesper Juul calls a "casual revolution."[39]
lea of casual games with mobile platforms,

Nintendo's Wii console, introduced in 2006, led the way into casual gaming by tapping into the mass market of first-time gamers or non-gamers and shifting attention by design from the rendering of realistic, 3D virtual game worlds to the physical and social space of the player's living room.[40] The Wii is all about the mixed-reality experience of using a sometimes klugy set of motion-control peripherals, connected in feedback loops that evert the gamespace, as it were, spilling it out into the living room, creating a kind of personal area network for embodied gameplay. It's that hybrid, everted gamespace where Wii gameplay takes place—with a coffee table at the negative center of it, and perhaps other people playing along, as well as various peripherals beaming data to and from the console—not some imaginary world on the other side of the screen. When Microsoft's Kinect appeared in 2010, it was marketed as gadget-free, a more transparent version of a somatic motion-control interface. It actually works, however, by taking the sensor system's gadgets out of the user's hand (or out from under her feet) and placing them up by the screen, looking back out at the room. In practice, Kinect play is a lot like Wii play in its focus on the player's body and the physical space in which she's moving around. A flood of hacks and homebrew applications for Kinect have, for the most part, focused on it, not as a VR machine, but as a system for connecting digital data and the physical world via the embodied player.

In this regard, the Wii and Kinect, and casual gaming in general, have only re-emphasized a fundamental aspect of all digital games. Writing about text-based adventure games and interactive fiction (IF), generically among the earliest examples of computer games, Nick Montfort has said that the two fundamental components of such games are the world model—"which represents the physical environment of the IF and the things in that environment"—and the parser—"that part of the program that accepts natural language from the interactor and processes it."[41] Although he is careful not to extend this model to video games in general, it offers an important general analogy. All computer games are about the productive relationship of algorithmically processed data and imagined world models—which include representations of place (maps, trees) and artifacts (weapons, tools, other inventory). One plays in collaboration or competition with other players, non-player characters (NPCs), or the "artificial intelligence" that is the overall design of the game, negotiating between the two: data and world. At the same time, one plays from an embodied position in the real physical world. That betweenness is the condition of engaged gameplay, the "hybrid consciousness" that Salen and Zimmerman refer to. Even a game with an apparently immersive game world, whether realistically rendered (*Skyrim*) or iconically rendered (*Minecraft*), is *played* between worlds, at the channels where data flow back and forth in feedback and feedforward loops. That's why HUDs, representing maps and inventories and statistics of various kinds, and other affordances of gaming persist—not to mention discussion boards, constantly revised Wikipedia articles, and other paratextual materials surrounding gameplay—even in games

that emphasize the immersive beauties (or sublimities) of their represented game worlds.

The digital humanities could do worse than look to games for examples of complex mixed-reality systems that reflect the contingencies of the network at the present moment. It's hard to think of a more widely distributed and widely experienced set of models of the larger process of eversion that we're now in the midst of than video games. And games are also useful models of the combined human-computer interactions by which all meaningful computing gets done. In the broader sense, the network doesn't evert by itself. It's not really turning *itself* inside out. That requires human agency, actors out in the world, just as games require players, and just as digital humanities research requires scholar–practitioners, working in the channels of the eversion, where the data network meets the world in its material, artifactual particulars.

*

Notes

1. William Gibson, "Google's Earth," *New York Times*, August 31, 2010, http://nytimes.com/2010/09/01/opinion/01gibson.html.
2. See, for example, Clay Shirky, *Here Comes Everybody: The Power of Organizing Without Organizations* (New York: Penguin Press, 2008), 195–96, who echoes Gibson on the term cyberspace and its fading from use. The notable exceptions, perhaps significantly enough, are uses of the term by the military and governments, as in cyber-attack and cyber-warfare, and in the analogous case of cyber-bullying. In all of these cases, one might imagine that there's a resistance to acknowledging the (frightening) breakdown of the distinction, the penetration of what had been conceived of as separate worlds.
3. Jane Holl Lute, written testimony before House Committee on Homeland Security, March 13, 2013, http://dhs.gov/news/2013/03/13/written-testimony-dhs-deputy-secretary-jane-holl-lute-house-committee-homeland. She has used the endoskeleton metaphor for years, for example, in an op-ed co-authored with Bruce McConnell, "A Civil Perspective on CyberSecurity," *Wired*, February 14, 2011, http://wired.com/threatlevel/2011/02/dhs-op-ed. (Thanks to Erik Hanson for cc'ing me in a retweet of Lute's latest remarks.)
4. "The Art of Fiction No. 211: William Gibson," *The Paris Review* 197 (Summer 2011), 106–49 (109).
5. By "the network," I refer to the notional composite that combines (and popularly confuses) the Internet, the Web, cellular data networks, the GPS satellite network, over copper, fiber optics, radio waves—in other words, the network as it's experienced by most people in their daily lives.
6. William Gibson interviewed by Robert Hilferty, 2009, YouTube (aitchayess), http://m.youtube.com/?reload=9&rdm=mfca6baq#/watch?v=GXaU_FLaSzo&desktop_uri=%2Fwatch%3Fv%3DGXaU_FLaSzo.
7. Marcos Novak, "Eversion: Brushing Against Avatars, Aliens, and Angels," in *From Energy to Information: Representation in Science and Technology, Art and Literature*, eds. Bruce Clarke and Linda Dalrymple Henderson (Stanford: Stanford University Press, 2002), 309–23. A version of the essay first appeared in *Hypersurface Architecture AD* 69 (London: Academy Editions, 1999), 9–10.
8. Marcos Novak, in exhibit sponsored by U 2008, "Turbulent Topologies," http://m
9. Gibson has said this in various interviews, i of the saying, see Brian Dear, Brianstorms com/archives/000461.html.
10. On the decline of Second Life, see Dan H *and Other Minor Surprises* (New York: C com/the-myth-of-the-garage.
11. Jason Farman, *Mobile Interface Theory: Er* and London: Routledge, 2011); and Eric *Locality: Why Location Matters in a Networke* Blackwell, 2011).
12. William Gibson, *Spook Country* (New Y
13. N. Katherine Hayles, "Cybernetics," in Mitchell and Mark B. N. Hansen (Chicag (147–48).
14. Adam Greenfield, *Everyware: The Dawnin* New Riders, 2006), 73. One of the virtu legal and ethical implications for agency, pr
15. Clay Shirky, Foreword to B. Coleman, (Cambridge, MA, and London, UK: MI
16. Nathan Jurgenson, "Digital Dualism vers February 24, 2011, http://thesocietyp dualism-versus-augmented-reality.
17. Nathan Jurgenson, "The IRL Fetish," thenewinquiry.com/essays/the-irl-fetish.
18. Nicholas Carr, "Digital Dualism Deniali http://roughtype.com/?p=2090.
19. The advantage of the metaphor of *coining* i rather than that more elusive thing—inv used "digital humanities" before 2001, I the term's coming into currency in "Wh in English Departments?," in *Debates in* (Minneapolis, University of Minnesota "Humanities Computing as Digital digitalhumanities.org/dhq/vol/3/3/000
20. Stephen Ramsay and Geoffrey Rockw Epistemology of Building in the Digital Bethany Nowviskie, "Eternal Septembe Gold, 243–48.
21. This was for the collection, ed. Susan Sch *A Companion to Digital Humanities* (Oxfor org/companion. On this shift from "digi is?," in *Debates*, ed. Gold, 5.
22. William Gibson, *Neuromancer* (New Yor
23. In a conversation with Timothy Leary i Gibson suggests that the cyberpunk pro cyberspace, has an orgasmic epiphany experience," in which, interestingly, he r he has been estranged, "as being this infir to as "the flesh the cowboys mocked" (23 were discussing the development of a vic ed., "Gibson and Leary Audio (*Mondo*

8. Marcos Novak, in exhibit sponsored by UCSB's Media Arts and Technology program, 2008, "Turbulent Topologies," http://mat.ucsb.edu/res_proj5.php.
9. Gibson has said this in various interviews, including on the radio in 1999. For one tracing of the saying, see Brian Dear, Brianstorms blog, October 16, 2004, http://brianstorms.com/archives/000461.html.
10. On the decline of Second Life, see Dan Heath and Chip Heath, *The Myth of the Garage and Other Minor Surprises* (New York: Crown Business, 2011), http://heathbrothers.com/the-myth-of-the-garage.
11. Jason Farman, *Mobile Interface Theory: Embodied Space and Locative Media* (New York and London: Routledge, 2011); and Eric Gordon and Adriana de Souza e Silva, *Net Locality: Why Location Matters in a Networked World* (Chichester, West Sussex, UK: Wiley-Blackwell, 2011).
12. William Gibson, *Spook Country* (New York: Putnam, 2007).
13. N. Katherine Hayles, "Cybernetics," in *Critical Terms for Media Studies*, ed. W. J. T. Mitchell and Mark B. N. Hansen (Chicago: University of Chicago Press, 2010), 144–56 (147–48).
14. Adam Greenfield, *Everyware: The Dawning Age of Ubiquitous Computing* (Berkeley, CA: New Riders, 2006), 73. One of the virtues of Greenfield's book is that it considers the legal and ethical implications for agency, privacy, and security of newly pervasive systems.
15. Clay Shirky, Foreword to B. Coleman, *Hello Avatar: Rise of the Networked Generation* (Cambridge, MA, and London, UK: MIT Press, 2011), iv–xiv.
16. Nathan Jurgenson, "Digital Dualism versus Augmented Reality," Cyborgology blog, February 24, 2011, http://thesocietypages.org/cyborgology/2011/02/24/digital-dualism-versus-augmented-reality.
17. Nathan Jurgenson, "The IRL Fetish," *The New Inquiry*, June 28, 2012, http://thenewinquiry.com/essays/the-irl-fetish.
18. Nicholas Carr, "Digital Dualism Denialism," Rough Type blog, February 27, 2013, http://roughtype.com/?p=2090.
19. The advantage of the metaphor of *coining* is that it suggests bringing a term into currency, rather than that more elusive thing—invention and first use. Though some may have used "digital humanities" before 2001, I follow Matthew Kirschenbaum's account of the term's coming into currency in "What is Digital Humanities and What's it Doing in English Departments?," in *Debates in the Digital Humanities*, ed. Matthew K. Gold (Minneapolis, University of Minnesota Press, 2012), 3–7. See also Patrik Svensson, "Humanities Computing as Digital Humanities," *DHQ* 3.3 (2009), http://digitalhumanities.org/dhq/vol/3/3/000065/000065.html.
20. Stephen Ramsay and Geoffrey Rockwell, "Developing Things: Notes Toward an Epistemology of Building in the Digital Humanities," in *Debates*, ed. Gold, 75–84; Bethany Nowviskie, "Eternal September of the Digital Humanities," in *Debates*, ed. Gold, 243–48.
21. This was for the collection, ed. Susan Schreibman, Ray Siemens, and John Unsworth, *A Companion to Digital Humanities* (Oxford: Blackwell, 2004), http://digitalhumanities.org/companion. On this shift from "digitized" to "digital," see Kirschenbaum, "What is?," in *Debates*, ed. Gold, 5.
22. William Gibson, *Neuromancer* (New York: Ace Books, 1984), 51.
23. In a conversation with Timothy Leary in 1989 that was later edited for *Mondo 2000*, Gibson suggests that the cyberpunk protagonist of *Neuromancer*, literally addicted to cyberspace, has an orgasmic epiphany at the end of the novel, a "transcendent experience," in which, interestingly, he recognizes the body, the "meat," from which he has been estranged, "as being this infinite complex thing." In the novel, it's referred to as "the flesh the cowboys mocked" (239). Intriguingly, at the time, Gibson and Leary were discussing the development of a video game based on *Neuromancer*. R. U. Sirius, ed., "Gibson and Leary Audio (*Mondo 2000* History Project)," Accerler8or blog,

December 23, 2011, http://acceler8or.com/2011/12/gibson-leary-audio-mondo-2000-history-project.
24. Norbert Wiener, *Cybernetics: or Control and Communication in the Animal and the Machine* (Cambridge, MA: MIT Press, 1948).
25. Vernor Vinge, *True Names*, first published in *Dell Binary Star* 5 (1981), reprinted in James Frenkel, ed., *True Names and the Opening of the Cyberspace Frontier* (New York: Tom Doherty Associates, TOR, 2001), 239–330, and available online at http://ny.iadicicco.com/Finished/20,000%20Ebooks/Vernor%20Vinge/Vernor%20Vinge%20-%20True%20Names.pdf. Vinge's story is set in the year 2014. Later, Neal Stephenson's *Snow Crash* (New York: Bantam, 1992) would imagine the Metaverse, which inspired the developers at Linden Lab to create Second Life in 2003. Both Vinge's and Stephenson's worlds are more explicitly gamelike than Gibson's. Fittingly, Vinge's more recent *Rainbows End* (New York: Tor, 2006) is set in a world of AR, an environment closer to the actual 2014.
26. N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 38.
27. *Wired Style: Principles of English Usage in the Digital Age*, ed. Constance Hale (New York: Hardwired, 1996), 66–67.
28. Hayles, *How We Became Posthuman*, 35.
29. See https://plus.google.com/+projectglass. And see Joshua Topolsky, "I Used Google Glass: The Future, With Monthly Updates," *The Verge*, February 22, 2013, http://theverge.com/2013/2/22/4013406/i-used-google-glass-its-the-future-with-monthly-updates.
30. Ian Bogost, "Beyond the Elbow-patched Playground," author's blog, August 23 and August 25, 2011, http://bogo.st/xy.
31. Kirschenbaum, "Digital Humanities As/Is a Tactical Term," in *Debates*, ed. Gold, 415–28 (418).
32. Roberto Busa, S.J., foreword to Schreibman et al. eds., *Companion*, http://digitalhumanities.org/companion.
33. Bruce Sterling, *Shaping Things* (Cambridge, MA: MIT Press, 2005).
34. August C. Bourré, "An Inteview With William Gibson," *Canadian Notes & Queries* (CNQ), August 17, 2011, http://notesandqueries.ca/an-interview-with-william-gibson.
35. Jerome P. McDonough, Robert Olendorf, Matthew G. Kirschenbaum, Kari Kraus, Doug Reside, Rachel Donahue, Andrew Phelps, Christopher Egert, Henry Lowood, Susan Rojo, *Preserving Virtual Worlds Final Report*, 2010, https://http://ideals.illinois.edu/handle/2142/17097.
36. Ian Bogost, "Gamification is Bullshit," author's blog, August 8, 2011, http://bogost.com/blog/gamification_is_bullshit.shtml.
37. Jesse Schell, "Design Outside the Box," presentation, DICE (Design, Innovate, Communicate, Entertain), February 18, 2010, http://g4tv.com/videos/44277/DICE-2010-Design-Outside-the-Box-Presentation.
38. Katie Salen and Eric Zimmerman, *Rules of Play: Game Design Fundamentals* (Cambridge, MA: MIT Press, 2004).
39. Jesper Juul, *A Casual Revolution: Reinventing Video Games and Their Players* (Cambridge, MA: MIT Press, 2009).
40. Steven E. Jones and George K. Thiruvathukal, *Codename Revolution: The Nintendo Wii Platform* (Cambridge, MA: MIT Press, 2012).
41. Nick Montfort, *Twisty Little Passages: An Approach to Interactive Fiction* (Cambridge, MA: MIT Press, 2003).

2

DIMENSIONS

The digital network and the physical wo
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popular or science-fiction sense of the te
behind the term have been foregrounded
have been everywhere disrupted. That w
physical has begun to lose its transparency
in front of us, the idea of the dimensional
I think, the often-reported sense that a r
separate worlds of the digital and the physi
the divide is real, necessarily, but that the
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So the language of two dimensions
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where the doubleness of digital and ph
designer and leader of the New Aesthetic
not a space . . . the network is not a spac
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the existing world, just one that has been
increasingly breaking into our field of
environments, city streets or airports
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