Indistinguishable from Magic

Invisible Interfaces and Digital Literature as Demystifier

> The twenty-first century will not have the same craving for media. As a matter of course, they will be a part of everyday life, like the railways in the nineteenth century or the introduction of electricity into private households in the twentieth.
>
> —Siegfried Zielinski, *Deep Time of the Media: Toward an Archaeology of Hearing and Seeing by Technical Means*

Invisible, Imperceptible, Inoperable

If the twenty-first century does not have, as Siegfried Zielinski writes in the chapter epigraph, a craving for media, it is because media, by way of interface, are steadily making their way toward invisibility, imperceptibility, and inoperability. We cannot crave whatever is ubiquitous. As I describe in this section, contemporary claims about ubiquitous computing (ubicomp) as the definitive technological innovation of this century—supposedly, the third wave of computing, which replaces desktop computing and whose devices are seamlessly embedded throughout our everyday environment—consistently tout the invisibility of its interfaces as providing us with a more natural, more direct, inherently better way to interact with our computers and more generally with the world around us. Without attention to the ways in which interfaces are anything but invisible in how they frame what can and cannot be said, however, the contemporary computing industry will continue unchecked in its accelerating drive to achieve the perfect black box not only through the latest ubicomp devices but also through parallel developments, such as so-called Natural User Interfaces, Organic User Interfaces, and even the now widely

prevalent multitouch interfaces. All of these interfaces share a common goal underlying their designs: to efface the interface altogether and so also efface our ability to read, let alone write, the interface, definitively turning us into consumers rather than producers of content. By contrast, with a critical eye on interface, a growing body of digital literature courts difficulty, defamiliarization, and glitch as antidotes to this receding present. Mark Weiser, the reputed father of ubicomp, originally believed that this mode of computing was an antidote to windows and desktop computing—now, we need digital literature as an antidote against what ubicomp has become.

Though this chapter focuses on invisible interfaces of the present and near future, as well as works of digital literature that disrupt this insistent drive toward invisibility, for the moment it is instructive to turn to the mid-1990s. This time period acts as a hinge that opens, in one direction, onto the subject of this chapter and, in the other, onto the subject of chapter 2, the turn from the 1970s' philosophy of open hardware/software to the mid-1980s' ideology of the user-friendly via closed hardware/software—a hinge that I hope demonstrates how we can wield media archaeology as a conceptual knife that cuts into the present and the near future, not just, in the sense of Zielinski's *deep time,* into the past, as in archaeology's digging in and around a historical context for a hole in the ground or the archaeological record. In 1995 Friedrich Kittler declared, "There Is No Software," as the logic of the computing community dictated that "in a perfect gradualism, DOS services would hide the BIOS, WordPerfect the operating system, and so on and so on on."[1] So while writer Rob Swigart noted in 1994 the gradual disappearance of the metaphorical desktop from his awareness—asserting, "That is the real danger. . . . Unless we pause from time to time to consider how these metaphors work to create boundaries . . . they will control us without our knowledge"—just a year later there would be no software at all.[2] Pivoting from the mid-1990s toward the present-future, not only does software obscure hardware, but interface obscures software.

We no longer have access to digital tools for making; instead, we have predetermined choices. Ideally, the seamlessness of ubiquitous computing devices will make even choice itself recede into the background. In this imagined near future, things will simply happen and we will simply do.

Thus, continuing in the direction of Kittler's 1995 essay, while Steven Johnson's 1997 *Interface Culture* was prescient in many different respects, one of his central claims was, "The most profound change will lie with our generic expectations about the interface itself. We will come to think of interface design as a kind of art form—perhaps the art form of the next century."[3] Although this declaration has held true in a certain respect, as evidenced by the digital writers I discuss in this chapter, our expectation that a user-friendly interface be an invisible interface has produced a present-future in which interface as an art form exists solely on the margins of digital literature and art as a means not to elevate the interface as a harmonious, beautiful objet d'art but by which to bring the interface back into view again via failure, discomfort, and dissonance. While Johnson did accurately foresee a future in which a "functional interface subculture" thrived, the conceptual framework underlying most definitions of *subculture* is one of oppositionality—no doubt drawn from a notion of the early twentieth-century avant-garde as that which pits itself against the mainstream, the ordinary, the status quo in favor of the marginal, the strange, the disruptive. This notion of the avant-garde as oppositional is not necessarily inaccurate, as Dada and Futurism did indeed see themselves as embattled movements that were explicitly against conventions and cultural norms of every kind. Just as certain Dada and Futurist practitioners worked from within language, painting, and music to undo linguistic, artistic, and musical conventions, so too certain digital writers and artists work to critique (by drawing attention to) the way in which not only hardware/software is now utterly black-boxed but its closed architecture is being marketed as a feature via attractive packaging that touts the marvelousness

of natural, intuitive, invisible, and even "magical" interfaces. Ultimately, this literary critique seeks to undermine what is now an ideology of invisible interface design by disrupting from within the strictures of widely used interaction systems such as the webpage, broadly speaking, or, more specifically, the hyperlink. Now, digital interfaces are artful only to the extent that they don't work, which is now the only extent to which we can experience them at all.

Since the goal of having ubiquitous, invisible interfaces and digital devices has been achieved so definitively, the current model for interface subculture is not oppositional—for how can anyone oppose that which we cannot see, that which is as ever present as air—but rather *insurgent,* coming from within often via the efforts of both everyday users and more established digital writers and artists who creatively find ways to hack closed interfaces. In the following sections, I first trace several directions in contemporary interface design—working back from contemporary, slick ubicomp-related devices and interfaces to the now nearly pervasive multitouch interface. Then, I show how writers who work with and against the iPad (such as Jörg Piringer, Jason Edward Lewis, and Erik Loyer), who create codework (such as Mez [Breeze] and Nick Montfort), and finally, who create hypertext/Web-based work (such as Deena Larsen, William Gibson, Talan Memmott, Judd Morrissey, Jason Nelson, and Young-Hae Chang Heavy Industries) advance an insurgent twenty-first-century poetics by producing digital literature that is deliberately difficult to navigate or whose interfaces are anything but user-friendly.

Natural, Organic, Invisible

While this section is largely about ubicomp, in many ways ubicomp is a convenient stand-in for a wealth of contemporary interface designs, all stemming from interpretations, usually oversimplifications and misconstruals, of Mark Weiser's writings from 1988 to 1996 on what interface design could and

should be. Weiser's ubicomp articles are surely responsible for introducing the term *invisible* into the lexicon of interface design, defining *invisibility* as a device's ability to be simultaneously everywhere yet also unexceptional in how it ideally lacks a distinct identity—the very opposite of the new highly visible, highly branded interface designs that claim a deep affiliation to ubicomp. By contrast, designers of the Fluid User Interface (Fluid UI), Organic User Interface (OUI), Natural User Interface (NUI), and even the first affordable multitouch interface demoed by Jeff Han, all consistently use *invisible* interchangeably with *natural* to describe their interfaces, so that both terms now imply a minimalist design, one that supposedly disappears and that is all the better equipped to mask the restrictiveness made possible by these interfaces that tightly control user access for the sake of becoming perfect portals for the consumption of content. These "invisible" and "natural" interfaces are also all marketed, of course, in the most joyful terms, to celebrate the fact that these devices sense *for us* what information we need and want.

From the MIT research group working on the Fluid UI, we are told their aim is to make "the user experience more seamless, natural and integrated in our physical lives" by creating interfaces that "perceive the user, her current context and actions and offer relevant services and information based on that awareness."[4] From the designers of the OUI, we read about a wondrous world populated by computers "with displays that are curved, flexible and that may even change their own shape in order to better fit the data, or user for that matter."[5] In OUI design computers are no longer distinguishable from the world in which they live, as their designers look toward "a final frontier in the design of computer interfaces that turn the natural world into software, and software into the natural world." This world of flexible surfaces is supposed to allow greater creativity, so that if you tire "of the color of your suit, the pattern of your wallpaper, or the interface on your cellphone, you simply download a new one from an online store," as if a world in which we

choose from prefabricated surfaces and predetermined designs is the realization of creative living (see Figure 1).[6] From those working on the NUI, we find that it is an "interface that is effectively invisible, or becomes invisible to its user with successive learned interactions," and that *natural* is defined as "organic, unthinking, prompted by instinct."[7] Claims that ubicomp-related interfaces are more "natural" for "human beings" are echoed even by independent writers unaffiliated with any particular company or research group: "Human beings are physical creatures; we like to interact directly with objects. We're simply wired this way. Interactive gestures allow users to interact naturally with digital objects in a physical way, like we do with physical objects."[8] Finally, in a decisive attempt not to reframe the interface as even more invisible or more natural but rather to do away with it altogether, we read of predictions from IBM that within five years our brains will be synced with computing devices so that "if you just need to think about calling someone, it happens."[9]

Again, all of the foregoing interface designs imply a belief in the value of an interface that recedes from view, ideally to the point of invisibility, which now also implies inaccessibility. We need not know how it works, or how it works on us rather than us on it. As Adam Greenfield astutely pointed out in 2006, it's not only that these ubicomp-related devices make it possible for users to engage with them "inadvertently, unknowingly, or even unwillingly" but also that the discourse of invisibility, which he called the "discourse of seamlessness," "deprives the user of meaningful participation in the decisions that affect his or her experience."[10] Thankfully, in addition to Greenfield, a few critics, such as Ben Schneiderman, Catherine Plaisant, and Donald Norman, consistently point out that spatially or visually based interfaces are not necessarily improvements even over command-line interfaces, especially for those who are blind or vision impaired.[11] More, the supposed naturalness of ubicomp-related gestural interfaces is utterly misleading once we consider that "most gestures are neither natural nor easy

WHAT MAKES AN INTERFACE FEEL ORGANIC?

BY CARSTEN SCHWESIG

Movies can make us forget that we are sitting in a cinema among strangers, looking at images projected onto a wall. Instead, we feel as though we are observing real people in real situations and we become emotionally involved in the narrative. User interfaces can trigger a similar suspension of disbelief: we forget we are operating a machine to manipulate virtual, digital data. Instead, we experience media and applications as part of our physical environment. Such interfaces feel "natural," or rather "organic."

Figure 1. Gummi interface prototype showing map navigation.

FIGURE 1. *From a special issue of* Communications of the ACM *on Organic User Interfaces (OUIs), we are told that user interfaces such as the OUI can trigger the same suspension of disbelief as when we go to the movies—because of how "natural" or "organic" they feel, both movies and OUIs are, it's implied, magical.*

to learn or remember. Few are innate or readily predisposed to rapid and easy learning. Even the simple head-shake is puzzling when cultures intermix. . . . Similarly, hand-waving gestures of hello, goodbye, and 'come here' are performed differently in different cultures."[12]

Even more surprising than the unthoughtful claims about seamlessness, invisibility, and the nature of human beings are the techno-determinist assumptions about how ubicomp-related devices *will* be deployed everywhere in the future and how this imagined deployment necessarily implies "the inadequacy of the traditional user interface modalities we've been able to call on, most particularly keyboards and keypads."[13] Again, marketing rhetoric convinces us that these interfaces work more "naturally" than what one designer calls the "crap desktop," which another claims is simply an outdated mode of interaction that "severely constrains us."[14] The rhetoric might not be so disagreeable if it didn't also help determine the shape of the future of computing—one that, for these designers, would ideally be populated not even with computers as appliances but with appliances embedded within small computers.

It's worth underscoring that the rhetoric around ubicomp is indeed just that, for most of its devices have turned out to be resounding failures. Whereas Mark Weiser advocated for what he believed was a better way for us to interact with computers—one with computers so small, so plentiful, so uniquely tailored to specific tasks, and so unimportant that human-to-human interactions would become dominant over individual interactions with branded personal computers made for multitasking—companies like Samsung have no such ethical investment in their Wi-Fi-enabled refrigerator "pre-loaded with apps," of course made only for Samsung, that allow you to check Twitter, look up recipes, or listen to Pandora. It turns out the future is not one in which, as Weiser heralded in 1996, we "most fully command technology without being dominated by it."[15] Instead, the future of computing is domineering, branded, and boring.

We can see a clear arc in Weiser's writing on ubicomp from this point in 1996 back to when he first coined the term in 1988 while serving as head of the Computer Science Laboratory at Xerox PARC. Cowritten with Jeff Sealey, his "The Coming Age of Calm Technology," which I quote in the preceding paragraph, signaled his concern that the philosophy driving most computing devices was one grounded in a paternalistic notion of ubiquity through invisibility that took the form of inaccessibility rather than a ubiquity of "calm technology," technology that "engages both the center and the periphery of our attention, and in fact moves back and forth between the two." He wrote, "Designs that *encalm and inform* meet two human needs not usually met together."[16] Illustrating just one of many reversals over the course of the history of computing, the goal of ubiquitous computing was never, as it is now, to transform the value of invisibility into an elimination of the need to freely access tools and information or the need to understand computer processes altogether. Simply because something has the ability to move to the periphery of our attention does not preclude us being aware of it or understanding how it works.

Just a few years earlier in his 1994 "The World Is Not a Desktop," Weiser even advocated for humanists to understand invisibility as "they specialize in exposing the otherwise invisible."[17] More, while he recognized in this same article that "a good tool is an invisible tool," writing, "I mean that the tool does not intrude on your consciousness; you focus on the task, not the tool," he did not believe that invisibility in computing should mean making computers appear more human-like at the cost of accessing the underlying computer:

> Why should a computer be anything like a human being? Are airplanes like birds, typewriters like pens, alphabets like mouths, cars like horses? Are human interactions so free of trouble, misunderstanding, and ambiguity that they represent a desirable computer interface goal?[18]

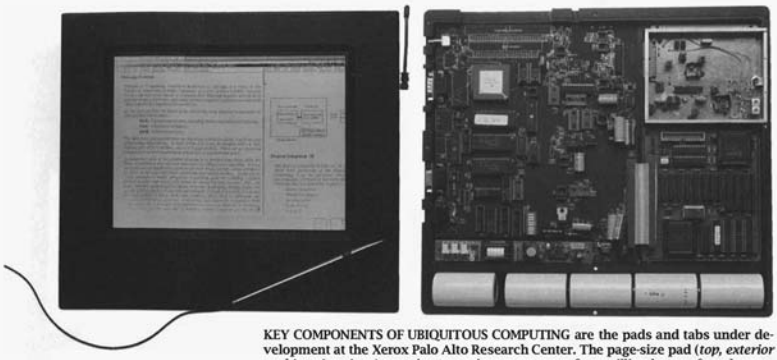
Therefore, neither did he advocate using "magic" as a way to trick the user into thinking the computer was behaving like a human by doing something it was not, usually via attractive packaging that called attention to the computer even more:

> Take magic. The idea, as near as I can tell, is to grant wishes. . . . I wish my computer would only show me what I am interested in. But magic is about psychology and salesmanship, and I believe a dangerous model for good design and productive technology. The proof is in the details—magic ignores them. Furthermore magic continues to glorify itself, as Robin Williams' attention-grabbing genie in Aladdin amply illustrates.[19]

But moving back in time, when ubicomp came to the attention of the general public in 1991 via a *Scientific American* article provocatively titled "The Computer for the 21st Century," Weiser framed ubicomp not with the twin terms *encalm* and *inform* but rather with the value-laden term *invisibility,* which has continued to dominate the rhetoric around nearly every new computing interface that has emerged since then. When Weiser first introduced ubicomp to the general public, he opened with the declaration, "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it." Weiser went on to cite print as a literary technology that had achieved this level of usability, familiarity, and thus invisibility.[20] Although this example of print as a technology that "gets out of the way of the user" has been used repeatedly in subsequent years to explain how ubicomp devices give us the opportunity to no longer have to "continuously tinker with the system, maintaining it and configuring it to complete a task," Weiser's original use of print as an example of effective ubicomp was meant in an entirely different spirit—it was, instead, about widespread availability, portability, convenience, flexibility, and readily transmitted information via ubicomp devices called *tabs, pads,* and *boards*.[21]

Quite unlike any contemporary ubicomp or ubicomp-related device, Weiser's tabs, pads, and boards were all developed at Xerox PARC to allow the user to customize what and how much information was displayed. Pads, for example, were supposed to be something between a sheet of paper and a laptop computer. Despite the family resemblance, these pads were profoundly different from the twenty-first-century iPad. As he wrote, "The pad that must be carried from place to place is a failure. Pads are intended to be 'scrap computers' (analogous to scrap paper) that can be grabbed and used anywhere; *they have no individualized identity or importance*."[22] Moreover, diametrically opposed to the iPad, which in many ways represents the logical endpoint of windows, Weiser's pads were "an antidote to windows. Windows were invented at PARC and popularized by Apple . . . as a way of fitting several different activities onto the small space of a computer screen at the same time. . . . Pads, in contrast, use a real desk. Spread many electronic pads around on the desk, just as you spread out papers. Have many tasks in front of you."[23] Finally, the picture of the pad in Figure 2, displaying its inner structure, hearkens back to another, earlier era of computing which valued an open (and therefore extensible) architecture.

Nowadays, introducing the latest iPad to the general public by opening up the device is practically unthinkable. In fact, at the Apple event to unveil the fourth-generation iPad and the iPad mini in October 2012, when Phil Schiller said, "Let's open it up and see what's inside," "inside" amounted to a screenshot of Apple-branded icons representing different functions and components. It's also not surprising that Weiser's later arguments against computing modeled on magic, via what he called "psychology and salesmanship," have been recently reversed and used even as a selling point for interfaces that do anything but encalm and inform. The iPhone/iPad multitouch interface, which is constantly touted as "magical" or as something that allows us to perform "magic tricks," is invisible in the sense that it constantly seeks to hide its inner workings through glossy, attractive packaging that makes the iPhone/iPad highly visible



KEY COMPONENTS OF UBIQUITOUS COMPUTING are the pads and tabs under development at the Xerox Palo Alto Research Center. The page-size pad (*top, exterior and interior views*) contains two microprocessors, four million bytes of random-access memory, a high-speed radio link, a high-resolution pen interface and a black-and-white display that is 1,024 by 768 pixels. Because it uses standard window system software, the pad can communicate with most workstations. The much smaller tab (*at left*), $2\frac{3}{4}$ by $3\frac{1}{4}$ inches, has three control buttons, a pen interface, audio and an infrared link for communicating throughout a room. The author believes future homes and offices will contain hundreds of these tiny computers.

very small, and the range large (50 to 100 meters), so that the total number of mobile devices is severely limited. The ability of such a system to support hundreds of machines in every room is out of the question. Single-room networks based on infrared or newer electromagnetic technologies have enough channel capacity for ubiquitous computers, but they can work only indoors.

Present technologies would require a mobile device to have three different network connections: tiny-range wireless, long-range wireless and very high speed wired. A single kind of network connection that can somehow serve all three functions has yet to be invented.

Neither an explication of the principles of ubiquitous computing nor a list of the technologies involved really gives a sense of what it would be like to live in a world full of invisible widgets. Extrapolating from today's rudimentary fragments of embodied virtuality is like trying to predict the publication of *Finnegans Wake* shortly after having inscribed the first clay tablets. Nevertheless, the effort is probably worthwhile:

Sal awakens; she smells coffee. A few minutes ago her alarm clock, alerted by her restless rolling before waking, had quietly asked, "Coffee?" and she had mumbled, "Yes." "Yes" and "no" are the only words it knows.

Sal looks out her windows at her neighborhood. Sunlight and a fence are visible through one, and through others she sees electronic trails that have been kept for her of neighbors coming and going during the early morning. Privacy conventions and practical data rates prevent displaying video footage, but time markers and electronic tracks on the neighborhood map let Sal feel cozy in her street.

Glancing at the windows to her kids' rooms, she can see that they got up 15 and 20 minutes ago and are already in the kitchen. Noticing that she is up, they start making more noise.

At breakfast Sal reads the news. She still prefers the paper form, as do most people. She spots an interesting quote from a columnist in the business section. She wipes her pen over the newspaper's name, date, section and page number and then circles the quote. The pen sends a message to the paper, which transmits the quote to her office.

Electronic mail arrives from the company that made her garage door opener. She had lost the instruction manual and asked them for help. They have sent her a new manual and also something unexpected—a way to find the old one. According to the note, she can press a code into the opener and the missing manual will find itself. In the garage, she tracks a beeping noise to where the oil-stained manual had fallen behind some boxes. Sure enough, there is the tiny tab the manufacturer had affixed in the cover to try to avoid E-mail requests like her own.

On the way to work Sal glances in the foreview mirror to check the traffic. She spots a slowdown ahead and also notices on a side street the telltale green in the foreview of a food shop, and a new one at that. She decides to take the next exit and get a cup of coffee while avoiding the jam.

Once Sal arrives at work, the foreview helps her find a parking spot quickly. As she walks into the building, the machines in her office prepare to log her in but do not complete the sequence until she actually enters her office. On her way, she stops by the offices of four or five colleagues to exchange greetings and news.

Sal glances out her windows: a gray day in Silicon Valley, 75 percent humidity and 40 percent chance of afternoon showers; meanwhile it has been a quiet morning at the East Coast office. Usually the activity indicator shows at least one spontaneous, urgent meeting by now. She chooses not to shift the window on the home office back three hours—too much chance of being caught by surprise. But she knows others who do, usually people who never get a call from the East but just want to feel involved.

The telltale by the door that Sal pro-

FIGURE 2. *Images of Mark Weiser's ubicomp pad and tab as they appeared in* Scientific American *in 1991.*

and puts it at the center of our attention while becoming a fetishistic object that's anything but Weiser's scrap pads.[24]

The iPad: "A Truly Magical and Revolutionary Product"

On October 23, 2012, Apple's Tim Cook and Phil Schiller "unveiled" (the word of choice to describe every introduction of a new computing device, a word that evokes a magician revealing a trick's hidden mechanism) the new iPad mini, along with several other products that were updated with sharper displays or to be thinner, faster, smaller. Given the mini's dimensions, 7.87-by-5.3 inches and 0.28 inches thick (what literature about the mini doesn't make its dimensions of utmost importance?), Cook and Schiller mentioned "thin," "thinner," or "thinnest" throughout the one-hour-twelve-minute event no less than thirty-five times. "Incredible" or "incredibly" were a close second at twenty-seven times, and "amazing" was third, at twenty-two times—and as if lifted from a women's fashion magazine, "beautiful," "elegant," "gorgeous," and "light" were consistently peppered throughout.[25] The mini is "a quarter thinner than the fourth-generation iPad. To put it in context, it's as thin as a pencil. It weighs just 0.68 pounds. That's 53 percent lighter than the fourth-generation iPad. . . . It's as light as a pad of paper."[26] In the usual breathless tones of an Apple "event," as they're called (again, no other term better describes the quiet theatricality of these product launches), Schiller was careful to repeat that the device was not "just a shrunken down iPad," and again, on the Apple website we are reminded the iPad mini "isn't just a scaled-down iPad. We designed it to be a concentration, rather than a reduction, of the original."[27] No unveiling would be complete without plenty of discussion about the fine craftsmanship that went into its construction, as "every detail is finely crafted and made exquisite," coupled with declarations about how "it's beautiful on both sides" and also "beautiful from every angle" because of its aluminum and glass enclosure, instead of the "heavy plastic" used by other products. Apple's quest for

thinness, particularly through its line of iPads—whose gestural, multitouch interface is a direct descendent of Weiser's ubicomp—is a quest for an immensely powerful device that moves as close as possible to invisibility without disappearing altogether, for then we couldn't marvel at its highly branded, highly individual, and supposedly artful packaging. This quest for the paradoxical combination of beauty, thinness, and invisibility most obviously extends back to the release of the iPod in October 2001. As Steven Levy writes in his usual awestruck tone, with an appearance by Jony Ive midsentence, "The iPod was the boldest step yet toward whiteness, an effort directed to the heart of visual simplicity and minimalism, with perhaps a yearning toward invisibility. 'Right from the very first time, we were thinking about the product, we'd seen this as stainless steel and white,' Ive explained. 'It is just so . . . so brutally simple. It's not just a color. *Supposedly neutral—but just an unmistakable, shocking neutral.*'"[28]

This is where magic comes in—through the supposedly neutral. The iPad's packaging, part of which is dubbed an "enclosure," no doubt for the word's undercurrent of specialness or even awe, and the device's marketing rhetoric are so seductive that we consistently overlook the fact that we are willingly suspending disbelief every time we use it. In fact, the willing suspension of disbelief is a key component to magic shows, for although the audience wants to be amazed by feats that are seemingly impossible, their amazement depends on two key, interdependent components: they must believe that the magician's assistant is not actually being sawed in half or that a dove is not actually being turned into a handkerchief, and yet they must remain in the dark (literally and figuratively) about exactly how the trick works.[29]

This logic was most clearly at work during the January 2010 launch of the first iPad, at which Steve Jobs stood onstage in a dimly lit auditorium (that itself looked like a modernized early twentieth-century theater, with its ornate friezes and columns juxtaposed with the clean lines of a black stage) and opened

the launch by calling the iPad "a truly magical and revolutionary device" before pulling the device out from underneath a black cloth on a pedestal.[30] Over the next one hundred minutes, Jobs went on to celebrate this device that was so "gorgeous," "incredible," "extraordinary," "awesome," "amazing," "phenomenal," and "unbelievable" and that was also their "most advanced technology in a magical and revolutionary device at an unbelievable price." Most telling, throughout the show a range of Apple executives explained that using the iPad was "just that simple" (repeated at least ten times) because "it just all works." "You don't even think about it. You just do." This reminder that the iPad transcended thought was only the most recent and most obvious example of similar Apple product slogans. "It just all works" was a near perfect echo of Apple's 2007 ad for Mac OS X, which also "just works."[31] If after ninety minutes of this show you were not quite convinced of the iPad's bewitching properties, Jony Ive, Apple's senior vice president of industrial design, appeared on screen to tell you: "It's true—when something exceeds your ability to understand how it works, it sort of becomes magical. That's exactly what the iPad is."[32] Ive was clearly channeling science fiction writer Arthur C. Clarke's famous Third Law, which states, "Any sufficiently advanced technology is indistinguishable from magic."[33] The difference here is that the iPad, which is indeed an advanced piece of technology, was deliberately made to appear magical. It's not that one day we will look back and, with clear hindsight made possible by a more refined understanding, comprehend the iPad and no longer see it as magical. Ideally, we will never comprehend it. The iPad works because users can't know how it works.[34]

With wild techno-enthusiasm, Jesus Diaz's writing for *Gizmodo* on April 2, 2010, the day before the release of the iPad, perfectly represents the irresistible pull of these new, slick computing devices. Without even a hint of critical-mindedness, he regurgitates some of the same language used to sell the iPad four months earlier at the product launch:

> [The iPad] shows that *computers have—must—be an invisible platform,* one that shifts its appearance to give people the tools to complete the tasks they want to accomplish, whatever these are. . . . By being invisible and letting the applications do the work in the most simple way possible, the power of the computer will, at last, be available for everyone. No previous knowledge required. From a 3-year-old baby to your 90-year-old grandma, *people will be able to just do things*.[35]

Diaz's rhetoric is, on the surface, remarkably similar to Mark Weiser's on ubicomp, but the fundamental difference is that Diaz's notion of an invisible computer whose appearance is constantly shifting and that "just does" depends on something that might as well be called "magic," which is, again, precisely what Weiser argued against.

Not surprisingly, the iPad launch was followed by an ad campaign throughout 2010 that included commercials such as "iPad Is Magical"—which doesn't mention "magic" once and instead gently nudges viewers into thinking the device must be magical since it "is" (rather than enables or gives tools for) "medical, live, musical, work, play, memories, social, magazines, historic."[36] This commercial was followed a few months later by "iPad Is Delicious," which claims the device is so because it is "current, learning, playful, literary, artful, friendly, productive, scientific, magical" (of course, "literary" and "artful" are illustrated with users merely reading, flipping pages, and finger-painting).[37] Then, a few months later, Apple released "iPad Is Electric," this time because it is "cinematic, elementary, academic, full size, presenting, bought, sold, fantasy."[38] Perhaps, then, it is perfectly fitting that the iPad (or perhaps just its marketing campaign) has given rise to so-called iPad magicians, who capitalize on the way in which users/consumers so easily and willingly suspend disbelief. Employing the device as a twenty-first-century version of a black hat, Charlie Caper and

FIGURE 3. *Shinya the "Salary Magician" stands outside an Apple store in Japan and creates the illusion of producing a dove from his iPad.*

Erik Rosales use the iPad as a magic prop to convince spectators to invest in Stockholm real estate. Shinya the "Salary Magician" turns the image of a dove on his iPad into an actual dove that flies in front of an Apple store in Japan (see Figure 3). And Simon Pierro, the "Wizard of OS," pours beer from the device in a German tavern to the awe and delight of a nonstop stream of patrons (see Figure 4).[39]

The iPad is, without a doubt, the most influential, "magical and revolutionary" closed computing device of the twenty-first century—and for the skeptical, Apple has the sales numbers to prove it. Tim Cook proudly intoned in a friendly southern drawl at the iPad mini launch that Apple had sold 100 million iPads in the past 2.5 years; that in November 2012 alone they had sold three million devices in just three days; that iPads accounted for 91 percent of the total Web traffic; that 94 percent of Fortune 500 companies were testing or deploying iPads; that of the

FIGURE 4. *Simon Pierro, the "Wizard of OS," creates the illusion of pouring beer from an iPad in front of delighted patrons in a German tavern.*

total 700,000 apps available through iTunes, 275,000 of those were specifically for iPad.[40]

Yet at the same time as iPad sales increase and the device becomes practically de rigueur in middle-class homes, workplaces, and schools, Apple continues not only to co-opt the terms *invisibility* and *user-friendly* but also—as I briefly point out in relation to the iPad's "literary" and "artistic" capabilities—to redefine the very notion of creativity, as if it has all along been undeterred in principle from its mid-1990s ad campaign to "think different." As Jobs said to his audience at Macworld in 1997, "You still have to think differently to buy an Apple computer. . . . The people who buy them do think different. They are the creative spirits in this world, and they're out to change the world. *We* make tools for those kinds of people."[41] Regardless of how much today's consumers of Apple products "think different," thinking can't overcome the brute fact that from Apple's perspective creativity on the iPad largely does not mean creating or producing content—neatly ensured by both

its slick external packaging and, as I lay out in the proceeding section, its operating system.

If the iPad signals the future of computing and of ubicomp-related computers, then perhaps it also simultaneously signals a future generation of hackers who will be driven to find a way out of this flat notion of creativity that amounts to little more than consumption and manipulation as users are turned into audience members watching their devices perform magic tricks before their very eyes. (Incidentally, this notion of creativity couldn't be more at odds with the tinkerer/homebrew notion of creativity underlying the 1980 ad campaign for the Apple II, which invited users to write directly to the company and describe "the most original use of an Apple since Adam.") While there will always be users who find ways to produce content on any device—in fact, I touch on several innovative digital literature iPad apps—given the months or even years it might take a novice to learn the Objective-C programming language, which is the standard language for iOS development, not to mention the rigid and restrictive iOS guidelines, it remains that the iPad, both inside and out, is unquestionably made for consumption, and its wild popularity, driven or bound to Apple's marketing rhetoric, continues to determine the shape of computing as companies clamor for a share of the profits.

From Videoplace to iOS: A Brief History of Creativity through Multitouch

It is as if Apple has successfully turned *creativity* into a proprietary eponym like Kleenex or Frisbee. But against forgetting what creativity via computers *could* mean and in fact at one point *did* mean, creativity (not unlike invisibility), especially via multitouch devices, has undergone significant reversals over the past twenty to thirty years. Myron Krueger's Videoplace is a particularly poignant example of how *creativity* in computing at one time implied tinkering, active learning, and interactivity, rather than being a term leveraged to drive profit

and that often means manipulating content by making surface-level changes—flipping through preprogrammed, locked-in settings and functions.

Krueger's work with artificial reality (AR), which he defined as the creation of synthetic, alternative realities, particularly through his Videoplace interface, is frequently cited as a crucial yet frequently overlooked influence on the development of multitouch. Of course, the history of multitouch interfaces is long and varied (himself a pioneer in multitouch interface design, Bill Buxton points out that keyboards were the first multitouch interfaces). But Krueger's work is essential not only because he was the first to create a wide and workable repertoire of gestures (including many gestures we now take for granted, such as the pinch and the swipe) that did not require gloves, headsets, mice, styluses, etc. but also because he was firmly invested in developing ways to interact with computers for aesthetic, scientific, and practical ends.[42] As Krueger puts it in a video from 1989 overviewing his work in Videoplace and responsive environments, he started work on these artificial reality systems after spending time teaching students "the essence of computers and trying to make it so that you would experience a computer . . . rather than doing something efficiently. And that is essentially the role of the artists—and I was thinking of expressing the computer the same way."[43]

In the opening to *Artificial Reality,* Krueger's account of his work in AR throughout the 1970s and 1980s, he makes the point that all of his work in interface design was grounded in his education at Dartmouth, whose attitude in the 1960s and early 1970s "was that knowledge of computers was part of a liberal arts education, and that anything we might do with these machines was likely to be instructive."[44] The point was to help students feel empowered to understand and create with computers—the diametric opposite of taking on an awestruck, passive stance. Thus, in 1972 Krueger began work on Videotouch, or what he called a "two-way installation," which encouraged two participants—each in separate virtual environments—to

touch each other's projected screen image and thereby create a shared environment called Videoplace. Over time this interaction system came to include such a remarkably rich collection of gestures and multifinger, multihand, and multiperson interaction that by comparison contemporary devices such as the iPad seem like nothing more than pale imitations.[45]

Just as important as the gestures and forms of touch-based interaction he developed was that the project was a digital staging of defamiliarization that encouraged a processual, open-ended exploration of the unexpected. As Krueger puts it, "This new graphic experience can highlight assumptions and expectations of which we are never aware, because it does not occur to us that our world could be other than it is."[46] Should we make the mistake of thinking Krueger sees art or aesthetics as Apple does—as the passive enjoyment of the beautiful that happens through magical devices on which you "just do"—we learn that "the purpose of the [Videoplace] displays is to provide a context within which the interaction occurs. . . . This context is an artificial reality in which the laws of cause and effect *are composed by the artist. The beauty of the displays is not as important in this medium*."[47] Rather than trying to efface the medium altogether to the point of near invisibility, what is important in this medium is the medium itself—that is, the goal of one's interactions and creations, the two inextricably intertwined, is "to express the medium itself."[48]

More, if the emphasis is on experiencing and expressing the medium itself through unexpected interactions, artistic production shifts away from representing things as they are to something more aligned with conceptual art and happenings from the 1950s and 1960s. This shift in turn works against the hermeneutic tradition, for rather than peel away layers of meanings to arrive at an interpretation, critics have very little choice but to simply describe the unfolding experience. One particular form of artistic interaction on Videoplace is called "body surfacing," which makes possible the continuous painting of the participant's image as she or he moves across a screen, while

another is called "videosyncrasy," in which a participant uses his or her finger to trace a path that is then traveled by accelerating and decelerating pulses of light that have what Krueger calls "a decaying tail."[49] The interactions on Videoplace are, then, ones that are open, active, generative, and—given that the emphasis is on the processual nature of interactions and not their product—art in themselves. In terms of literary arts such as poetry, which is conventionally understood to concern itself with the expressive delivery of some particular insight that readers then interpret, once our attention is turned to the poetic process itself the result is an emphasis on the letters and the words themselves and the participant's (now reader's) interactions:

> The reader would enter into a relationship with the words, which would become entities moving about the screen, each with its own rules of behavior. There rules would be based on the aesthetic of the poet and on the words themselves. The intent of such an interaction would be to create a poetic experience, rather than to duplicate exactly the function of poetry.[50]

Note how every user of the system is also a poet, for simply by virtue of interacting, one creates. More, Krueger's emphasis on processuality and on expressing the specificity of the medium moves us toward the practice of poetics—the doing of poetry through an attention to the material dimensions of the letter, morpheme, or word. Continuing on, as if writing about the Marshall McLuhan–inspired concrete poetry from the 1960s and 1970s that I discuss in chapter 3, Krueger proclaims that "allowing a word to interact physically with a participant is a symbolic statement, for the written word is then no longer solely a vehicle for communicating meaning, but rather is an entity behaving on its own as well."[51] Through Videoplace one can explore and express it *as* a medium at the same time as one can explore and express the written word as another kind of medium. Videoplace is a medium for media study.

FIGURE 5. *Screenshot from a 1989 video of Myron Krueger demoing Videoplace and Videotouch.*

iPoems

Given the diametrically opposed pulls between the philosophy underlying Videoplace and that underlying contemporary multitouch devices such as the iPad, it's surprising that Krueger's description of what a truly interactive poetry could be in an AR environment sounds remarkably similar to what contemporary digital writers/artists have accomplished twenty years later with their iPad/iPhone apps. In digital poetry apps by Jörg Piringer, Jason Edward Lewis, and Erik Loyer, the acts of touching, tapping, swiping, and sliding are the only mechanisms by which the works come into being, and in some cases it is the only way by which the works unfold. That said, since these works are primarily about the medium of the iPad and the word as media, they are also not particularly invested in providing the reader/user with a text that is interpretable. If Lewis, for example, did not provide a description about what

each of his poems were about, it would be difficult to say what the turning, twisting, moving letters and occasional phrases or sentences "meant" in relation to the work as a whole.

Even more striking is that these digital writers have produced innovative works that express the multitouch medium as a medium despite the Apple iOS developer guidelines that continue the interface design tradition of making sweeping generalizations about "people," assumptions about nature and intuition, all of which are tied to statements about the necessity of hiding the device's workings via interface and therefore the necessity to black-box the device. In the iOS Human Interface Guidelines, we read that "a great user interface follows human interface design principles that are based on the way people—users—think and work, not on the capabilities of the device"; that the multitouch display "encourages people to forget about the device and to focus on their content or task"; and that "iOS-based devices and the built-in apps are intuitive and easy to use, so people don't need onscreen help content."[52] There are also the many and varied difficulties associated merely with getting one's app approved—for one may create only within Apple's rigid and deeply moral strictures. For example, Apple is clear they will reject apps with easter eggs or "undocumented or hidden features inconsistent with the description of the app"; apps "that encourage excessive consumption of alcohol or illegal substances"; apps that "present excessively objectionable or crude content"; apps that include pornography, as well as gambling; and apps that "target a specific race, culture, a real government or corporation, or any other real entity."[53] First, many banned features, such as easter eggs, implicitly ban the unexpected—even though an experience of the unexpected was precisely what Krueger originally sought to foment through his multitouch display and even though the experience of the unexpected defines many compelling works of art and literature.[54] In fact, Apple maintains as much control as possible over apps by intentionally avoiding stating their criteria for determining what is objectionable, crude, porn, targeting, etc. Neither are

they clear about how app reviewers discern between encouragement and mere or, even, pointed representation.

Despite this remarkable range of restrictions on both the form and the content of creative expression on the iPad, in a handful of digital literature apps there is still a clear connection between Videoplace and the attempt to explore and express the medium as a medium through open-ended play, touch, embodied movement, and a courting of the unfamiliar (*through* the unfamiliar). For example, Piringer's *abcdefghijklmnopqrstuvwxyz* is essentially a playful DIY kinetic poetry platform that allows users to flick any or all letters of the alphabet onto a simulated white canvas (see Figure 6). While the user can, to some degree, control the movement of the letters by tilting and rotating the iPad (taking advantage of the accelerometer, a sensor-based technology capable of measuring the force of gravity–or movement-induced acceleration), the user can also choose four modes in which the letters can move without requiring any additional interaction.[55] "Gravity" causes letters to drop and bounce while emitting an oral articulation of the letter-form every time it bounces off one of four virtual surfaces. "Crickets" causes letters to turn into pixilated critters, emitting an equally pixilated sound and traveling a more indeterminate path on a plane that's horizontal rather than the vertical plane of "gravity." "Vehicles" and "birds" also operate on this horizontal plane. Taking advantage of the blank, white canvas that Piringer can use to suggest nearly any surface, "vehicles" not surprisingly causes letters to behave and sound like automobiles moving across the ground, whereas we are invited to imagine the letters in "birds" moving across the sky and at a much slower speed. (The app makes just as much room for destruction as it does for creation, as it includes the capability of targeted destruction of individual letters on-screen or detonation of the entire alphabetic scene.) Here, individual letters become entities unto themselves, and our experience of them is one that defies the standard procedures for literary analysis.

Jason Lewis's works from his P.O.e.M.M series (Poetry for

FIGURE 6. *Screenshot from Jörg Piringer's* abcdefghijklmnopqrstuvwxyz *app using all four modes to mobilize letters: "gravity," "crickets," "vehicles," and "birds."*

Excitable [Mobile] Media) are also relevant examples of apps that do the work of inventively expressing the iPad's unique multitouch capabilities. *What They Speak, Migration,* and his most recent limited-edition app, *Smooth Second Bastard,* all—regardless of the author notes accompanying each work that state what the poetry app is about—embrace an aesthetic of exploring, only through touch, the material, tangible, yet ephemeral qualities of individual letters and words. *What They Speak* is the first in the P.O.e.M.M series, and it allows the user to draw tracks of text (either from the ready-made letters and words, from a poem the user writes, or from text drawn from Twitter) that read backwards, with a swipe to the right, and forwards, with a swipe to the left.[56] *Migration* is perhaps even more mysterious, as it features vague spermatozoa-like entities that similarly respond to tapping and swiping and have short phrases trailing out of them (such as, "I'm not sure if this is happenstance").[57] Finally, Lewis's most recent app, *Smooth Second Bastard,* seems to be an experiment to see how far the iPad multitouch interface can be made into a complex and generative interface for the experience of a kind of procedurally based poetry (see Figure 7).[58] This limited-edition app (in itself an oddity, but one that reminds us that we never own the apps we purchase; we are only granted access to them, if not by the app creator then by Apple) utilizes touch first as a way to generate spools of text from either side of the user's pressed finger. Without the pressure of the finger, all but one word disappears, and as Lewis explains, "After three words have built up, each new word—created by releasing a line—leaves behind one letter as the rest disappears off-screen. The lines, the words, and the letters all form their own texts, creating a three-dimensional poem."[59] If the poem is about anything at all, it is about experiencing the complexity of its touch-driven, generative medium through the additional medium of language itself.

Finally, Erik Loyer's *Strange Rain* particularly resonates with Krueger's vision for creativity via Videoplace (see Figure 8).[60] The app contains three different modes of falling rain and/or

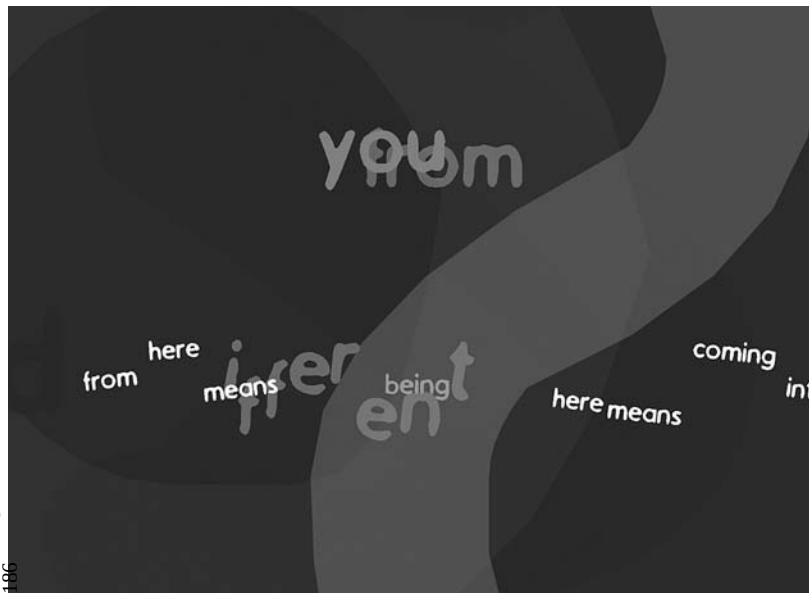


FIGURE 7. *Screenshot from Jason Edward Lewis's app* Smooth Second Bastard.

text that respond to tilting, rotating, and touching and that insist on sustained interaction by touch—not by scrolling, flipping, clicking, or viewing—as a way to immerse oneself deeper in the mechanics of the app. The first mode is the slow, meditative "wordless" mode, which turns the iPad into a window onto which rain falls down (or depending on how you wish to hold it, the rain can even fall up), settling in splattered patterns on the screen. Swiping or swirling creates a responsive pattern of fallen raindrops, and pinching in or out changes the intensity of the rain, which as the author quietly notes at the bottom of the screen, can also "perform" as an element of the equally strange soundtrack playing at the same time that has neither a beginning nor an end. As another hint at the bottom of the screen tells us, "The more times you play through the melody, the more strange things will appear." For example, planes ominously float across the stormy sky; frames disappear into frames of frames

FIGURE 8. *Screenshot from the "wordless" mode in Erik Loyer's app* Strange Rain.

of the rain-covered window (making us suddenly aware of the window and even the device itself as media that frame our experience); and the white and grey of the scene abruptly change to red and green.[61] As Loyer himself puts it, "Before your eyes and beneath your fingers, the familiar becomes strange, and

the strange, familiar." The "whispers" mode builds on the structure of the rain-spattered window and adds a feature by which some raindrops turn into words such as "absolve," "liberate," or "nourish."[62] "Story" mode imports a story Loyer wrote, "Convertible," into the multitouch environment as a way to explore the impact of the same interactions with rain on story—that is, in this mode touching the screen produces text expressing thoughts from the main character, Alphonse, who has stepped into his sister's rainy backyard to clear his head after what we can only assume was an earlier conflict inside the house. The iPad screen then turns into the eyes of a character looking up into rain falling from the sky—prompting us to think of eyes as media just as much as windows or screens—and tapping makes brief thought statements appear, whereas dragging produces further elaborations on these same thoughts. *Strange Rain* shows us that—quite in spite of Apple—it is possible to create apps that help us think through and experience the multitouch device as both interface and medium.

Making the Invisible Visible: Hacking, Glitch, Defamiliarization in Digital Literature

It may be precisely because our devices are ever more hermetically sealed that *hacking* is an apt term to describe certain works of digital literature created before 2000, before the era of the magical device. Although this section is mostly concerned with glitch, understood as intentional disruptions to the smooth surface of the interface, I touch on a long-standing tradition in innovative writing that helped make way for these glitch works. This tradition took a hacker's approach to both writing and media-specific interface, often doing so by drawing attention to the process underlying the writing product, the way in which process and product were unavoidably intertwined. These works engaged in hacking not in the more recent sense of illegally bypassing computer security mechanisms but rather in

its earlier (perhaps original) sense, embodied by the computer hobbyists of the Homebrew Computer Club from the 1970s and early 1980s, who were invested in the communal enterprise of open-source DIY computing. Hacking in this sense has been usefully reenlivened by McKenzie Wark, who describes it in terms of the activities of a class of people who "create the possibility of new things entering the world" and whose slogan is, "Not the workers of the world united, but the workings of the world untied."[63]

Both early and contemporary examples of codework digital literature untie the workings of the computer not just by making visible the code or the normally invisible underbelly of our digital devices but by making the code the work of literature itself. Process becomes both product and fodder for appropriation and remix by others. Although not particularly invested in glitch, difficulty, or failure, the Apple BASIC code poem buried

```
1.SocialConnectionAccessProtocol[- SCAP -]

_____________________________________
SocialConnectionAccessProtocol[- SCAP -]
ControlVersioningSystem
09:07am 25/05/2007
_____________________________________


$ cvs -d :codependentserver:internaltripwiring@cvs-mirror.abortive.org:/cvsroot login
(Logging in to internaltripwiring@cvs-mirror.abortive.org)
CVS password: [internaltripwiring]
$
$ cvs -z3 -d :codependentserver:internaltripwiring@cvs-mirror.abortive.org:/cvsroot co SCAP

cvs server: Updating abortive/directory/SCAP
U abortive/directory/SCAP/NO.pls
U abortive/directory/SCAP/YES.dmg
U abortive/directory/SCAP/ChangeRealityLog

--
#There are currently 6 SocialConnection release_valves available.
#Use the main an[ti]xiety_loading trunk:
#Release-1_0: 1st attempt at SCAP. Tremory_+_Shuddery.
#Release-1_2: 1st attempt at the 2nd release. Thick_womb_music_cables
#unre[a|]eling unstable_conversation_w[g]r[e|]app[l]ing.
#Release-1_2_2: The final[ity] + most stab[b{l}ing_with_ur_g(old)athering_eyes]le
#release in the 1.2 series.
#Release-1_3: 1st 1.3 release with [g]host_groin_spas[onic]m[ush]s.
#Release-1_3_2: Latest release with some s[pidery]tone_lizard_clubbed2deathness.
#Release-1_3_3: Latest release with some st[p]arched_+_sw[|t]ollen_body_w[l]ords
#drenched chemically. Yearn_f[l]ingers_cup_sh[gl]immer_throats.


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FIGURE 9. *Screenshot of part 1 of Mez's "_cross.ova.ing][4rm.blog.2.log][_", written in the pseudo–code language of Mezangelle.*

in bpNichol's 1984 *First Screening,* which I discuss in chapter 2; Mez's unexecutable code poems from the 1990s, written in the fictional programming language Mezangelle (see Figure 9); and Nick Montfort's 2009 open-source Python poetry generator *Taroko Gorge,* which has spawned at least twenty different remixes, present themselves to us as already untied and therefore clearly situated against the sort of black-boxing embodied by the iPad.[64]

Moreover, nearly every early work of digital literature created on the influential hypertext authoring environment Storyspace from the late 1980s through the 1990s is arguably also an instance of hacking in this broad sense. Even though the software—which predates the Web and provides a far richer environment for linking and for linking as mapping than is possible with the one-to-one style of linking that is the basis of the Web—was explicitly created for writers and writing, authors inevitably came up against some feature or even bug they sought to subvert or exploit or felt they needed to create in order to make their text operate in the ways they wanted. For example, Deena Larsen's *Samplers: Nine Vicious Little Hypertexts* from 1997 exploits a bug in Storyspace 1.2C that produces a screen requiring the reader to choose between two writing spaces after they hit Enter (see Figure 10).[65] Larsen writes, "This was crucial in *Samplers,* as I wanted readers to be able to hit enter and see a default story line, but I also wanted readers to be forced to choose at key ventures."[66] In the same work Larsen also takes advantage of the fact that the names of links in *Samplers* can double as phrases that when strung together create what she calls a "shadow story of the main text."[67] Storyspace publisher Mark Bernstein describes how this friendly hack functions:

> Links in Larsen's *Samplers* appear in a dialog box—a conventional list of links that Storyspace authors can use to build an ad hoc multi-tailed link. The dialog is designed to be purely functional, showing a list of links by pathname and

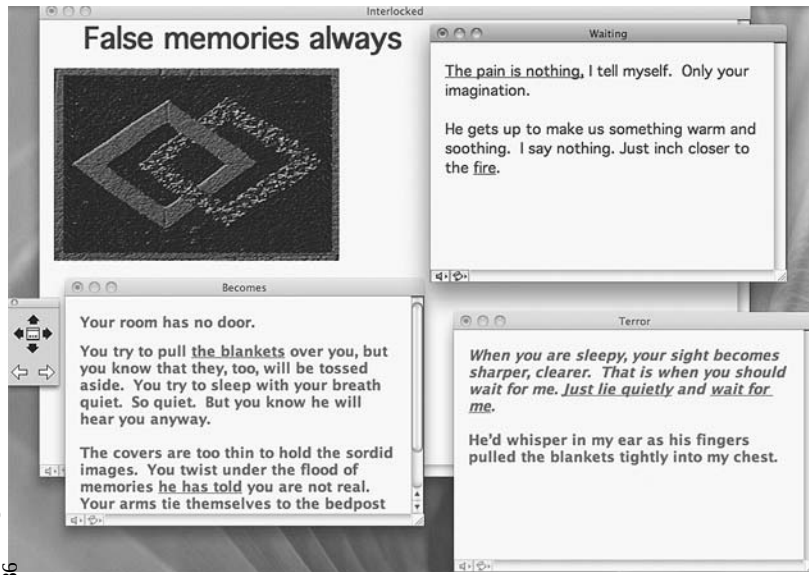

FIGURE 10. *Screenshot of Deena Larsen's* Samplers: Nine Vicious Little Hypertexts *from 1997 and the way in which names of links can be strung together to form a secondary but related narrative.*

destination, but Larsen has chosen path names so that this list itself can be read as an interstitial poem.[68]

Finally, Larsen, as well as countless other Storyspace authors, also managed to create the equivalent of easter eggs—called "Jane's Spaces," named after the hypertext literature critic Jane Yellowlees Douglas—in their works. Writes Bernstein in a blog post:

> In hypertext parlance, a Jane's Space is a part of a hypertext that you can't find in the usual, link-following way. A Web page that's not linked to your site and that's hidden from the search engines is a Jane's space; you can only get there if you happen to know the URL. . . . I recently wrote a small program that scans Storyspace documents, looking for spaces with text but no inbound links. Of 28

> published hypertexts, at least 16 appear to have Jane's spaces. I knew some of these, but the overall total seems extraordinarily high.[69]

The creation of Jane's Spaces, particularly without the knowledge or the permission of the publisher, is certainly a feat that would not be possible if these authors were creating for Apple multitouch devices, especially given Apple's strict developer guidelines.

Although a handful of digital literature practitioners have found ways to work within and against the strictures of the iPad's tightly controlled hardware and software, since the device is symptomatic of the larger direction in computing toward products that are black-boxed in the name of the supposedly user-friendly, the vast majority of contemporary writers position themselves against the foregoing by using the Web or even Web browsers. By comparison with Storyspace, the Web is certainly more limited, but it is also by far the most profoundly influential and accessible computing platform. Thus, in opposition to the (marketing) rhetoric that celebrates magic, invisibility, seamlessness, and whatever is deemed "natural," work by Talan Memmott, Judd Morrissey, Jason Nelson, and Young-Hae Chang Heavy Industries court glitch on the Web as a way to make the invisible visible once again. Otherwise put, these authors (among numerous others in the field of digital literature) create interfaces that frustrate us as readers, because they seek to defamiliarize the interfaces we no longer notice—a literary strategy akin to Viktor Shklovsky's early twentieth-century invocation of "defamiliarization," which has become the watchword of Russian formalism and its belief about the purpose of art and, by extension, poetic language:

> Art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone stony. . . . The technique of art is to make objects "unfamiliar," to make forms difficult, to increase the difficulty and length of perception

> because the process of perception is an aesthetic end in itself and must be prolonged. Art is a way of experiencing the artfulness of an object; the object is not important.[70]

The last line in the foregoing quote is an important point at which digital writers and artists depart, however, from Shklovsky and much of the heritage of the early twentieth-century avant-garde, for these digital writers and artists deploy difficulty and failure to defamiliarize and thus resee interfaces of the present so that we become aware of how the object—in this case, the digital interface—is in fact of utmost importance. Framed as that which gives an account of the normally invisible—the taken-for-granted that nonetheless defines what can be said—the unsettling work by these three authors presents a compelling argument for the importance of digital literature as an intervening force in the computing industry's push to have our devices do all the thinking, perceiving, and even creating for us.

Although *glitch* is rarely used to describe digital literature, the way in which it is commonly used by musicians, gamers, artists, and designers to describe an artistic practice of experimenting with and even aestheticizing the visible results of provoked or unprovoked computer error make it a relevant framework for understanding a whole range of early and contemporary works of difficult digital literature. *Glitch* was first used in the early 1960s to describe either a change in voltage in an electrical circuit or any kind of interference in a television picture. By the 1990s *glitch* broadly described brief bursts of unexpected behavior in electrical circuits, but it was also more specifically used to describe a style of electronic music that was created from already-malfunctioning audio technology (or from causing technology to malfunction) as a way to explore the life of the digital machine and as a reaction against the push in the computing industry to create an ever more clean, noise-free sound. The term has since been appropriated as a name for what Olga Goriumnova and Alexei Shulgin call a

"genuine software aesthetics."[71] Glitch aesthetics, then, could include aestheticizing the visible results of a virus or even provoking the computer to take on a virus in order to explore its underlying workings.[72]

Glitch takes this radical shift in what counts as an aesthetic object or an aesthetic experience and asserts that its disruptiveness (in that a glitch constitutes a moment of dysfunctionality in the computer system) defamiliarizes the slick surface of the hardware/software of the computer and so ideally transforms us into critically minded observers of the underlying workings of the computer. As Goriumnova and Shulgin put it, "A glitch is a mess that is a moment, a possibility to glance at software's inner structure. . . . Although a glitch does not reveal the true functionality of the computer, it shows the ghostly conventionality of the forms by which digital spaces are organized."[73] One of the best-known creators of glitch art and games is the Dutch-Belgian collective Jodi, whose members are Joan Heemskerk and Dirk Paesmans. Since the mid-1990s, Jodi has, as they put it in a 1997 interview, battled "with the computer on a graphical level. The computer presents itself as a desktop, with a trash can on the right and pull down menus and all the system icons. We explore the computer from inside, and mirror this on the net. When a viewer looks at our work, we are inside his computer."[74] For example, their 1996 *Untitled Game* is a modification of the video game *Quake* in that the game's architecture no longer functions according to the conventions of gameplay. One way they do this is by exploiting a glitch that is provoked every time the *Quake* software attempts to visualize the cube's black-and-white-checked wallpaper, causing the player to become trapped in a cube.[75] Thus, quite in opposition to the computing industry's attempt to naturalize the interface to the point of invisibility, Jodi makes the interface confusing, unfamiliar, uncomfortable, malfunctioning.[76]

In the field of digital literature, one of the earliest works of glitch is William Gibson's infamous *Agrippa (A Book of the Dead),* which was published in 1992 as a collaborative effort between

Gibson, book artist Dennis Ashbaugh, and publisher Kevin Begos Jr.[77] It has been thoroughly and subtly discussed by Matthew Kirschenbaum, who understands *Agrippa* in the same terms as all of the works I discuss throughout this book, as exemplifying "the capacity of a digital object to take on and accumulate a material, indexical layer of associations," indicating its own "awareness of the mechanism"—an awareness that ties it to the foregoing hacker-like works of digital literature and that actually reveals itself through its own provoked error.[78] That is, *Agrippa* is packaged as a black box that once opened reveals both a hologram of a circuit board on the underside of the lid and, inside the box, a book, inside of which is nested a 3.5-inch floppy disk that is programmed to encrypt itself after it is used just once. Not surprisingly, once exposed to light, the words and images on the pages of the book fade altogether.[79] Given the self-reflexivity of *Agrippa* and the way its different material components comment on each other, appropriately enough the text of the book doubles as a description of itself and of a photo album that contains fading photographs from the early family history of the narrator, W. F. Gibson Jr.

I hesitated
before untying the bow
that bound this book together.

A black book:
ALBUMS CA. AGRIPPA
Order Extra Leaves By Letter and Name

A Kodak album of time-burned
black construction paper

The string he tied
Has been unravelled by years
and the dry weather of trunks
Like a lady's shoestring from the First World War

Its metal ferrules eaten by oxygen
Until they resemble cigarette-ash
Inside the cover he inscribed something in soft graphite
Now lost
Then his name
W. F. Gibson Jr.
and something, comma,
1924[80]

Agrippa is a work of conceptual writing that not only performs its textual content and itself as a black-boxed black box but also hacks its own mechanism to catalyze its obsolescence and become a book of the dead on, no surprise, dead media.

A more recent instance of digital literature glitch is Talan Memmott's "Lexia to Perplexia" from 2001 (the same year Apple released the iPod, the device with a "yearning toward invisibility" that clearly made way for the iPad)—a work requiring Netscape 4.x or Internet Explorer 4.x to view it such that Memmott quite knowingly built in the work's own protracted, provoked glitch. As every year brings with it the obsolescence of some Web browsers and the updating of others, we slowly lose the ability to access certain parts of "Lexia to Perplexia," if we do not lose the ability to access it altogether. As Memmott writes in the introduction, this work "began as an observation of the fluctuating and ever-evolving protocols and prefixes of internet technology as applied to literary hypermedia. As well, 'Lexia to Perplexia' was originally meant as a critique of both the Author and User/Reader positions in relation to web-based literary content."[81] That is, the reader will notice that in all four sections of the work—"The Process of Attachment," "Double-Funnels," "Metastrophe," and "Exe.termination"—"Lexia to Perplexia" makes wide use of neologisms as a means of presenting, in Katherine Hayles's words, "a set of interrelated speculations about the future (and past) of human-intelligent machine interactions, along with extensive re-inscriptions of human subjectivity and the human body."[82] The text is, however, performed

not only linguistically but also narratively and visually. Narratively, Memmott alludes to classical literary references ranging from ancient Greek and Egyptian myth to postmodern literary theory reflecting on humans, technologies, and their collaborative agency. Visually, the work makes use of interactive features that override the source text, leading to a fragmentary reading experience. The functioning and malfunctioning of the interface itself carries as much meaning as the words and the images that compose the text. Memmott instructs his readers to note that the "User/Reader of this piece . . . encounters a number of screens that appear simple upon access. As the User/Reader interacts with the presented objects—images, textual fragments, various UI permutations—the screens are made more."[83] That said, as the years go on, "Lexia to Perplexia" becomes less and less about its linguistic, narrative, and visual elements and more fundamentally about its interface and its slow but sure transformation into an utterly malfunctioning, inaccessible work.

Also published in 2001, Judd Morrissey's "The Jew's Daughter" similarly works against the troubling move toward transparent or invisible computing. In it readers are invited to click on hyperlinks embedded in the narrative text, links that are actually unclickable and that do not lead anywhere so much as they unpredictably change some portion of the text before their eyes.[84] I discuss this work in greater detail in chapter 4 as a way to account for the work's overall complex relationship to the bookbound page—the way in which it reads and reworks both the bookbound page through the digital and the digital through the bookbound page. In the context of this chapter, "The Jew's Daughter" reveals itself as a work that unties the workings of the hyperlinked Web interface, of whose structure we are less and less aware (as we unthinkingly click on any available link on a page) and that more and more seems to be driven by the belief that clicking is an empowering act of identity formation, one that emboldens us to access more-meaningful information and so become active learners and producers of knowledge. In fact,

clicking most often simply takes us to something other and yet other again—with most of these clicks carefully monitored by your favorite search engine, which then conveniently sells you back to yourself. Not only has the link become a naturalized structure of the Web, but its very invisibility conceals how our clicks are actually used, nearly always without our awareness.

Likewise working against the clean, "natural," and transparent interface of the Web, Jason Nelson in many of his game poems hybridizes interactive art, video games, and poetry to self-consciously embrace a hand-drawn, handwritten, messy, dissonant aesthetic. In pieces such as the wildly successful "Game, Game, Game And Again Game" from 2007, he also deliberately undoes video game conventions (of accumulation, progress, winning/losing, clear moral victories, immersion) through a nonsensical point system and mechanisms that ensure the most a player ever wins is, for example, a strange home video featuring Nelson playing with action figures in his kitchen (see Figure 11).[85] Nelson has gone on to experiment explicitly with interfaces for digital poetry—creating, in addition to games, everything from mosaic interfaces to cubes, videographs, slot machines, deep-menu poetry, 3D emulations, and circular interfaces. As he states quite unequivocally in an interview with the *Cordite Review,* "Within many digital poems there is one commonality, the emphasis on interface. . . . These interfaces are not just vessels for content, they are poems in themselves. . . . An interface is the life, the body, and a poetic construction in itself."[86]

Finally, although Young-Hae Chang Heavy Industries (YHCHI) are not obviously concerned with either glitch or a hacker aesthetic, insofar as all of their work is defined by a refusal to incorporate interactivity into their works, pieces such as *Traveling to Utopia: With a Brief History of the Technology* use this utter lack of interactivity to create what one might call "clean glitch."[87] This clean-glitch aesthetic is against its own cleanliness in that it uses Adobe Flash to create a spare, mostly black-and-white, cinematic, and totally uninteractive environment

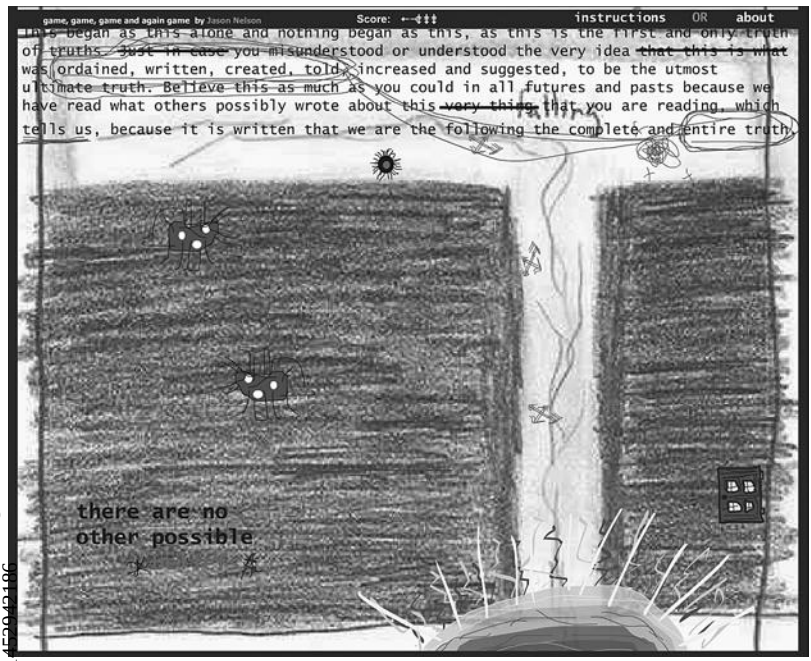

FIGURE 11. *Screenshot from the first level of Jason Nelson's 2007 digital game-poem "Game, Game, Game and Again Game."*

that thereby provides the reader with the ultimate control: to click *away*. They state in an interview from 2005:

> The spectator is far from powerless. She is still the one who decides whether or not she will watch the piece, or having clicked on it, whether she'll click away from it. That's the same power that she has when she considers any other art and literature. Clicking away is one of the essences of the Internet. It's no different from deleting. It's rejection, it's saying "no." That's ultimate power.[88]

Taking a lack of interactivity to such an extreme that it demands spectators reject the work altogether is a gesture that

throws them back on themselves and away from the mindless/endless clicking that determines most interactions on the Web.

Consisting of the American poet Marc Voge and Korean artist Young-Hae Chang, who since the beginning of their collaboration in 1999 have written and produced their work in English, French, and Korean, YHCHI is the very definition of unlocatable. Not only does their work slip back and forth between languages, as well as from either a male or a female point of view, but all of their work—whether one calls it net art or digital literature—studiously eschews literary, artistic, and Web conventions. That is, YHCHI intentionally troubles Ezra Pound's dictum to "make it new," which hangs over much twentieth- and even twenty-first-century poetry, creating new works that are new only to the extent that the text and the music is different. Otherwise, every piece that they've created looks identical to every other piece. All of their work begins by mimicking the ten-second countdown that was used by projectionists to focus the film about to be screened. In the same way that the countdown drew the audience's attention to the film as a medium, rather than effacing it altogether as a means to better foster the illusion of film as reality, all YHCHI pieces open with a ten-second countdown that not only alternates between flashing the numeral on the even number (e.g., *10*) and the word on the odd (e.g., *nine*) but also ends at *three,* leaving readers/viewers to count down to zero themselves. Similarly, all pieces by YHCHI are marked by the use of a zero instead of the letter *O*—yet another means by which to force the reader to look at rather than through the text and its interface.

In terms of their disavowal of Web design conventions, their work is created with Adobe Flash simply as a means to present moving, large, bare, black text in Monaco font against a white background (a strategic move against the computing industry's seductive rhetoric perpetually touting the virtues of the new). Pieces by YHCHI are also generally devoid of graphics, colors, photos, illustrations, and interactivity. They write, "We dislike graphic design, and we also dislike interactivity, which are the

two staples of web design, if not the web itself. Being artists, we like to do things wrong, or at least our own damn way. We ended up with a moving text synchronized to jazz, which was (and still is) all we could do."[89] Not entirely unlike in Judd Morrissey's "The Jew's Daughter," YHCHI's dislike of interactivity is partly derived from the emptiness of the interactive features in most pieces, which may be touted as offering the reader a liberatory freedom but that in fact simply allow the reader to choose between several predetermined directions. Rather than foster the illusion that their work is an exemplar of democratic literature, they choose to accentuate the absence of freedom in their work. The reader/viewer cannot fast-forward or rewind; they can only click away from the piece and end the experience altogether. YHCHI's dislike of interactivity is also derived from their sense that the Web has become so familiar to us that we're not even aware of its structures, its codes, and the way it works on us rather than us working on it. Distinctly echoing the sentiments of Jodi, they write:

> The Internet and Web have become familiar and even boring and sometimes disagreeable spaces. The Web artist's goal is to make it become less familiar, less boring, less disagreeable, to make it become fresh and new again . . . The computer screen is a superficial support, akin to the surface of a painting. Any Web art that employs images tries to create visual depth to this surface. Any Web art that employs textual information also tries to create depth, albeit with a strategy similar to the writing using: to make the reader forget he or she is looking at ink on a bound page. In this sense, yes, our work and other textual work tries to smash the surface of the computer screen.[90]

While *Traveling to Utopia: With a Brief History of the Technology* has received no critical attention, especially noteworthy in comparison with the broad acclaim given to *Dakota,* it is exemplary of YHCHI's desire to "smash the surface of the computer

screen." First, the piece is available in either English/Korean or French/English, and each version is structured slightly differently from the other. The former has large English text in black letters against a white background, with Korean text in green against a black background running across the top of the screen like a stock-market ticker tape and static English text (separate from the main English text at the center of the screen) at the bottom of the screen, also in green against a black background but with a blinking green cursor that's reminiscent of the era of the command-line interface. Already, with only a nod to the visual codes of three different writing interfaces, we have before us a "BRIEF HISTORY OF THE TECHNOLOGY." The French/English version also contains a moving line of green text against a black background on the bottom of the screen, but this time it flashes to the beat of the jazz music playing in the background. The text tells a personal history of the writing technologies that dominated the narrator's life from the time she was a small girl to the time she was an adult, a personal history that is inevitably enmeshed in larger political and national histories. The story begins with the narrator relating her first encounter with a computer, which "LOOKS LIKE A SMALL REFRIGERATOR." She continues, "JUST A GIRL, I THINK ITS MONITOR WITH ITS DIM GLOW, FOR A TV—WEIRD TV SHOW," a naive yet perfectly accurate description of the computer, which has long tried to emulate the TV's ability to masquerade as a window onto an alternate reality.

Immediately after this observation, the narrator provides a description of the only two distinct age markers in her life. The first is the day her father "LEAVES FOR THE MINISTRY AND NEVER COMES HOME. THAT HAPPENS WHEN I'M THIRTEEN." Following this unsettling statement, which leaves the reader wondering whether the father's use of the computer (which he also forbade his daughter to touch, whether for reasons related to her gender or not is unclear) somehow ran counter to the political regime of his day and whether it was connected with his disappearance, the narrator declares:

"WHEN I'M TWENTY I GO ABROAD TO STUDY. I TYPE ON A KEYBOARD WITH A REPEATING SPACE BAR. PRETTY ADVANCED FOR THE PRICE, THE SALESMAN TELLS ME, AND NOT BAD CONSIDERING MOST STUDENTS STILL WRITE THEIR PAPERS BY HAND." Only one or two minutes into this seemingly simple coming-of-age story, we already see how the history of writing technologies is intertwined with surveillance, gender, capitalism, and cultural difference.

As the story unfolds, the narrator then recounts the day that a man appeared at her door, introduced himself as a countryman, and handed her a laptop computer as a gift from "MY LITTLE COMMUNITY." She continues: "BEFORE I CAN RESPOND HE TURNS ON THE COMPUTER'S LITTLE BLACK AND WHITE SCREEN AND SHOWS ME HOW TO USE IT." Then, our visual experience of the piece shifts as the main black text on a white background literalizes the content of the story. At this point the narrator tells of being introduced to fax and e-mail. Recalling the disappearance of her father early on in the story, underlying each introduction of a new writing technology is an ever-present surveillance. First, distant relatives whom she did not inform she had a computer began to call and scold her for not sending them faxes, and then, once she had the ability to e-mail, she was informed by the same countryman that a small fee would be deposited in her account for every e-mail she sent. The narrator ends her story with her return home and her discovery that she now sets off airport security alarms. Shortly after noticing a pain in her abdomen, the narrator came to discover that a Samsung Z-3000 computer chip had been implanted inside her—a computer chip, the text tells us, that is commonly used in global positioning systems or in special collars attached to endangered species for tracking. (Samsung is also, of course, one of the largest Korean-based companies and also claims to have "pioneered the digital age." In the early 1990s they were the largest producer of memory chips in the world.) The piece ends with the narrator claiming she avoids going places where she might set off alarms, staying instead at

airport hotels, which are both familiar and exotic—as if she's gone to "A FAR OFF PLACE THAT'S BOTH NOWHERE AND SOMEWHERE."

The meaning of the storyline in *Traveling to Utopia: With a Brief History of the Technology* is as unlocatable as the piece's interface, or its representations of interfaces to comment on interfaces. It is a piece simultaneously of and not of cinema, the Internet, the typewriter, the command-line interface, the windows interface. It is also part fictionalized biography and part allegory for the ways in which access to the contemporary digital world—especially the Web, as I discuss in the postscript—is carefully surveilled and determined by corporations and political maneuverings.

More, alongside work by Memmott, Morrissey, and Nelson, we can read YHCHI's work as a pointed response to the increasing prevalence of invisible interfaces that prevent any kind of making or doing beyond those surface-level activities that are strictly delimited by the interface. With an aesthetic that is either clean or messy, these authors' use of difficulty and defamiliarization by way of digital writing interfaces works against the way in which digital media and their interfaces are becoming increasingly invisible even while these interfaces increasingly define what and how we read/write.