for a sabbatical in 2007 and the support and unfailing good humor of English Department chair Thomas Wortham. As always, my family provided much-needed support. My greatest debt is to my husband Nicholas Gessler, collector extraordinaire and my constant collaborator in all matters technical, as indeed in life itself.

CHAPTER ONE

Electronic Literature

What Is It?

The Scriptorium was in turmoil. Brother Paul, the precentor in charge, had detected a murmur from the back row and, furious that the rule of silence was being compromised, strode down the aisle just in time to see Brother Jacob tuck something under his robe. When he demanded to see it, Brother Jacob shamefacedly produced a codex, but not one that the antiquarii of this monastery had copied—or of any monastery, for this Psalter was printed. *Shocked as much by the sight of the mechanical type as by Brother Jacob's transgression, Brother Paul so far forgot himself that he too broke the silence, thundering that if books could be produced by fast, cheap, and mechanical means, their value as precious artifacts would be compromised. Moreover, if any Thomas, Richard, or Harold could find his way into print, would not writing itself be compromised and become commonplace scribbling? And how would the spread of cheap printed materials affect the culture of the Word, bringing scribbling into every hut and*

hovel whose occupants had hitherto relied on priests to interpret writing for them? The questions hung in the air; none dared imagine what answers the passing of time would bring.

This fanciful scenario is meant to suggest that the place of writing is again in turmoil, roiled now not by the invention of print books but the emergence of electronic literature. Just as the history of print literature is deeply bound up with the evolution of book technology as it built on wave after wave of technical innovations, so the history of electronic literature is entwined with the evolution of digital computers as they shrank from the room-sized IBM 1401 machine on which I first learned to program (sporting all of 4K memory) to the networked machine on my desktop, thousands of times more powerful and able to access massive amounts of information from around the world. The questions that troubled the Scriptorium are remarkably similar to issues debated today within literary communities. Is electronic literature really literature at all? Will the dissemination mechanisms of the internet and the Web, by opening publication to everyone, result in a flood of worthless drivel? Is literary quality possible in digital media or is electronic literature demonstrably inferior to the print canon? What large-scale social and cultural changes are bound up with the spread of digital culture, and what do they portend for the future of writing?[1]

These questions cannot be answered without first considering the contexts that give them meaning and significance, and that implies a wide-ranging exploration of what electronic literature is, how it overlaps and diverges from print, what signifying strategies characterize it, and how these strategies are interpreted by users as they go in search of meaning. In brief, one cannot begin to answer the questions before thoroughly

exploring and understanding the specificities of digital media. To see electronic literature only through the lens of print is, in a significant sense, not to see it at all. This chapter aims to provide (some of) the context that will open the field of inquiry so that electronic literature can be understood as both partaking of literary tradition and introducing crucial transformations that redefine what literature is.

Electronic literature, generally considered to exclude print literature that has been digitized, is by contrast "digital born," a first-generation digital object created on a computer and (usually) meant to be read on a computer. The Electronic Literature Organization, whose mission is to "promote the writing, publishing, and reading of literature in electronic media," convened a committee headed by Noah Wardrip-Fruin, himself a creator and critic of electronic literature, to come up with a definition appropriate to this new field. The committee's choice was framed to include both work performed in digital media and work created on a computer but published in print (as, for example, was Brian Kim Stefans's computer-generated poem "Stops and Rebels"). The committee's formulation reads: "work with an important literary aspect that takes advantage of the capabilities and contexts provided by the stand-alone or networked computer."

As the committee points out, this definition raises questions about which capabilities and contexts of the computer are significant, directing attention not only toward the changing nature of computers but also to the new and different ways in which the literary community mobilizes these capabilities. The definition is also slightly tautological in that it assumes preexisting knowledge of what constitutes an "important literary aspect." Although tautology is usually regarded as a cardinal sin by definition writers, in this case the tautology seems appropriate, for electronic literature arrives on the scene after

five hundred years of print literature (and, of course, even longer manuscript and oral traditions). Readers come to digital work with expectations formed by print, including extensive and deep tacit knowledge of letter forms, print conventions, and print literary modes. Of necessity, electronic literature must build on these expectations even as it modifies and transforms them. At the same time, because electronic literature is normally created and performed within a context of networked and programmable media, it is also informed by the powerhouses of contemporary culture, particularly computer games, films, animations, digital arts, graphic design, and electronic visual culture. In this sense electronic literature is a "hopeful monster" (as geneticists call adaptive mutations) composed of parts taken from diverse traditions that may not always fit neatly together. Hybrid by nature, it comprises a "trading zone" (as Peter Galison calls it in a different context) in which different vocabularies, expertises, and expectations come together to see what might emerge from their intercourse.[2] This hybridity is vividly on display in the *Electronic Literature Collection*. Of the sixty works in the *ELC*, perhaps a third have no recognizable words, virtually all have important visual components, and many have sonic effects as well. By calling these works "literature," my co-editors and I hope to stimulate questions about the nature of literature in the digital era. Must an artistic work contain words (or sounds that draw on words, such as the protosemantic art of "sound poetry," as Steve McCaffrey calls it)? I would argue that although we may well wish to retain this criterion of verbal art for "literature," we need a broader category that encompasses the kind of creative work on display in the *ELC*. I propose "the literary" for this purpose, defining it as creative artworks that interrogate the histories, contexts, and productions of literature, including as well the verbal art of literature proper. The

significance of designating "the literary" as central to literary studies is beyond the scope of my discussion here. Nevertheless, even a casual acquaintance with major movements in the literary studies in the last half-century will immediately confirm that the discipline, in embracing cultural studies, postcolonial studies, popular culture, and many other fields, has been moving toward the broader category of "the literary" for some time. Now, at the dawn of the twenty-first century, we are poised to extend the interrogations of the literary into the digital domain. Hence this book's subtitle, "New Horizons for the Literary." The works in the *ELC*, and more generally the entire field of electronic literature, test the boundaries of the literary and challenges us to rethink our assumptions of what literature can do and be.

GENRES OF ELECTRONIC LITERATURE

In the contemporary era, both print and electronic texts are deeply interpenetrated by code. Digital technologies are now so thoroughly integrated with commercial printing processes that print is more properly considered a particular output form of electronic text than an entirely separate medium. Nevertheless, electronic text remains distinct from print in that it literally cannot be accessed until it is performed by properly executed code. The immediacy of code to the text's performance is fundamental to understanding electronic literature, especially to appreciating its specificity as a literary and technical production. Major genres in the canon of electronic literature emerge not only from different ways in which the user experiences them, but also from the structure and specificity of the underlying code. Not surprisingly, then, some genres have come to be known by the software used to create and perform them.

The varieties of electronic literature are richly diverse, spanning all the types associated with print literature and adding some genres unique to networked and programmable media. Readers with only a slight familiarity with the field, however, will probably identify it first with hypertext fiction characterized by linking structures, such as Michael Joyce's *afternoon: a story,*[3] Stuart Moulthrop's *Victory Garden,*[4] and Shelley Jackson's *Patchwork Girl.*[5] These works are written in Storyspace, the hypertext authoring program first created by Michael Joyce, Jay David Bolter, and John B. Smith and then licensed to Mark Bernstein of Eastgate Systems, who has improved, extended, and maintained it. So important was this software, especially to the early development of the field, that works created in it have come to be known as the "Storyspace school." Intended as stand-alone objects, Storyspace works are usually distributed as CDs (earlier as disks) for Macintosh or PC platforms and, more recently, in cross-platform versions. Along with Macintosh's Hypercard, it was the program of choice for many major writers of electronic literature in the late 1980s and 1990s. As the World Wide Web developed, new authoring programs and methods of dissemination became available. The limitations of Storyspace as a Web authoring program are significant (for example, it has a very limited palette of colors and cannot handle sound files that will play on the Web). Although Storyspace continues to be used to produce interesting new works, it has been eclipsed as the primary Web authoring tool for electronic literature.

With the movement to the Web, the nature of electronic literature changed as well. Whereas early works tended to be blocks of text (traditionally called "lexia")[6] with limited graphics, animation, colors, and sound, later works make much fuller use of the multimodal capabilities of the Web; while the hypertext link is considered the distinguishing feature of the

earlier works, later works use a wide variety of navigation schemes and interface metaphors that tend to deemphasize the link as such. In my keynote speech at the 2002 Electronic Literature Symposium at UCLA, these distinctions led me to call the early works "first-generation" and the later ones "second-generation," with the break coming around 1995.[7] To avoid the implication that first-generation works are somehow superseded by later aesthetics, it may be more appropriate to call the early works "classical," analogous to the periodization of early films.[8] Shelley Jackson's important and impressive *Patchwork Girl* can stand as an appropriate culminating work for the classical period. The later period might be called "contemporary" or "postmodern" (at least until it too appears to reach some kind of culmination and a new phase appears).

As the varieties of electronic literature expanded, hypertext fictions also mutated into a range of hybrid forms, including narratives that emerge from a collection of data repositories such as M. D. Coverley's *Califia* and her new work *Egypt: The Book of Going Forth by Day;*[9] the picaresque hypertext *The Unknown* by Dirk Stratton, Scott Rettberg, and William Gillespie, reminiscent in its aesthetic of excess to Kerouac's *On the Road;*[10] Michael Joyce's elegantly choreographed Storyspace work *Twelve Blue,* disseminated on the Web through the Eastgate Hypertext Reading Room;[11] Caitlin Fisher's *These Waves of Girls,* including sound, spoken text, animated text, graphics, and other functionalities in a networked linking structure;[12] Stuart Moulthrop's multimodal work *Reagan Library,* featuring QuickTime movies with random text generation;[13] *The Jew's Daughter* by Judd Morrissey in collaboration with Lori Talley, with its novel interface of a single screen of text in which some passages are replaced as the reader mouses over them;[14] Talan Memmott's brilliantly designed and programmed *Lexia to Perplexia;*[15] and Richard Holeton's parodic

Frequently Asked Questions about Hypertext, which in Nabokovian fashion evolves a narrative from supposed annotations to a poem,[16] along with a host of others. To describe these and similar works, David Ciccoricco introduces the useful term "network fiction," defining it as digital fiction that "makes use of hypertext technology in order to create emergent and recombinatory narratives."[17]

Interactive fiction (IF) differs from the works noted above in having stronger game elements.[18] The demarcation between electronic literature and computer games is far from clear; many games have narrative components, while many works of electronic literature have game elements. (As a pair of mirror phrases in Moulthrop's *Reagan Library* puts it, "This is not a game" and "This is not not a game.") Nevertheless, there is a general difference in emphasis between the two forms. Paraphrasing Markku Eskelinen's elegant formulation, we may say that with games the user interprets in order to configure, whereas in works whose primary interest is narrative, the user configures in order to interpret.[19] Since interactive fiction cannot proceed without input from the user, Nick Monfort in *Twisty Little Passages: An Approach to Interactive Fiction,* the first book-length scholarly study of IF, prefers the term "interactor."[20] In his pioneering study, Montfort characterizes the essential elements of the form as consisting of a parser (the computer program that understands and replies to the interactor's inputs) and a simulated world within which the action takes place. The interactor controls a player character by issuing commands. Instructions to the program, for example asking it to quit, are called "directives." The program issues replies (when the output refers to the player character) and reports (responses directed to the interactor, asking for example if she is sure she wants to quit).

Alternating game play with novelistic components, interactive fictions expand the repertoire of the literary through a variety of techniques, including visual displays, graphics, animations, and clever modifications of traditional literary devices. In Emily Short's *Savoir-Faire,* for example, solving many of the IF puzzles requires the user to make a leap of inference from one device to another that resembles it in function; for example, if a door and box are properly linked, opening the box also opens the door, which otherwise will not yield.[21] Such moves resemble the operation of literary metaphor, although here the commonality is routed not through verbal comparison of two objects but rather functional similarities combined with the player character's actions—a kind of embodied metaphor, if you will. In subtle ways, IF can also engage in self-referential commentary and critique. In Jon Ingold's *All Roads,* the player character is a teleporting assassin, William DeLosa, over whom the interactor discovers she has minimal control.[22] The allusion evoked by the title ("all roads lead to Rome") suggests that the imperial power here is the author's capacity to determine what the interactor will experience. The player character's vocation can thus be interpreted to imply that the metatextual object of assassination is the illusion that hypertext is synonymous with democracy and user empowerment.

Donna Leishman spins a variant of interactive fictions in her work, where the visual interface invites game-like play but without the reward structure built into most interactive fictions. Her striking visual style, exemplified by *Deviant: The Possession of Christian Shaw,* combines primitivism with a sophisticated visual sensibility, contemporary landscapes with a narrative originating in the seventeenth century.[23] Rather than striving to progress by solving various puzzles and mysteries,

the interactor discovers that the goal is not reaching the end (although there is a final screen providing historical context for the visual narrative), but rather the journey itself. The literariness (as distinct from the gaming aspect) is instantiated in the work's dynamics, which are structured to project the interactor inside the troubled interior world of Christian Shaw. With no clear demarcation between Christian's perceptions and exterior events, the work deconstructs the boundary between subjective perception and verifiable fact.

While works like *Deviant* use perspective to create the impression of a three-dimensional space, the image itself does not incorporate the possibility of mobile interactivity along the Z-axis. The exploration of the Z-axis as an additional dimension for text display, behavior, and manipulation has catalyzed innovative work by artists such as David Knoebel, Ted Warnell, Aya Karpinska, Charles Baldwin, Dan Waber, and John Cayley. In a special issue of *Iowa Review Web* guest-edited by Rita Raley,[24] these artists comment on their work and the transformative impact of the Z-axis. One need only recall Edward Abbott's *Flatland* to imagine how, as text leaps from the flat plane of the page to the interactive space of the screen, new possibilities emerge.[25]

One kind of strategy, evident in Ted Warnell's intricately programmed JavaScript work *TLT vs. LL*, is to move from the word as the unit of signification to the letter. The letters are taken from email correspondence with Thomas Lowe Taylor and Lewis Lacook (the sources for TLT and LL), with the "vs." indicating contestations translated in the work from the level of semantic content to dynamic interplay between visual forms. In "Artist's Statement: Ted Warnell," he comments that the breakthrough for him was thinking of the "vs." as "taking the form of 'rising' (coming to top/front) rather than 'pushing' (as if it were) from left/right."[26] Consequently, the emphasis

shifts to a dynamic surface in which rising and sinking motions give the effect of three dimensions as the layered letter forms shift, move, and reposition themselves relative to other letters, creating a mesmerizing, constantly mutating dance of competing and cooperating visual shapes.[27]

David Knoebel's exquisitely choreographed "Heart Pole," from his collection "Click Poetry," features a circular globe of words, with two rings spinning at 90 degrees from one another, "moment to moment" and "mind absorbing." A longer narrative sequence, imaged as a plane undulating in space, can be manipulated by clicking and dragging. The narrative, focalized through the memories of a third-person male persona, recalls the moment between waking and sleeping when the narrator's mother is singing him to sleep with a song composed of his day's activities. But like the slippery plane that shifts in and out of legibility as it twists and turns, this moment of intimacy is irrevocably lost to time, forming the "heart pole" that registers both its evocation and the on-goingness that condemns even the most deeply seated experiences to loss.[28]

The next move is from imaging three dimensions interactively on the screen to immersion in actual three-dimensional spaces. As computers have moved off the desktop and into the environment, other varieties of electronic literature have emerged. Whereas in the 1990s email novels were popular, the last decade has seen the rise of forms dependent on mobile technologies, from short fiction delivered serially over cell phones to location-specific narratives keyed to GPS technologies, often called "locative narratives." In Janet Cardiff's *The Missing Voice (Case Study B)* (1996), for example, the user listened to a CD played on a Walkman keyed to locations in London's inner city, tracing a route that takes about forty-five minutes to complete; *Her Long Black Hair* was specific to New York City's Central Park and included photographs as

well as audio narratives.[29] Blast Theory's *Uncle Roy All Around You* combined a game-like search for Uncle Roy, delivered over PDAs, with participants searching for a postcard hidden at a specific location.[30] Meanwhile, online observers could track participants and try to help or confuse them, thus mixing virtual reality with actual movements through urban spaces.

The complements to site-specific mobile works, which foreground the user's ability to integrate real-world locations with virtual narratives, are site-specific installations in which the locale is stationary, such as a CAVE virtual reality projection room or gallery site. In their specificity and lack of portability such works are reminiscent of digital art works, although in their emphasis on literary texts and narrative constructions they can easily be seen as a species of electronic literature. Like the boundary between computer games and electronic literature, the demarcation between digital art and electronic literature is shifty at best, often more a matter of the critical traditions from which the works are discussed than anything intrinsic to the works themselves.[31]

Pioneering the CAVE as a site for interactive literature is the creative writing program at Brown University spearheaded by Robert Coover, himself an internationally known writer of experimental literature. At the invitation of Coover, a number of writers have gone to Brown to create works for the CAVE, including John Cayley, Talan Memmott, Noah Wardrip-Fruin, and William Gillespie. Works produced there include Cayley's *Torus* (2005) in collaboration with Dmitri Lemmerman; Memmott's "E_cephalopedia//novellex" (2002); Wardrip-Fruin's *Screen* with Josh Carroll, Robert Coover, Shawn Greenlee, and Andrew McClain (2003);[32] and Gillespie's *Word Museum* with programming by Jason Rodriguez and David Dao.[33] Performed in a three-dimensional space in which the user wears virtual reality goggles and manipulates a wand, these works

enact literature not as a durably imprinted page but as a full-body experience.

Screen, with introduction narrated by Robert Coover, illustrates the potential of this work. As it begins, the user hears Coover read the words "In a world of illusions, we hold ourselves in place by memories" and sees text displayed on the three vertical CAVE walls in billboard fashion. The texts, one by a female narrator and one by a male, relate memories that slip away even as the narrators try to hold onto them. This narrative theme becomes enacted in a startlingly literal way when words suddenly begin peeling away from the walls and moving in the three-dimensional space. The user can try to bat them back into place with the data glove, but more words peel off faster than she put them back, despite her best efforts. Moreover, the batted words move along trajectories difficult to control, creating neologisms, nonsense words, and chaotic phrases that further make the text difficult to read. Eventually all the words lay jumbled on the floor, the text now impossible to recover for "normal" reading. In another sense, of course, the work has redefined what it means to read, so that reading becomes, as Rita Raley has pointed out, a kinesthetic, haptic, and proprioceptively vivid experience, involving not just the cerebral activity of decoding but bodily interactions with the words as perceived objects moving in space.[34]

Entering the narrative now does not mean leaving the surface behind, as when a reader plunges into an imaginative world and finds it so engrossing that she ceases to notice the page. Rather, the "page" is transformed into a complex topology that rapidly transforms from a stable surface into a "playable" space in which she is an active participant. "Playable media," a term coined by Noah Wardrip-Fruin to denote computer games and other interactive works such as *Screen*, accurately expresses the user's engagement with the game-like

aspects of the work.[35] In effect, *Screen* performs a historical trajectory arcing from a print-like reading surface that invites the reader to enter an imaginative world to complex topologies that constantly reenact, with every movement and change of spatial orientation, a computationally intense environment. In this environment, the barely perceptible lag times remind the user that nothing happens without the incredibly rapid calculations that are continuously generating the perceived environment, creating an interface in which a human user cooperates and competes with intelligent machines.

If memories hold us in place, as *Screen*'s introduction suggests, the engagement of human and machine cognizers shakes us out of our accustomed place of reading to an active encounter that hints at the place of the human in the contemporary world. The enchanced sensory range that such works as *Screen* entail is not without cost. CAVE equipment, costing upward of a million dollars and depending on an array of powerful networked computers and other equipment, is typically found only in Research 1 universities and other elite research sites. Because of the high initial investment and continuing programming and maintenance costs, it is usually funded by grants to scientists. Of the few institutions that have this high-tech resource, even fewer are willing to allocate precious time and computational resources to creative writers. Literature created for this kind of environment will therefore likely be experienced in its full implementation only by relatively few users (although some idea of the works can be gained from the QuickTime documentation that Cayley and others have created for their CAVE pieces), thus sacrificing the portability, low cost, robust durability, and mass distribution that made print literature a transformative social and cultural force.[36] Nevertheless, as conceptual art pushing the boundary of what

literature can be, this kind of coterie electronic literature has an impact beyond the technology's limitations. Moreover, the Brown programming team has recently developed a spatial hypertext authoring system that allows authors to create and edit their works using a representation of the CAVE on their laptops, with capabilities to link text, images, 3-D photographs and videos, and 3-models.[37] This development could be used not only to create but also to view CAVE works. Although it is too soon to know the impact of this software, it has the potential greatly to increase the audience and impact of CAVE productions.

Like the CAVE productions, interactive dramas are often site specific, performed for live audiences in gallery spaces in combination with present and/or remote actors. Many of these dramas proceed with a general script outlining the characters and the initiating action (sometimes the final outcome will also be specified), leaving the actors to improvise the intervening action and plot. In a variation on this type of performance, M. D. Coverley coordinated *M Is for Nottingham* as a trAce project in July 2002. Writers, including Coverley and Kate Pullinger, joined in collaborative writing at a website preceding the Incubation 2 Conference in Nottingham, riffing on the murder mystery genre to create a story revolving around the "death" of the book. During the conference the denouement was acted out by volunteers in costume, thus adding a component of live dramatic production. At SIGGRAPH 2006, *Unheimlich,* a collaborative telematic performance created by Paul Sermon, Steven Dixon, Mathias Fucs, and Andrea Zapp, was performed mixing audience volunteers (among them the media artist Bill Seaman) placed against a bluescreen background on which were projected images of actors improvising at a remote location.[38] Mixing the virtual and the real within

a loose dramatic framework, *Unheimlich* created a borderland that encouraged playful innovation and improvisational collaboration.

Interactive drama can also be performed online. Michael Mateas and Andrew Stern's *Façade* (2005) has a graphical interface and is programmed in ABL (A Behavior Language), which they devised to structure the action into "beats."[39] The drama situates the user as a dinner guest of a couple, Grace and Trip, celebrating their tenth wedding anniversary. Although the couple appears prosperous and happy, in *Who's Afraid of Virginia Woolf* fashion, cracks soon develop in the façade. The user can intervene in various ways, but all paths lead to an explosion at the end, a programming choice that maintains intact the Aristotelian plot structure of a beginning, middle, and end.

How to maintain such conventional narrative devices as rising tension, conflict, and denouement in interactive forms where the user determines sequence continues to pose formidable problems for writers of electronic literature, especially narrative fiction. Janet Murray's entertaining and insightful *Hamlet on the Holodeck* was one of the first critical studies to explore this issue in depth, surveying a wide variety of forms, including hypertext fiction, computer games, and interactive drama. With her usual acuity, she accurately diagnoses both sides of the question. "Giving the audience access to the raw materials of creation runs the risk of undermining the narrative experience," she writes, while still acknowledging that "calling attention to the process of creation can also enhance the narrative involvement by inviting readers/viewers to imagine themselves in the place of the creator."[40]

Marie-Laure Ryan, in *Avatars of Story*,[41] pioneers a transmedial approach to narrative that seeks to construct a comprehensive framework for narrative in all media, consisting

of simulative, emergent, and participatory models. She further constructs a taxonomy for narratives specifically in New Media that takes into account textual architecture and the actions and positions of the user, which she types as three binaries describing interactivity: internal/external, exploratory/ontological, and external/exploratory. Like Murray, she notes the tension between the top-down approach to narrative in which the narrator spins a story, and the bottom-up model of interactivity in which the user chooses how the story will be told.

The response to this tension in electronic literature has been a burst of innovation and experimentation, with solutions ranging from the guard fields of classic Storyspace works (in which certain conditions must be met before a user can access a given lexia) to the Aristotelian constraints of *Façade*. Even where multiple reading pathways exist, many interactive works still guide the user to a clear sense of conclusion and resolution, such as Deena Larsen's *Disappearing Rain*[42] and M. D. Coverley's *Califia*. Nevertheless, the constraints and possibilities of the medium have encouraged many writers to turn to nonnarrative forms or to experiment with forms in which narratives are combined with randomizing algorithms.

An important spokesperson for these approaches is Loss Pequeño Glazier, a poet and critic who has established the Electronic Poetry Center, which along with Kenneth Goldsmith's Ubuweb is one of the premier online sites for electronic poetry on the Web.[43] In his book *Digital Poetics: Hypertext, Visual-Kinetic Text and Writing in Programmable Media*, Glazier argues that electronic literature is best understood as a continuation of experimental print literature.[44] In his view, the medium lends itself to experimental practice, especially to forms that disrupt traditional notions of stable subjectivities and ego-centered discourses. Although he underestimates the

ways in which narrative forms can also be disruptive, Glazier nevertheless makes a strong case for electronic literature as an experimental practice grounded in the materiality of the medium. Moreover, he practices what he preaches. His *White-Faced Bromeliads on 20 Hectares*[45] uses JavaScript to investigate literary variants, with new text generated every ten seconds. The procedure disrupts narrative poetic lines with disjunctive juxtapositions that derail the line midway through, resulting in suggestive couplings and a sense of dynamic interplay between the prescripted lines and the operations of the algorithm. The combination of English and Spanish vocabularies and the gorgeous images from Latin American locations further suggest compelling connections between the spread of networked and programmable media and the transnational politics in which other languages contest and cooperate with English's hegemonic position in programming languages and, arguably, in digital art as well.

Generative art, whereby an algorithm is used either to generate texts according to a randomized scheme or to scramble and rearrange preexisting texts, is currently one of the most innovative and robust categories of electronic literature.[46] Philippe Bootz has powerfully theorized generative texts, along with other varieties of electronic literature, in his functional model that makes clear distinctions between the writer's field, the text's field, and the reader's field, pointing out several important implications inherent in the separation between these fields, including the fact that electronic literature introduces temporal and logical divisions between the writer and reader different from those enforced by print.[47] Bootz also usefully points out that in a European context hypertext has not been the dominant mode but rather textual generators and animated works, citing particularly the group of writers associated with A.L.A.M.O. (Atelier de Littérature Assistee par le

Mathematique et les Ordinateurs, or Workshop of Literature Assisted by Mathematics and Computers), which includes among others Jean-Pierre Balpe, and the group with which he is associated, L.A.I.R.E. (Lecture, Art, Innovation, Recherche, Écriture, or Reading, Art, Innovation, Research, Writing).[48] Bootz has pioneered many seminal works of generative and animated literature dating from the 1980s, including recently *La série des U (The Set of U)*,[49] an elegant poem with text, pictures, and programming by Bootz and music by Marcel Frémiot. The work generates a different text-that-is-seen (texte-à-voir) each time it is played through subtle variations in the timing at which the textual elements appear and the relation between the verbal text and the sonic component, which is not directly synchronized with the words but nevertheless gives the serendipitous impression of coordination through programmed meta-rules.

American explorations of generative text include Noah Wardrip-Fruin's *Regime Change* and *News Reader*, created in collaboration with David Durand, Brion Moss, and Elaine Froehlich, works that Wardrip-Fruin calls "textual instruments" (a designation to which we will return). Both pieces begin with news stories (for *Regime Change*, President Bush's claim that Saddam Hussein had been killed, and for *News Reader*, the headlined stories in Yahoo.com), then employ the *n*-gram technique pioneered by Claude Shannon to find similar strings in the source and target documents, using them as bridges to splice together the two texts.[50] Naming such works "instruments" implies that one can learn to play them, gaining expertise as experience yields an intuitive understanding of how the algorithm works. Other randomizing algorithms are used by Jim Andrews in such works as *On Lionel Kearns*,[51] which splices extracts from the poems of Canadian writer Lionel Kearns to create scrambled texts, accompanied

by amusing and effective visualizations that function as interpretations of Kearns's work.

As Andrews, Kearns, and Wardrip-Fruin acknowledge, these works are indebted to William Burroughs's notion of the "cut-up" and "fold-in." They cite as theoretical precedent Burroughs's idea that randomization is a way to break the hold of the viral word and liberate resistances latent in language by freeing it from linear syntax and coherent narrative.[52] Other notable instances of randomizing works are Jim Andrews's *Stir Fry Texts*, in which collaborators used Andrews's "Stir Fry" algorithm to randomize their texts;[53] *When You Reach Kyoto*, a visual/verbal collaboration by Geniwate and Brian Kim Stefans;[54] Millie Niss and Martha Deed's *Oulipoems;*[55] and Patrick-Henri Burgaud's *Jean-Pierre Balpe ou les Lettres Dérangées*, a tribute to the earlier mentioned poet and software developer Jean-Pierre Balpe (also a pioneer in text generation algorithms) in which the work performs as a textual instrument that the user can manipulate.[56] If tenacious (and lucky), the user will find the "deranged" letters assuming coherency at the end, where "this is not the end" appears across Balpe's bibliography.

Just as the twentieth century saw an explosion of interest in the book as a medium, with an impressive canon of artists' books and other experimental practices exploring the potential of the book as an artistic and literary venue, so electronic literature has seen a growing body of work that interrogates networked and programmable media as the material basis for artistic innovation and creation. "Code work," a phrase associated with such writers as Alan Sondheim, MEZ (Mary Ann Breeze), and Talan Memmott and with critics such as Florian Cramer, Rita Raley, and Matthew Fuller, names a linguistic practice in which English (or some other natural language) is hybridized with programming expressions to create a creole

evocative for human readers, especially those familiar with the denotations of programming languages. "Code work" in its purest form is machine readable and executable, such as Perl poems that literally have two addressees, humans and intelligent machines. More typical are creoles using "broken code," code that cannot actually be executed but that uses programming punctuation and expressions to evoke connotations appropriate to the linguistic signifiers.[57] Replete with puns, neologisms, and other creative play, such work enacts a trading zone in which human-only language and machine-readable code are performed as interpenetrating linguistic realms, thus making visible on the screenic surface a condition intrinsic to all electronic textuality, namely the intermediating dynamics between human-only languages and machine-readable code.[58] By implication, such works also reference the complex hybridization now underway between human cognition and the very different and yet interlinked cognitions of intelligent machines, a condition that Talan Memmott has brilliantly evoked in *Lexia to Perplexia* with neologisms like "remotional" and "I-terminal."

The conjunction of language with code has stimulated experiments in the formation and collaboration of different kinds of languages. Diane Reed Slattery, Daniel J. O'Neil, and Bill Brubaker's *The Glide Project* enacts the visual language of Glide, which can be seen and performed as gestures in a dance but cannot be spoken because the semicircular shapes comprising it have no verbal equivalents, only clusters of denotations, functioning in this respect somewhat like ideographic languages.[59] Other experiments traversing the borderland between gestural and verbal languages have been performed by Sha Xin Wei and collaborators in *TGarden*,[60] where virtual reality technologies are used to record the movements of dancers as they attempt to create new gestural vocabularies, a topic

brilliantly explored by Carrie Noland in "Digital Gestures" analyzing digital works that evoke embodied gestures.[61] Such experiments in multiple and interrelated semiotic systems are both enabled by and reflective of the underlying fact that behaviors, actions, sounds, words, and images are all encoded as bits and ultimately as voltage differences. Another kind of interrogation of the conjunction between code and language has been explored by John Cayley through procedures that he calls "transliteral morphing," algorithms that transform source texts into target words letter by letter, a strategy that emphasizes the discreteness of alphabetic languages and its similarities to the discreteness of digital code[62] (see chapter 4 for an extended discussion). In *riverIsland,* Cayley uses transliteral morphing to juxtapose different translations of Chinese poems, comparing and contrasting the discreteness of alphabetic languages with the more analogue forms of Chinese morphographic language systems.[63]

The multimodality of digital art works challenges writers, users, and critics to bring together diverse expertise and interpretive traditions so that the aesthetic strategies and possibilities of electronic literature may be fully understood. Some writers, for example Thom Swiss, prefer to find graphic artists as collaborators. Others, such as Stephanie Strickland in her elegantly choreographed and playfully imagined hypertextual poem "The Ballad of Sand and Harry Soot," incorporate images by artists, including in this case the beautiful mechanized sand sculptures of Jean Pierre Hebert and Bruce Shapiro.[64] Still others who think of themselves as primarily graphic artists and programmers write texts to incorporate into their works; I would put Jason Nelson's playful and imaginative net art into this category, including his haunting *Dreamaphage,* with its bizarre narratives and childlike yet somehow ominous graphics.[65] Still others who come to digital media from backgrounds as print writers, such as M. D. Coverley, are on steep upward learning curves in which their visual and graphic sensibilities are rapidly becoming as accomplished as their verbal expertise (compare, for example, the design qualities of *Califia* with the stunning graphic design of *Egypt: The Book of Coming Forth by Day*). From a critical point of view, works that appear in both print and electronic instantiations, such as Stephanie Strickland's innovative poetry book *V: Wave Son.Nets/Losing l'Una* and the Web work *V:Vniverse*, programmed in Director in collaboration with Cynthia Lawson, illustrate that when a work is reconceived to take advantage of the behavioral, visual, and/or sonic capabilities of the Web, the result is not just a Web "version" but an entirely different artistic production that should be evaluated in its own terms with a critical approach fully attentive to the specificity of the medium.[66] Moreover, in a few cases where the print and digital forms are conceptualized as one work distributed over two instantiations, as is the case with *V*, possibilities for emergent meanings multiply exponentially through the differences, overlaps, and convergences of the instantiations compared with one another. Other notable works that have appeared in different media instantiations include Lance Olsen's *10:01*, first published as a print hypertext and then transformed into a Web work in collaboration with Tim Guthrie,[67] and Geoff Ryman's *253* that made the opposite transition from Web hypertext to print book.[68]

As such works make vividly clear, the computational media intrinsic to electronic textuality have necessitated new kinds of critical practice, a shift from literacy to what Gregory L. Ulmer calls "electracy."[69] The tendency of readers immersed in print is to focus first on the screenic text, employing strategies that have evolved over centuries through complex interactions between writers, readers, publishers,

editors, booksellers, and other stakeholders in the print medium. For readers who do not themselves program in computational media, the temptation of reading the screen as a page is especially seductive. Although they are of course aware that the screen is not the same as print, the full implications of this difference for critical interpretation are far from obvious. Moreover, the shift from print to programmable media is further complicated by the fact that compositional practices themselves continue to evolve as the technology changes at a dizzying pace.

Among the critical voices exploring the new territories of networked and programmable media are many practitioner-critics whose astute observations have moved the field forward, including among others John Cayley, Loss Pequeño Glazier, Alan Sondheim, Brian Kim Stefans, and Stephanie Strickland.[70] Among those who work on the critical interpretation of electronic media, Florian Cramer, Rita Raley, Matthew Fuller, Ian Bogost, Mark B. N. Hansen (whose work is discussed in more detail in chapter 3), Adalaide Morris, and Matthew Kirschenbaum deserve special mention for their insistence on the specificity of networked and programmable media.[71] At the same time, these critics also build bridges linking digital art, literature, and games on the one hand, and traditional critical practice and philosophical writing on the other. In my view the optimal response requires both of these moves at once—recognizing the specificity of new media without abandoning the rich resources of traditional modes of understanding language, signification, and embodied interactions with texts.

Exemplifying this kind of critical practice is Matthew Kirschenbaum's *Mechanisms: New Media and Forensic Textuality*. Drawing an analogy with the scrutiny bibliographers and textual critics lavish on print texts, Kirschenbaum argues that

close examination of electronic objects is necessary fully to comprehend the implications of working with digital media. And look closely he does, all the way down to microscopic images of bit patterns on the disk substrate. He parses the materiality of digital media as consisting of two interrelated and interacting aspects: forensic materiality and formal materiality. Whereas forensic materiality is grounded in the physical properties of the hardware—how the computer writes and reads bit patterns, which in turn correlate to voltage differences—formal materiality consists of the "procedural friction or perceived difference . . . as the user shifts from one set of software logics to another" (ms. 27). Using the important distinction that Espen J. Aarseth drew in *Cybertext: Perspectives on Ergodic Literature*[72] between scriptons ("strings as they appear to readers") and textons ("strings as they exist in the text") (62), Kirschenbaum pioneers in *Mechanisms* a methodology that connects the deep print reading strategies already in effect with scriptons (letters on the page, in this instance) to the textons (here the code generating the screenic surface). He thus opens the way for a mode of criticism that recognizes the specificity of networked and programmable media without sacrificing the interpretive strategies evolved with and through print.

Stephanie Strickland, an award-winning print poet who has created significant work in digital media, has a keen sense both of literary tradition and of how criticism needs to change to accommodate digital media. In "Writing the Virtual: Eleven Dimensions of E-Poetry,"[73] she focuses on the ways in which E-poetry achieves dynamism, leading her to coin the neologism "poietics" (from "poetry" and "poiïsis," the Greek work for "making"). With succinct brilliance and a wide spectrum of examples, Strickland emphasizes thematic emergences, such as the emphasis on ruins; new processes of user psychology,

such as the "intense attachment" users experience at sites of interaction; and new configurations of physical parameters, such as the manifestation of time as "active, stratigraphic, and topologic," leading to the conclusion that time is "written multiply" (1). Recombinant flux using computational writing engines and generators is part of this dynamism, reflecting a desire, she argues, to create works that instantiate in their operations the incredibly swift operations of code and the deterministic and yet aleatory operations of digital networks.

The intermixture of code and language on which recombinant flux depends is situated within a more general set of practices in which human thinking and machine execution collaborate to produce literary works that reference both cognitive modes. Any work that uses algorithmic randomizers to generate text relies to a greater or lesser extent on the surprising and occasionally witty juxtapositions created by these techniques. It should be noted that algorithmic procedures are not unique to networked and programmable media. Before personal computers became as ubiquitous as dust mites, writers in print media were using a variety of techniques to achieve similar results, as Florian Cramer points out in *Words Made Flesh: Code, Culture, Imagination*. Jim Rosenberg's *Diagram* series poems, for example, in which the user can manipulate shapes representing grammatical relationships such as verbs and conjunctions, were implemented first on paper and only later in computer code.[74] Other works using algorithmic procedures in print media include Raymond Queneau's *Cent mille milliards de poèmes*, John Cage's mesostics, and Jackson Mac Low's *The Virginia Woolf Poems*.[75]

Brian Kim Stefans implicitly referenced this tradition when he published his computer poem "Stops and Rebels" in his print collection of essays, *Fashionable Noise: On Digital Poetics*, along with extensive annotations available only in

the print version.[76] In these annotations, which amount to a hyperlinked essay, he meditates on the conjunction of human and machine cognition. He anthropomorphizes the computer program that generated the poem by calling it the "Demon." The Demon, Stefans notes, is involved in a two-way collaboration: between the programmer who works with the limitations and possibilities of a computer language to create the program, and between the user and the computer when the computer poem is read and interpreted. Both collaborations invoke and enact the creative (mis)understandings and (mis)-prisings that emerge from the overlaps and disjunctions between humans as meaning-seeking animals and intelligent machines for which meaning is constructed in very different contexts than human-only language. This dimension of randomized electronic works distinguishes them from print works associated with algorithmic operations. A given work may, of course, ignore this specificity in its explicit textual content. Nevertheless, the conditions in which a work is created, produced, disseminated, and performed *always* mark it in distinctive ways that provide openings for critical interrogation and media-specific analysis, as Matthew Kirschenbaum decisively demonstrates in *Mechanisms*.

The collaboration between the creative imagination of the (human) writer and the constraints and possibilities of software is the topic of Ian Bogost's *Unit Operations: An Approach to Videogame Criticism*, in which he develops an extended analogy between the unit operations of object-oriented programming and a literary approach that explores the open, flexible, and reconfigurable systems that emerge from the relations between units.[77] In a sense, literary criticism has long regarded print works as enacting these kinds of systems, infinitely reconfigurable as critical attention shifts focus from one kind of textual parsing to another. By redescribing traditional

interpretations as "unit operations," Bogost builds a framework in which computer object-oriented programming can be seen as a related and interpenetrating domain with video games (his central focus), print literature, and electronic literature.

As Bogost's approach suggests, taking programming languages and practices into account can open productive approaches to electronic literature, as well as other digital and nondigital forms. The influence of software is especially obvious in the genre of the Flash poem, characterized by sequential screens that typically progress with minimal or no user intervention. (There are, however, exceptions to this practice, notably the Flash poem "Errand upon Which We Came,"[78] a collaboration between Stephanie Strickland and M. D. Coverley in which the authors include on principle possibilities for user intervention and choice.) Brian Kim Stefans's "The Dreamlife of Letters,"[79] although highly unusual in its stunning virtuosity, is in this sense more typical. Asked to respond to a theoretically dense piece by Rachel Blau DuPlessis, Stefans liberated the words from their original context by alphabetizing them and parsing them into thirty-six groups. He then choreographed the groups with different behaviors in a tour de force of animation and visualization. The eleven-minute Flash work playfully brings out, in Concrete fashion, the implications and connotations of the sexually laden language of the original, as well as new implications that emerge from the juxtapositions created by the alphabetized text. As the letters and words dance, stretch, collapse, fall, conjoin, separate, seduce, and swirl, it is as though the morphemes and phonemes of language have themselves acquired an eroticized graphic imagination, a collective unconscious capable of feeling and expressing desire—that is to say, of dreaming.

Robert Kendall's "Faith," although 180 degrees athwart from "The Dreamlife of Letters" in sensibility and theme, like Stefans's visual poem uses the computer's multimodal capabilities to create a work in which color, animation, music, and timed sequence collaborate with the verbal text to create signification.[80] The work proceeds in five stages (four of which are distinctly color coded in orange, red, burgundy, and black/grey respectively), layering letters and words onto previously existing ones to create new meanings. For example, the orange "logic" from the first stage is interpolated in the second stage into "I edge/ logic/ out," with the new letters appearing in red; in the third stage, "edge" transforms into "hedge," with the new letter appearing in burgundy. As the words change position and become interpolated into new texts, they retain a hint of their previous significations through the colors that link them to their earlier appearances. The effect creates a palimpsest that visually performs the vacillations the lyric voice verbally articulates as it oscillates between logic and faith.

Young-Hae Chang Heavy Industries (YHCHI), a Seoul-based collaboration between Young-Hae Chang and Marc Voge, follows a different aesthetic strategy in creating Flash works where the emphasis falls mainly on the text, music, and timed sequence, with animation and color playing subsidiary roles. In *Dakota,* for example, black text on a white background proceeds in rhythmic syncopation to the jazz music of Art Blakey, evoking both a Kerouac-like road trip and Ezra Pound's first two *Cantos.*[81] Jessica Pressman classifies this work as "digital modernism," a phrase describing electronic works that emphasize their connection with modernist print texts.[82] In YHCHI's *Nippon* (discussed in more detail in chapter 3) a similar aesthetic strategy is used to narrate the story of a Japanese woman who entertains salarymen in an after-hours

bar, with Japanese ideograms in red and English in black appearing on the successive screens, choreographed to a Japanese folk song by R. Taki.[83] While alluding to print predecessors, this time-based work also performs its difference from a codex book in its rhythmic pace synchronized to the music tempo and operating outside the user's control.

Hypertext fiction, network fiction, interactive fiction, locative narratives, installation pieces, "codework," generative art, and the Flash poem are by no means an exhaustive inventory of the forms of electronic literature, but they are sufficient to illustrate the diversity of the field, the complex relations that emerge between print and electronic literature, and the wide spectrum of aesthetic strategies that digital literature employs. Having been a widely visible presence only for some two decades (although its predecessors stretch back at least to the computer poems of the early 1960s, and far beyond this in the print tradition), electronic literature has already produced many works of high literary merit that deserve and demand the close attention and rigorous scrutiny critics have long practiced with print literature. Such close critical attention requires new modes of analysis and new ways of teaching, interpreting, and playing. Most crucial, perhaps, is the necessity to "think digital," that is, to attend to the specificity of networked and programmable media while still drawing on the rich traditions of print literature and criticism.

ELECTRONIC LITERATURE IS NOT PRINT

Paying attention to the ways in which electronic literature both extends and disrupts print conventions is a neat trick, and the criticism is littered with those who have fallen prey to Scylla or Charybdis, ballyhooing its novelty or failing to see

the genuine differences that distinguish it from print. After a generation of spirited debate it is now possible to see the landscape more clearly, in part because we are able to build on the path-breaking work of those who came before. Early hypertext theorists, notably George Landow and Jay David Bolter,[84] stressed the importance of the hyperlink as electronic literature's distinguishing feature, extrapolating from the reader's ability to choose which link to follow to make extravagant claims about hypertext as a liberatory mode that would dramatically transform reading and writing and, by implication, settings where these activities are important, such as the literature classroom. Given the major works of electronic literature that then loomed large, particularly Michael Joyce's *afternoon: a story* and Stuart Moulthrop's *Victory Garden*, this emphasis was understandable, for these works consist mainly of screens of text with very limited graphics, no animation, and no sound.

One problem with identifying the hyperlink as electronic literature's distinguishing characteristic was that print texts had long also employed analogous technology in such apparati as footnotes, endnotes, cross-reference, and so on, undermining the claim that the technology was completely novel. Perhaps a more serious problem, however, was the association of the hyperlink with the empowerment of the reader/user. As a number of critics have pointed out, notably Espen J. Aarseth, the reader/user can only follow the links that the author has already scripted.[85] Moreover, in a work like *afternoon: a story*, looping structures are employed from which there is no escape once the reader has fallen into them, short of closing the program and beginning again. Compared to the flexibility offered by the codex, which allows the reader complete freedom to skip around, go backward as well as forward, and open the book wherever she pleases, the looping struc-

tures of electronic hypertexts and the resulting repetition forced on the reader/user make these works by comparison more rather than less coercive. As Aarseth astutely observed, interactivity in this early criticism "is a purely ideological term, projecting an unfocused fantasy rather than a concept of any analytical substance" (51).

A corollary to the emphasis on multiple reading paths was the connection Landow and Bolter forged between deconstruction and electronic literature. In the heady days when deconstruction was seen as a bold strike against foundational premises, hypertext was positioned as the commonsense implementation of the inherent instabilities in signification exposed by deconstructive analysis. Hypertext, Bolter wrote in his seminal book *Writing Space*, takes "the sting out of deconstruction."[86] In conflating hypertext with the difficult and productive aporias of deconstructive analysis, these theorists failed to do justice either to the nuanced operations of works performed in electronic media or to the complexities of deconstructive philosophy. Nevertheless, both theorists have made important contributions, and their books remain landmarks in the field. Moreover, both have significantly revised their earlier work to take into account the rapidly changing technology and additional insights it catalyzed. In the second edition of *Writing Space*, subtitled *Computers, Hypertext, and the Remediation of Print*, Bolter incorporates insights from the important work he co-authored with Richard Grusin, *Remediation: Understanding New Media*, which posits and extensively illustrates the recursive dynamic between immediacy and hypermediation in New Media.[87] Landow similarly has twice revised his original text, considerably expanding his insights and adding new material to take account of the Web in *Hypertext 2.0: The Convergence of Contemporary Critical*

Theory and Technology and of globalization in *Hypertext 3.0: Critical Theory and New Media in an Era of Globalization.*[88]

The shortcomings of importing theoretical assumptions developed in the context of print into analyses of electronic media were vividly brought to light by Espen J. Aarseth's important book *Cybertext: Explorations of Ergodic Literature.* Rather than circumscribe electronic literature within print assumptions, Aarseth swept the board clean by positing a new category of "ergodic literature," texts in which "nontrivial effort is required to allow the reader to traverse the text" (1). Making a different analytical cut through textual groupings that included computer games, print literature, and electronic hypertexts, among others, Aarseth established a grid comprised of eight different operators, many of which have purchase mostly with electronic texts rather than print. The grid yields a total of 576 different positions on which a variety of different kinds of texts can be located.[89] Although the method has limitations, notably that it is blind to content and relatively indifferent to the specificity of media, it has the tremendous virtue of demonstrating that electronic texts cannot simply be shoved into the same tent with print without taking into account their different modes of operation. These innovations have justifiably made *Cybertext* a foundational work for the study of computer games and a seminal text for thinking about electronic literature.[90] Markku Eskelinen's work, particularly "Six Problems in Search of a Solution: The Challenge of Cybertext Theory and Ludology to Literary Theory," further challenges traditional narratology as an adequate model for understanding ergodic textuality, making clear the need to develop frameworks that can adequately take into account the expanded opportunities for textual innovations in digital media. Proposing variations on Gérard Genette's narratologi-

cal categories, Eskelinen demonstrates, through a wide variety of ingenious suggestions for narrative possibilities that differ in temporal availability, intertextuality, linking structures, and so on, how Aarseth's ergodic typology can be used to expand narratology so it would be more useful for ergodic works in general, including digital works.[91]

Similar ground clearing was undertaken by Lev Manovich in his influential *The Language of New Media*.[92] Although his emphasis is primarily on cinema rather than electronic literature, his "five principles of new media" have helped to define the distinctiveness of new media forms in contrast to print and other electronic media such as broadband television.[93] Four of the five follow in straightforward fashion, respectively, from the binary basis for digital computers (numerical representation), object-oriented programming (modularity and variability), and networked architectures with sensors and actuators (automation). The deepest and most provocative for electronic literature is the fifth principle of "transcoding," by which Manovich means the importation of ideas, artifacts, and presuppositions from the "cultural layer" to the "computer layer" (46). Although it is too simplistic to posit these "layers" as distinct phenomena (because they are in constant interaction and recursive feedback with one another), the idea of transcoding nevertheless makes the crucial point that computation has become a powerful means by which preconscious assumptions move from such traditional cultural transmission vehicles as political rhetoric, religious and other rituals, gestures and postures, literary narratives, historical accounts, and other purveyors of ideology into the material operations of computational devices. This is such an important insight that, although space does not allow me to develop it fully here, I will return to it later to indicate briefly some of the ways in which it is being explored.[94]

With these ground-clearing arguments, new opportunities became available to rethink the specificities of print and electronic literature and to explore their commonalities without collapsing one into the other. Loss Pequeño Glazier's *Digital Poetics*, cited earlier, argues that the materiality of practice is crucial both to experimental print literature and to innovative electronic work. As he and others have argued, notably Matthew Kirschenbaum, John Cayley, and Matthew Fuller, code must be considered as much a part of the "text" of electronic literature as the screenic surface. Web pages, for example, rely on HTML, XML, or similar markup languages to be properly formatted. Alexander Galloway in *Protocol* puts the case succinctly: "*Code is the only language that is executable*" (emphasis in original).[95] Unlike a print book, electronic text literally cannot be accessed without running the code. Critics and scholars of digital art and literature should therefore properly consider the source code to be part of the work, a position underscored by authors who embed in the code information or interpretive comments crucial to understanding the work.

Jerome McGann, whose work on the Rossetti Archive[96] and contributions to the Institute of Advanced Technology in the Humanities (IATH) at the University of Virginia have made him a leading figure in the field, turns this perspective on its head in *Radiant Textuality: Literature after the World Wide Web* by arguing that print texts also use markup language, for example, paragraphing, italics, indentation, line breaks, and so forth.[97] Although this point somewhat muddies the waters in that it conflates operations performed by the reader with those performed by the computer, it nevertheless establishes common ground between scholars interested in bibliographic and textual criticism of print works and those oriented to close examination of digital texts. Also contributing to building

bridges between digital protocols and close-reading practices is *The Ivanhoe Game*, a joint project of Johanna Drucker and Jerome McGann, now being developed at Speculative Computing Laboratory at the University of Virginia.[98] Part literary criticism, part creative play, and part computer game, *The Ivanhoe Game* invites participants to use textual evidence from a given literary text to imagine creative interpolations and extrapolations, facilitated through a computer interface.[99] Noah Wardrip-Fruin and David Durand follow similar lines of inquiry in *Cardplay*, a program that uses virtual playing cards to create the script of a play. Similar projects are Mark Bernstein's *Card Shark* and *Thespis*, systems to create hypertext narrative using AI techniques.[100] As with *Regime Change* and *News Reader* discussed earlier, Wardrip-Fruin and Durand call these programs "textual instruments," likening them both to computer games and musical instruments.

Complementing studies focusing on the materiality of digital media are analyses that consider the embodied cultural, social, and ideological contexts in which computation takes place. Although a full account of this body of work is beyond the scope of this discussion, a few seminal studies should be noted. Mark B. N. Hansen, focusing more on digital arts than electronic literature, makes powerful arguments for the role of the embodied perceiver as not only a necessary site for the reception of digital art work but as a crucial aspect foregrounded by works that literally do not make sense without taking embodiment into account.[101] Working the opposite side of the street, so to speak, is Friedrich A. Kittler's emphasis on the genealogy of technology as a formative force in its own right.[102] Kittler's controversial opening line in the preface to *Gramophone, Film, Typewriter*, "Media determine our situation," although not unproblematic, suggests the larger contours within which electronic literature can be seen as a

cultural force helping to shape subjectivity in an era when networked and programmable media are catalyzing cultural, political, and economic changes with unprecedented speed[103] (the work of these two theorists is discussed in detail in chapter 3). Writing on New Media poetics, Adalaide Morris aptly discusses this aspect of digital literature by commenting that it articulates for us what we already in some sense know.[104] To this I would add it creates practices that help us know more about the implications of our contemporary situation. Much as the novel both gave voice to and helped to create the liberal humanist subject in the seventeenth and eighteenth centuries, so contemporary electronic literature is both reflecting and enacting a new kind of subjectivity characterized by distributed cognition, networked agency that includes human and nonhuman actors, and fluid boundaries dispersed over actual and virtual locations (a topic explored further in chapter 4).

Located within the humanities by tradition and academic practice, electronic literature also has close affinities with the digital arts, computer games, and other forms associated with networked and programmable media. It is also deeply entwined with the powerful commercial interests of software companies, computer manufacturers, and other purveyors of apparatus associated with networked and programmable media. How and in what ways it should engage with these commercial interests is discussed in Alan Liu's magisterial work *The Laws of Cool: Knowledge Work and the Culture of Information*.[105] Liu urges a coalition between the "cool"—designers, graphic artists, programmers, and other workers within the knowledge industry—and the traditional humanities, suggesting that both camps possess assets essential to cope with the complexities of the commercial interests that currently determine many aspects of how people live their everyday lives in developed societies. Whereas the traditional

humanities specialize in articulating and preserving a deep knowledge of the past and engage in a broad spectrum of cultural analyses, the "cool" bring to the table expert knowledge about networked and programmable media and intuitive understandings of contemporary digital practices. Electronic literature, requiring diverse orientations and rewarding both contemporary and traditional perspectives, is one of the sites that can catalyze these kinds of coalitions. Realizing this broader possibility requires that we understand electronic literature not only as an artistic practice (though it is that, of course), but also as a site for negotiations between diverse constituencies and different kinds of expertise.

Among these constituencies are theorists and researchers interested in the larger effects of network culture. Of the very large number of studies that have appeared in recent years, I will mention two to illustrate the kinds of scholarship that should rightly fall within the domain of electronic literature. First is Alexander Galloway and Eugene Thacker's *The Exploit*, a work that builds on Gilles Deleuze's notion of the control society[106] and Michael Hardt and Antonio Negri's *Empire* and *Multitude*[107] to argue that the materiality, rhetorical force, and structure of the network provide the basis for new kinds of political power and oppression while also opening possibilities for new modes of theoretical analysis and political resistance.[108] Complementing their study is Rita Raley's *Tactical Media*, a brilliant analysis of a systemic shift from strategy to tactics in contemporary political resistance as enacted by a diverse group of artistic computer games, online art works, and art installations. Adrian Mackenzie's *Cutting Code: Software as Sociality* studies software as collaborative social practice and cultural process.[109] Analyzing a range of technical practices from Unix operating systems to extreme programming, *Cutting Code* explores how social forms, subjectivities, materialities, and power relations entwine in the creation, marketing, and use of software.

Mackenzie's work serves as a salutary reminder that just as one cannot understand the evolution of print literature without taking into account such phenomena as the court decisions establishing legal precedent for copyright and the booksellers and publishers who helped promulgate the ideology of the creative genius authoring the great work of literature (for their own purposes, of course), so electronic literature is evolving within complex social and economic networks that include the development of commercial software, the competing philosophy of open source freeware and shareware, the economics and geopolitical terrain of the internet and World Wide Web, and a host of other factors that directly influence how electronic literature is created and stored, sold or given away, preserved or allowed to decline into obsolescence.

PRESERVATION, ARCHIVING, AND DISSEMINATION

Over the centuries, print literature has developed mechanisms for its preservation and archiving, including libraries and librarians, conservators, and preservationists. Unfortunately, no such techniques exist for electronic literature. The situation is exacerbated by the fluid nature of digital media; whereas books printed on good quality paper can endure for centuries, electronic literature routinely becomes unplayable (and hence unreadable) after a decade or even less. The problem exists for both software and hardware. Commercial programs can become obsolete or migrate to new versions incompatible with older ones, and new operating systems (or altogether new machines) can appear on which older works will not play. With a foreshortened canon limited to a few years and without the

opportunity to build the kinds of traditions associated with print literature, electronic literature risks being doomed to the realm of ephemera, severely hampered in its development and the influence it can wield.

The Electronic Literature Organization has taken a proactive approach to this crucial problem with the Preservation, Archiving and Dissemination Initiative (PAD). Part of that initiative is realized in the *Electronic Literature Collection,* volume 1, co-edited by Nick Montfort, Scott Rettberg, Stephanie Strickland, and me, featuring sixty works of recent electronic literature and other scholarly resources. Collecting innovative, high-quality work is an important step forward in opening electronic literature up to a wider audience and moving it into the classroom. (I am frequently asked by colleagues how they can find "the good stuff" among the immense flood of works available on the Web; now there is an easy—albeit still very partial—answer to that question.) It is anticipated that the *ELC* will continue on a biennial basis, with each subsequent volume compiled by an editorial collective that will take responsibility for soliciting important works and making them available in accessible cross-platform formats.

Another part of the PAD initiative is this chapter, which appears in essay form at the ELO website. By attempting to give a recognizable shape to this fast-moving and diverse community of artists, writers, designers, programmers, and critics and to the works they create and interpret, I hope this essay will also interest specialists who may be familiar with one or more areas of electronic literature but not necessarily with the field as a whole. The essay is part of a triad of critical works commissioned by the Electronic Literature Organization as part of the PAD initiative, joining two white papers published at the ELO site, "Acid-Free Bits" by Nick Montfort and Noah Wardrip-Fruin,[110] and "Born-Again Bits" by Alan Liu, David

Durand, Nick Montfort, Merrilee Proffitt, Liam R. E. Quin, Jean-Hughes Rety, and Noah Wardrip-Fruin.[111] While this essay focuses on surveying the field (and thus on dissemination), the two white papers are centrally concerned with preserving and archiving electronic literature.

"Acid-Free Bits" offers advice to authors to help them "find ways to create long-lasting elit, ways that fit their practice and goals" (3). The recommendations include preferring open systems to closed systems, choosing community-directed systems over corporate driven systems, adhering to good programming practices by supplying comments and consolidating code, and preferring plain-text to binary formats and cross-platform options to single-system options. Since electronic literature does not have the economic clout to convince commercial developers to ensure its continuing viability on their platforms, it is simply good sense to prefer open systems to closed. Likewise, plain-text formats will remain human-readable while binary formats will not, and cross-platform options increase the availability of works to interested audiences. These commonsense recommendations make available to writers and authors issues they can consider at the beginning of projects, before substantial time and resources are invested in options that may prove damaging to long-term preservation and costly to change, once the work has been implemented.

More encompassing, and even more visionary, is the proposal in "Born-Again Bits" for the "X-Literature Initiative." The basic premise is that XML (Extensible Markup Language) will continue to be the most robust and widespread form of Web markup language into the foreseeable future. Working from this assumption, the proposal envisions a set of practices and tools that will enable older electronic literature to be migrated to XML for preservation, facilitate XML compliant authoring, ensure the inclusion of appropriate metadata to allow

works properly to be identified and archived, develop tools for the easy reading, annotating, and teaching of electronic literature, and provide authors with applications for creating electronic literature in X-Lit formats. The scope here is breathtaking, and if even a portion of the proposal can be successfully implemented, the contribution to the preservation, dissemination, and archiving of electronic literature will be immense.

The X-Literature Initiative makes startlingly clear that the formation we know as "literature" is a complex web of activities that includes much more than conventional images of writing and reading. Also involved are technologies, cultural and economic mechanisms, habits and predispositions, networks of producers and consumers, professional societies and their funding possibilities, canons and anthologies designed to promote and facilitate teaching and learning activities, and a host of other factors. All of these undergo significant transformation with the movement into digital media. Exploring and understanding the full implications of what the transition from page to screen entails must necessarily be a community effort, a momentous task that calls for enlightened thinking, visionary planning, and deep critical consideration. It is in these wide and capacious senses that electronic literature challenges us to rethink what literature, and the literary, can do and be.

Intermediation

From Page to Screen

Literature in the twenty-first century is computational. As noted in chapter 1, almost all print books are digital files before they become books; this is the form in which they are composed, edited, composited, and sent to the computerized machines that produce them as books. They should, then, properly be considered as electronic texts for which print is the output form. Although the print tradition of course influences how these texts are conceived and written, digitality also leaves its mark, notably in the increased visuality of such best-selling novels as Mark Danielewski's brilliant hypertext novel *House of Leaves*, Jonathan Safran Foer's *Extremely Loud and Incredibly Close*, and Salvador Plascencia's *The People of Paper*,[1] texts whose dynamics are explored in chapter 5. The computational nature of twenty-first century literature is most evident, however, in electronic literature. More than being marked by digitality, electronic literature is actively formed by it. For those of us interested in the present state of literature and where it might be going, electronic literature raises complex, diverse, and compelling issues. In what senses is electronic literature in dynamic interplay with computational media, and what are the effects