Cyberspace Textuality

Computer Technology and Literary Theory

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Introduction

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No situation could be worse than that in which the cultured men and women isolate themselves in the territory of the alphabetical text and leave the language of tomorrow into the hands of technicians and salesmen.
—Pierre Lévy, "Toward Superlanguage"

Varieties of Computer-Supported Texts

Recent advances in computer technology, such as world-spanning information networks, virtual reality, multimedia communication, and the digitization of texts, have led to the development of a computer culture that is quickly becoming a major force in the humanities. The term "cyberspace" captures the growing sense that beyond—or perhaps on—the computer screen lies a "New Frontier" both enticing and forbidding, a frontier awaiting exploration, promising discovery, threatening humanistic values, hatching new genres of discourse, altering our relation to the written word, and questioning our sense of self and of embodiment. The purpose of this book is to explore the concepts of text and the forms of textuality currently emerging from the creative chaos of electronic technologies.

Computers were once thought of as number-crunching machines; but for most of us it is their ability to create worlds and process words that have made them into a nearly indispensable part of life. If computers are everywhere, it is because they have grown into "poetry machines."[1] The digital revolution of the last decade has let words on the loose, not just by liberating their semantic potential, as most avant-garde movements of the past hundred years have done, but in a physical, quite literal sense as well. Information patterns travel incessantly inside and outside the machine, from disk storage to active memory to output devices to other computer sites. At the end of their journey through cyberspace—each packet of information following its own itinerary—

bit patterns reorganize themselves into letters, words, and texts. Hopefully into meanings. Sometimes the words on the loose become malleable substance in our hands, as we grab them with a hand-shaped cursor, move them, erase them, banish and recall them, pull more words from under words, cut them out and paste them into a new context; sometimes they become actors and dancers on the stage of the computer screen, animated by the script of an invisible program; sometimes they fail to regroup at the end of their trip, and the screen fills up with garbage, dismembered text, visual nonsense, or surrealistic graphics. Whether we play with them or watch them perform for us, whether we control them or they rebel against us, electronic words never stand still for long, never settle down on a page, even when a copy is sent to the printer; for the printer merely outputs a lifeless replica, a still photograph of objects in motion.

The new forms of discourse and literary genres born out of computer technology can be classified into three categories, depending on the role of the computer. The machine can function as author or co-author, as medium of transmission or as space of performance—what Brenda Laurel calls the computer as theater. At the time of this writing, the genres of electronic textuality include the following:

The Computer as (Co-)Author

In the seventies and eighties, when Artificial Intelligence was the leading application of computing power—triggering the hope or fear that machines would soon replace humans—the potential contribution of computers to literature was generally envisioned as the production of text. This production does not necessarily mean that the human factor is excluded; as Espen Aarseth has observed (348), computer-generated literature is a collaboration between man and machine in which the computer can play three roles: output a blueprint for the human partner to translate into literary language, produce text in a live dialogue with the user, or perform various operations on a human-composed text. The human partner will be respectively post-processor, co-processor, and pre-processor. These projects may be intended as literary experiments, to be judged by the aesthetic value of the product, or they may be conceived as contributions to cognitive science. The output may be a standard print text, or exist exclusively in an electronic environment. (This last case is discussed under "Computer-modulated texts" below.) Here are examples of the three types of collaboration:

CLASSICAL ARTIFICIAL INTELLIGENCE: THE COMPUTER AS OUTLINE-GENERATOR. This category is illustrated by the story-generating programs developed in the seventies and eighties as contributions to AI. (The best-known is Tale-Spin by James Meehan.) What matters in these projects is not their output *per se*—usually mediocre imitations of standard types of narrative such as fables or fairy tales—but the reasoning power of the generative algorithm and its credibility as a simulation of human creative processes. In the most intelligent story-generating programs, the variety and quality of the output is out of proportion with the complexity of the algorithm. One of the most recent projects in the field, for instance, Scott Turner's MINSTREL, needs 10,000 lines of code to generate the plotline of a dozen different King Arthur stories of half a page each. These stories read like this:

> Once upon a time, a knight named Lancelot loved a princess named Andrea. Lancelot saw Andrea kiss a knight named Frederick. Lancelot believed that Andrea loved Frederick. Lancelot wanted to be the love of Andrea. But he could not because Andrea loved Frederick. This caused him to make a hasty decision. Later, he discovered that his hasty decision was incorrect. He wished he could take back what he did. But he couldn't. (Turner 183)

This story-outline poses little threat to win a Pulitzer prize, even if it is brilliantly rewritten by a human author, but the project is considered significant from a cognitive point of view because it begins with a small amount of knowledge, and is able to expand this database into stories through powerful logical and analogical reasoning.

ALTERNATIVE ARTIFICIAL INTELLIGENCE: TEXT PRODUCED IN A DIALOGUE BETWEEN COMPUTER AND USER. Here the prototypical example is ELIZA, a computer program written in 1966 by Joseph Weizenbaum. Its purpose was not to produce literature, but to "test the limits of a computer's conversational capacity" (Turkle 105) by simulating a dialogue between a patient (the user) and a psychotherapist (ELIZA). ELIZA was remarkable for its ability to carry on a reasonably coherent conversation without using any sophisticated language-parsing techniques. Rather than building a syntactic and semantic representation of the user's input, as do programs seriously aiming at language understanding, it relied on rather crude strategies, such as detecting key words, recycling the user's input, responding with canned formulae, or abruptly changing the topic. Yet despite the system's total lack of understanding of the human mind, ELIZA's conversation was clever enough to fascinate users. The program is now revered as the pioneer of a new brand of AI known as "alternative." In this new brand, faking intelligence and passing as human is more important than emulating thinking. The most advanced successor of ELIZA is Julia, a robot

developed at Carnegie Mellon University who enlivens a MOO with her opinionated conversation.[2]

TEXT MANIPULATION: THE COMPUTER AS POSTPROCESSOR. The texts of this category are mostly intended as experimental literature. Their generation owes nothing to AI: words and textual fragments are manipulated as opaque objects, not as meaning-bearing units. A computer program fabricates text out of ready-made texts by searching a database for elements fitting certain patterns (rhymes, palindromes, anagrams) or by subjecting the input text(s) to various aleatory procedures, such as collage and permutations. In an automated version of the Mad Lib party game, words may be randomly selected from the database and pasted into human-made templates, thereby producing the surrealistic effect of "exquisite cadavers." The poetry of John Cage offers a good illustration of these various techniques. In a work titled *I-V*, which produces a print text, a program generates "mesostric strings" (internal acrostics) by selecting a word from a list and locating its individual letters in quotations randomly chosen from another list. In the output text, the capitalized letters of the mesostric string are centered in the middle of the page on the vertical axis, surrounded on the horizontal axis by the "wing words" of the quoted source texts (Perloff 208).

The Computer as Medium of Transmission

The texts of this group are not radically new forms of writing, but electronic implementations of already established genres. Though the computer functions primarily as channel of transmission, it is by no means a passive medium. As it facilitates certain operations, the machine fosters new reading and writing habits which can lead to significant stylistic and pragmatic differences between electronic genres and their print counterparts.

DIGITIZED PRINT TEXTS. Should the digitization of texts written to be printed—for instance, of the novels of Jane Austen—be regarded as a genre in its own right, or is it merely a new mode of storage? Some theorists of electronic culture (especially Lanham) have argued that the phenomenology of reading is radically altered when print texts are transferred to the electronic medium: "What happens when a text moves from the page to the screen? First, the digital text becomes unfixed and interactive. The reader can change it, become writer" (31). There is no denying that we can perform different operations on a digitized text than on a printed one: rewrite parts of it without leaving

physical traces of this activity, reformat it, change its font, cut into it and paste the cuts elsewhere, establish electronic links with other texts, and so on. Some of these activities change the appearance of the text, others place it in a different context, and still others modify "the text" of the text. But is this still reading, or using the text for other kinds of games? Regarding the digitized text as generically different from its printed counterpart presupposes that "text" is not so much a collection of linguistic signs produced for the sake of being read as an activity kit, a set of possible operations including reading, among many others. According to this position, altering an electronic text does not create a different text, but actualizes the potential for transformation that results from its digitization.

ASYNCHRONOUS COMMUNICATION THROUGH COMPUTER NETWORKS: E-MAIL AND POSTINGS TO USER-INTEREST GROUPS. Here users do not interact live, in contrast to Internet chatrooms and MOO conversations (see below), but compose and send messages which will be kept in the semi-permanent storage of a bulletin board or an electronic mailbox. These texts are less durable and therefore less binding than handwritten and printed messages, yet they allow more time for planning and editing than live conversation. As they lessen the writer's sense of responsibility for the form and contents of the message, electronic mail and postings encourage informality, brainstorming, and the throwing of ideas on the forum for the pure sake of testing the reactions of the audience. Discussion groups are a stage for performance, where success is measured by the number of responses to a posting.

TREE FICTION AND COLLABORATIVE LITERATURE. Tree fiction is one of those ideas that can be realized in print or handwriting, but receives a boost from the ability of electronic telecommunications to establish contacts between physically remote people with common interests. Many tree fiction projects are currently being developed on the World Wide Web.[3] Like hypertext, tree fictions use electronic linking to join fragments of text and create forks in the plot, but their structure allows no returns to former decision points and no merging of paths. Since every branch in the plot is kept strictly separate from the others, it is relatively easy to maintain narrative continuity and logical coherence. In contrast to more densely linked forms of hypertext, every traversal of a story tree from the common root node to a terminal node should thus yield a well-formed linear plot with a definite beginning, and striving toward a definite ending. In the tree fiction projects of the Internet, more explicitly than in any other context, the purpose of reading is to

become a writer. The user reads along a branch until he finds a suitable point for a contribution. Depending on the insertion point, his contribution may either initiate a new fork in the plot, or add text at the end of a branch. Collaborative literary projects can also take the form of a network of autonomous texts. This is the case in Robert Coover's literary MOO, the Hypertext Hotel.[4] Users are invited to add permanent texts to the system, and the rooms of the structure function as storage for their contributions, rather than as meeting places for real-time conversation.

ELECTRONIC SERIALS. This genre is exemplified by *The Spot*, a soap opera on the World Wide Web[5] which follows the daily lives of the five habitants of a California beach house. A new installment in the diary of the characters is posted every day. Each character is "played" by a writer responsible for his or her diary, but since the characters interact in the plot, the global coherence of the story line must be ensured through advance planning by the whole cast. Besides reading the entries, the visitor of the site can view pictures, buy merchandise, access summaries of past episodes, and send e-mail offering advice to the characters on how to live their life or suggestions to their writers on how to develop the plot. The writers/characters are supposed to respond personally to their fan mail. This interaction opens the possibility of a mild form of collaboration between writers and readers. It also leads to a transgression of the traditional ontological boundaries between readers and characters, since readers can write to characters.

The Computer as Theater

Here the text cannot be divorced from the electronic environment, because it exploits some of the specific features of its hardware and software support: fluid visual displays, interactive algorithms, structured databases, randomizing capabilities, and a "real-time" mode of operation which potentially turns every run of the text-animating program into a unique performance. In the following genres, electronic writing truly comes into its own:

HYPERTEXT. In this best-known of electronic genres, text is broken into fragments ("lexias," "textrons") and stored in a network whose nodes are connected by electronic links. A fragment typically contains a number of different links, offering the reader a choice of directions to follow. By letting readers determine their own paths of navigation through the database, hypertext promotes what is customarily regarded as a non-

linear mode of reading. (Multilinear would be more appropriate, since reading always requires a sequential parsing.) Hyperlinks are not only used in experimental literary fiction, they can also build multimedia networks of autonomous documents relating to a certain topic (e.g., George Landow's *Dickens Web*). Since it facilitates access to information, the device provides an efficient searching tool through a database, such as on-line help files or the World Wide Web. Through its structured network of choices, hypertext stands halfway between texts that impose a strictly sequential reading order (traditional novels) and texts with a totally free mode of access (encyclopedias, texts written on cards that can be shuffled).[6] The "follow the links" idea can be implemented in print (*Choose Your Own Adventures* books; novels with multiple reading sequences, such as Julio Cortázar's *Hopscotch*), but these texts merely break the surface of a much deeper ground. The Codex book allows with great difficulty what comes easily for the computer: the bound format stands in the way of jumping around the text. This is why we should not categorize hypertext as the electronic implementation of a print genre, but rather, regard print texts with multiple reading sequences as the embryo of an electronic genre.

MUDS AND MOOS. Sherry Turkle calls them a "new form of collectively written literature" (11) but for John Perry Barlow they are "CB radio, only typing."[7] These diverging opinions concern multi-user computer games (MUDs) or social meeting places (MOOs) accessible through the Internet. On a MOO, users design and play a character through purely textual commands, interacting with other characters on a stage set up by the system or by the more experienced users. The MOO system relies on both permanent descriptions of the setting (typically a building consisting of many rooms furnished with various objects), and evanescent speech acts. These two types of discourse encourage two types of activity: exploring the setting by activating the textual descriptions stored by the system; and communicating in real time with other characters by typing dialogue or action-describing statements, which count as the live performance of these actions.

INTERACTIVE DRAMA. This term refers to applications of virtual reality technology (VR) designed for the entertainment of the participant. Interactive Drama allows a considerable range of variations. It can take the form of a multimedia version of the MOO (or conference room), in which physically distant users meet and converse in a virtual landscape under fictional identities; of dramatic performances placing the spectator in a computer-generated setting, where she listens to or interacts

with live actors; or of an electronic theme park ride, during which the user explores a fantastic virtual world populated with computer-simulated characters. In its most utopian form, Interactive Drama would be a fully automated production, in which users would impersonate characters in a dialogue with AI-driven agents. The script would allow users to "choose what to do, say, and think at all times" (Kelso et al. 2), thus letting them influence the direction of the plot, but their actions would nevertheless be controlled by the system, so that every choice would result in an aesthetically pleasing and narratively well-formed dramatic action. This type of production, if ever implemented, would realize the age-old dream of abolishing the differences between author, characters, actors, and spectators.

COMPUTER GAMES. Computer games are not so much a new textual genre, as a new environment for the use of text. (The same may be said of all multimedia systems.) The textual dimension of computer games may involve the features of several of the categories listed above: as in Interactive Drama, the user is placed in the role of protagonist; as in hypertext, his progress traces a path on a hidden map of decision points; as in MOOs and MUDs, he may interact in real time with other players. (MUD stands for Multi-User Dungeon, and the earlier MUDs were in fact computer games based on the plot structure of *Dungeons and Dragons*.) In most games, however, the user receives a much more specific task than in the other types of computer-based textual activities. In the early eighties, computer games were either entirely textless (*Tetris*, *Pac-Man*, and most joystick-operated games) or entirely text-based (*Zork*). In the text-based forms, the computer displayed segments of an interactive fiction, and the user performed her moves by typing rudimentary verbal responses. The introduction of CD-ROMs allowed text to become a part of a multi-media environment. In recent games, such as *Myst* and the latest *Zork* episodes, the fictional world discloses itself though the spoken dialogue of characters and through written messages inscribed within the fictional world, but this mode of communication is not available to the user; his mode of action is point-and-click with a mouse rather than typing verbal commands. In an ironic revenge of the printed word, however, popular computer games tend to generate non-electronic texts, such as "cheat-books" offering strategic advice, or novels chronicling the history of the game world on fake antique leather-bound tomes artfully aged by chemicals (*Myst: The Book of Atrus*).

CD-ROM MULTIMEDIA WORKS. A variant on hypertext, interactive CD-ROM productions orchestrate text with sound, images, and animation.

The group includes two main subtypes: children's "Living Books," and artists' CD-ROMs. In *Arthur's Teacher Troubles*, a children's book produced by Brøderbund, the user moves page by page through an illustrated story, but every page offers hidden surprises: click on the teacher, and she turns into a monster; click on one of the students, and he makes a funny face; click on a mirror on the wall, and it is shattered by a baseball; click on the text under the picture, and it is read aloud. These activities are not forks in the plot, but the roadside attractions of a basically linear narrative. In artists' CD-ROMS—as in their more solid counterparts, artists' book-objects—the design of the user interface and the choreography of her movements through the work-world become an integral dimension of meaning. "As never before," writes Margot Lovejoy, "the creation of a work calls for an awareness of what is meant by reading and looking, and of how associative thought processes take place" (118–19). Here is how Lovejoy describes one of these works, Laurie Anderson's CD-ROM *Puppet Motel*: "[T]he participant can choose a theme to explore from a bank of images projected on the wall of what appears to be a mysterious tunnel containing animal tracks, clocks, and electric outlets. After exploring a chosen theme, the action shifts to an attic-like space full of images and forms. Clicking on these can call up excerpts from many of Anderson's poems, songs, and performances, and allows a level of choice. The more one visits this space, the more the forms change and increase in number" (120).

COMPUTER-MODULATED TEXTS (POETRY MACHINES, CYBERTEXTS). Cybertexts are a form of poetry that lives and breathes the fluidity of the electronic environment. They highlight the dynamic production of text, turning this production into a spectacle. Experiencing the text means watching words and meaning emerge and evolve on the screen, animated by the invisible code of a computer program. These "poetry machines" are the textual equivalent of the artificial life projects discussed in Katherine Hayles's contribution to the present volume: the user's occasional input is a random event which forces the largely self-regulating textual system to modify itself. According to John Cayley, creator of the cybertext series *Indra's Net*, "your selections will feed back into the process and change it irreversibly." Here is how Cayley describes his own projects: "Visitors to the installation will see the words of a generated text appearing on the wall before them. The computer itself is hidden, but there is a 'mouse' or other pointing device available . . . allowing the user to interact with the display. When a visitor ceases to control the installation, it will, after a short time, continue to generate text automatically, providing an intriguing, continually changing and

visually engaging display."[8] Many of these productions are the electronic equivalent of conceptual art: texts that erase themselves after only one reading (William Gibson);[9] chaotic superpositions of pages on the screen that the reader peels off one by one to reveal a readable text (Rosenberg, *Intergrams*), texts that allegorize the incompleteness and selective character of the reading process by scrolling down so fast that the eyes of the reader can pick only some of the words (Bootz 242).

Rethinking Literary Language through Electonic Texts

For the literary scholar, the importance of the electronic movement is twofold: it problematizes familiar notions, and it challenges the limits of language. The emergence of a new form of writing has refined the concept of medium: we are now better aware that the medium (under this term I understand categories such as verbal language, music, painting, sculpture, cinema, or dance) is affected by its material support. Before the computer revolution, the question of the support of the literary text was reduced to a dichotomy of the oral and the written. Now the written has been exploded into at least three manifestations—manuscript, print, and electronic. Under this new taxonomy, the Codex book can no longer be considered the exclusive support of the literary text. One of the most significant effects of the development of electronic textuality on literary theory in general is that it has led to a rediscovery and critical investigation of print and the Codex book. Long taken for granted, the material support of the text and its expressive potential have now become objects of active enquiry, both in the theoretical and the artistic mode.[10]

The territory of the written has not only been subdivided—its very identity has become problematic: Does "written" refer to the visual manifestations of language, or to its durable inscription? The sign language of deaf communities is visual but not permanent, while audio recordings are permanent but not visual. Electronic textuality is generally considered a form of writing, but some of its genres are as volatile as speech: the written conversations of the MOOs (the system may keep a permanent record, but the users experience the exchange in real time), the never-to-be-repeated displays of animated cyberpoems, the self-destructing text. The relation between print, oral, and electronic textuality is best represented as triangular: depending on the genres and features taken into consideration, the electronic text aligns itself with the oral against print, with print against the oral, or stands alone in opposition to both. Cyberpoems and computer games share with the oral,

against the written, a real-time dimension which makes it possible to monitor the temporal flow of the encounter between the text and its destinator. Words and situations are displayed on the screen for a fleeting moment, and the reader or player has to seize opportunities that will never present themselves again. Hypertext shares with the written, against the oral, the fact that the entire text is prerecorded. The time-transcending existence of the signs allows the reader to treat the text as a space to be explored with a relative freedom of movement (a freedom limited by the network of roads). Traditional print texts are not considered interactive because they impose a sequential reading protocol, but the accessibility of all their pages at any given time offers an illicit escape from the prescribed order: it enables the reader to skip text, to reread earlier passages, or to take a forbidden peek at the ending. The vaunted interactivity of hypertext may be a reaction against the linear protocol of print, but it is also the exploitation, systematization, and legitimization of a potential inherent to all forms of permanent inscription. In yet another respect, electronic textuality stands alone against print and oral texts. In most forms of print literature—visual poetry being the exception—the written word is treated as a substitute for the spoken word. Poems are meant to be read aloud and novels can be recorded on tape, but neither hypertext nor animated cybertexts can be subjected to oral performance. Electronic textuality could be the advent of a fully non-logocentric mode of expression.

This leads us back to the other significant feature of electronic textuality: the attempt to expand the limits of language. Through its commitment to new forms of signification, electronic literature represents the latest episode of a poetic quest that spans nearly two centuries of literary history. From Romanticism to Symbolism, from Dadaism to Surrealism, and from Modernism to Postmodernism, the persistent dream of a new language has taken many shapes. If the claims of cybertext theorists sound often wildly hyperbolic, they are certainly no more utopian than the ambitions of their predecessors:

The Dream of the Total Language

Here verbal expression is not the sole focus of attention, but one of the components of an artistic event that mobilizes all media and modes of signification. The nineteenth-century expression of this dream was the opera; in the mid-twentieth century, it inspired the dramaturgies of a Brecht or an Artaud—theatrical performances combining text, music, song, dance, and visual elements to promote a critical stance (Brecht) or a ritualistic, deeply transforming immersion of the mind and body

(Artaud). In the electronic age, the total spectacle is reincarnated as either multimedia CD-ROM artwork, or as VR production.

The Dream of the Multisensory Language

In this case, language does not cooperate with other media, but absorbs their properties. Eric Vos observes that in most instances of verbal communication, including literature, language is codified into patterns that seem to reward us for not paying attention to its non-alphabetic aspects, patterns such as "shape, color, permutation, position in and movement through time and space" (232). Modern poetry has waged a sustained campaign against this loss of potentiality: Rimbaud imagined the color of vowels; Apollinaire dreamed a "pure" poetry talking to the soul through a musical mode of signification; concrete poetry and calligrams explored the expressive resources of the visual interplay between the written signs and the blank space of the page; and James Joyce, in *Finnegans Wake*, attempted to create a syncretic and synaesthesic language involving the entire sensorium and simulating the effects of all the media.[11] More recently, video poetry, film, and TV have added a kinetic dimension to language: think of the dancing letters of *Sesame Street* or of the text that summarizes the story and then disappears into hyperspace at the beginning of the *Star Wars* movies. Electronic technology not only synthesizes these various dimensions, it also introduces one of its own: the tactile pleasure of grabbing words with a click of the mouse (Rosenberg 111). By activating the full semiotic potential of language, the electronic text proposes a space as stimulating and challenging as the physical world: a space in which "we need *all* our sensorial capacities to find our way" (Vos 232).

The Dream of the Democratization of Art and of the Transformative Power of Language

Lautréamont claimed (perhaps ironically) that "[p]oetry must be made by all. Not by one" (279). The movements of Dadaism and Surrealism were animated by the belief that poetry was everywhere, and that everybody should live in a constant state of poetry. In proclaiming the death of the author, Barthes hoped to put the mass of readers in control of meaning. The egalitarian dream of the participation of the reader in the creative process is tied to a belief in the performative force of language, in its almost magical power to cause events of lasting consequences for RR (real reality). The claim of hypertext theorists that the medium turns readers into writers (or "wreaders") is the latest variation

on this theme of language-induced transformation.[12] Taken literally it may strike some of us as facile hyperbole (wouldn't it be wonderful if writing were as easy as a clicking) and as self-serving flattery ("read me, and you will become author"), but it appears much less arrogant if we read it as a figural expression of the perennial longing of literary authors for a language capable to change mankind and society through the release of creative energies. The main difference between the past and present forms of the dream is that hypertext theorists are more inclined to conceive these energies in terms of critical thinking than their less politically oriented predecessors.

The Dream of the Text That Reflects Its Reader

What could be more fulfilling for the reader than a text speaking not only to her, but also for her, a text adapting itself to her most personal desires? Electronic textuality offers many features that turn the public text into private language: in hypertext and dynamic cybertexts, nobody else will probably see the same sequence of signs; in a computer game you become the hero of the unfolding story; in the textual world of the MOOs you may reinvent yourself; and when you work with an interactive database, you may create your own customized text by cutting, pasting, linking, and annotating. The dream of the text that reflects the individuality of the reader is epitomized by the poetry machines of John Cayley (for instance *Collocations: Indra's Net II*). These works are computer programs that select strings from an input text, perform certain operations on them, animate them, and project the output on a screen. In some of the installations, the reader is free to chose the input text. If she selects samples of her own writing, she will literally become a co-author, and her copy will be unique ("Potentialities" 180–83).

The Dream of the Physically Multidimensional Language

An oral text is linear: the hearer perceives it one sound at a time. Writing uses the two-dimensional support of the page, but it rarely takes advantage of this spatiality: as already noted, most written texts can be read aloud (cf. the "books on tape"), and most of them could be transcribed on a very long line. With visual poetry, language conquers a second dimension: the text cannot be performed in the temporal flow, because it exploits the semiotic potential of the spatial arrangement of the words on the page. Hypertext has developed yet another way to construct a reading space: the multiplication of parallel linear sequences. Each traversal of the network traces a one-dimensional path, but the

sum of the possible paths can be represented only on a two-dimensional map. Let us replace these linear paths with two-dimensional screen images—as is the case in interactive visual poetry—and the text becomes a three-dimensional collection of planes; let us animate each of these planes, and the text becomes a four-dimensional space-time continuum.

The Dream of the Text as Sum, or Every Text in One

Every period has its monument to a totalizing vision: in the Middle Ages it was the Cathedral, complex architecture whose windows and sculptures encompassed all of space and all of history; in the Enlightenment it was the Encyclopedia, immense compendium of knowledge; in Symbolism and Modernism, it was the literary text as cathedral: Mallarmé's imagined but never written Book, and the novels of Proust and Joyce. The cathedral work is the only text that the reader will ever need, because it sums up all human experience, because its exploration is never complete, because its architecture is so fluid that it continually rebuilds itself. As Umberto Eco describes Mallarmé's concept of the Book, it is a "multidimensional, deconstructible" "work in movement" (13). In postmodernism, the ideal of the total work gives way to the idea of universal intertextuality: every individual text is linked to countless other ones, and the whole is reflected in every of its parts, as in fractal images. In the electronic age, thanks to the hyperlink, the text literally becomes a matrix of many texts and a self-renewing entity. We need to look no further than the World Wide Web to find the text that contains all others. For Michael Joyce, hypertext narratives are "virtual storytellers," telling a different story with every traversal (*Of Two Minds* 193), while for Jay Bolter, "an electronic text is all architecture, all reference" (160)—a perpetual invitation to try another link and to explore (or build) another structure.

The Dream of a Language That Captures the Emergence of Thought

This dream originates in a rejection of the rationalist view of language: a view according to which thought precedes language, and the function of words is to translate the pure, stable, fully formed ideas that reside in the mind. The eighteenth-century mystic Swedenborg imagined "the language of the angels" as a mode of communication that lets feelings and thoughts flow directly from one soul to the other, without the mediation of the linear patterns of logic and syntax. Surrealism, through its *écriture automatique*, and Modernism, through the development of stream-of-consciousness techniques, attempted the paradox of a lan-

guage capturing the life of the mind in a preverbal stage. The polysemous language of Joyce's *Finnegans Wake*, with its simultaneous emissions of associative trails activating meanings in many directions, is perhaps the closest verbal approximation of the thought processes of the neural level. Electronic textuality has brought a renewal of interest for the idea of a language closer to thought. The propaganda of VR developers comes eerily close to the doctrine of Swedenborg. According to Michael Benedikt, the VR experience will be a "post-symbolic mode of communication"; "language-bound descriptions and semantic games will no longer be required to communicate personal viewpoints"; "we will become again 'as children' but this time with the power of summoning worlds at will" (12). As for hypertext, it has been claimed to be better adapted to the spontaneous movements of thought than traditional writing techniques because it enables ideas to grow in rhizomatous patterns, allows jumps and digressions, and because the user never needs to sacrifice those bursts of inspiration that cannot be bent in the direction of a general argumentative or narrative line. If thought is analogical before it is forced into logical patterns, hypertext highlights the truly creative moment. The electronic poet Jim Rosenberg believes that hypertext could come even closer to the dynamics of thought by operating on elementary linguistic material rather than on sizable lexias containing fully formed ideas. Such a system could become a toolkit for thinking, the user putting ideas together by following the links and trying out various combinations.[13] We can also imagine a cybertext in which isolated words and phrases would float on the screen, gather into patterns, break apart, and regroup. As in neural networks, words would fire each other, competing chains of meaning would race across the screen, the winner would dominate the display until new input came in from the user, and the process would start all over again, ideas and associations emerging right here and right now, in a poetic simulation of brain activity.

About This Book

The literature on recent developments in electronic technology and their impact on textuality has generally gravitated around three poles: prophecies of salvation (we are entering the age of the posthuman, and our mental and physical faculties will be enhanced); prophecies of doom (the advent of the posthuman is inevitable, but it will mean the loss of all that is worth preserving in our cultural heritage); and Luddite calls to resistance (something *can* be done to defend our humanity against the steady advance of the machine). Though some of these voices will

be occasionally heard in the following pages, the purpose of the present collection is not to pass judgment on the desirability of the electronization of the word, but to usher in a new phase in cybertext criticism. The first wave of literature on electronic textuality has been enthusiastically promotional: in the early days of the new medium, the most urgent task was to convince the public that there was a need for it. When it was not busy vaunting the advantages of cybertext over the Codex book, most of this literature consisted of detailed explanations of how the system works, and of narrowly descriptive presentations of individual examples. In a second wave, the hyperbolic promises of VR and hypertext developers triggered skeptical counterreactions and passionate elegies to the Codex book. What we need at this stage in the development of cybertext theory and criticism is neither wild promotion nor denigration, but (1) a critical, though not hostile, assessment of the claims of the first-generation developers and theorists; (2) a way to read the individual texts that finds a middle ground between pure description of the works and general considerations about the medium; (3) a poetics tailor-made for electronic textuality; and (4) a thematic approach that relates cybertexts and textual constructions of cyberspace to the major human, aesthetic, and intellectual concerns of contemporary culture.

Rather than trying to map the entire territory of electronic writing, the essays gathered in this book explore the area that presents the greatest potential for literary innovation: the forms of discourse in which the computer functions as theater. Because electronic textuality cannot be separated from its cultural environment, the essays will cover both electronic texts and print texts that deal with the imaginative world of cyberspace. Within this general domain, they focus on three areas: poetics and text theory, the question of identity, and the practice of writing. But most of the texts, as one might suspect, have implications for more than one of these topics. It will be left to the reader to actualize other possible books by discovering or creating other systems of links.

The first section examines how postmodern thought has theorized the textual products of the recent electronic revolution, and how, conversely, these new forms of textuality challenge postmodern thought, invite us to reconsider the concept of text, and call for an expansion of the analytical repertory of literary theory. In the first chapter, "Aporia and Epiphany in *Doom* and *The Speaking Clock*," Espen Aarseth lays the groundwork for a poetics of "ergodic art," i.e., of art based on a cybernetic system that generates a different sequence of signs every time the work is experienced. Besides hypertext, ergodic art includes the above-mentioned "poetry machines," as well as computer games. The focus of the essay is on how games and dynamic cybertexts introduce a new

variable into the textual experience (I use this term to cover both reading and playing): the manipulation of time as strategic element. Classical written narrative plays with the relation between narrated time and time of narration (i.e., how long it takes for the events to happen versus how long it takes to read their report), but the text has no control over the time granted to the reader to absorb the narration. In cyberpoetry and computer games, the time of reading can be determined by the system, and the performance of the user depends on a wise use of this limited resource. It is in this sense that games and cyberpoems operate "in real time."[14] We do not normally think of computer games as art, but in addition to their creative exploitation of the time variable they highlight two features which play a crucial role in art appreciation. The first, *aporia*, occurs when the player takes a dead-end branch on the game-map or fails to overcome an obstacle. The second, *epiphany*, is the solving of a problem that allows the player to progress in his quest. If the goal of the game is to reach the ultimate epiphany (heaven or total knowledge), it is the dangers on the road, the risk of losing one's life, that make it worth playing. The same could be said of literature in general. What makes literature intellectually stimulating is the resistance of the text, its invitation to exercise problem-solving skills, and the fact that not all paths are worth pursuing in the forest of meaning. This emphasis on the necessity of aporia to the aesthetic experience can be contrasted to Jay Bolter's description of hypertext as a network in which "every path defines an equally convincing and appropriate reading" (2). In hypertext, every electronically marked path may be legitimate, but should every possible itinerary guarantee satisfaction? The dilemma here is between a conception of the text as risk and adventure, or as Garden of Delights.

The next two chapters, by Poster and Nunes, investigate cyberspace technologies in the light of the work of some of the most influential figures on the contemporary literary-theoretical scene. The development of electronic writing and VR technology has been hailed by many as the fulfillment of the ideas of Jacques Derrida and Jean Baudrillard on textuality, representation, and the media. Following up on his earlier book *The Mode of Information*, in which he discusses the affinities of post-structuralist doctrine and electronic writing, Mark Poster details the efforts of Baudrillard and Derrida to catch up with the development of computer culture and their self-appointment as the theorists of the new technologies. Refreshingly critical of two figures widely revered as authorities, especially of their tendencies to flee into the symbolic rather than confronting concrete technological phenomena, Poster's essay emphasizes the limitations of Baudrillard's treatment of VR as another

manifestation of the hyperreal (alongside amusement parks and television), and denounces the facility of Derrida's claims of political significance for the theory of "hauntology" into which he develops his analysis of the concept of virtuality.

Developing the imaginative potential of the "space" of cyberspace, Mark Nunes's "Virtual Topographies : Smooth and Striated Cyberspace" renews a tradition initiated in the early fifties by Gaston Bachelard's phenomenological investigation of the poetics of space. The development of information technologies and electronic networks, such as the Internet, has exercised a significant influence on the perception of space by the imagination. Whereas classical phenomenological approaches focus on predominantly meditative themes such as space as habitat and its apprehension/appropriation by consciousness and the body, the cybercultural experience privileges active themes of travel, conquest, expansion, colonization, utilization, and above all mapping. The postmodern mind tends to reject Cartesian conceptions of space as continuous spread of fixed (number of) dimensions in favor of topographies made of discontinuities, parallel worlds, black holes, shrinking and expanding substance, and Moebius strip effects. The concepts of smooth and striated space, borrowed from the work of Deleuze and Guattari, offer two complementary models for the apprehension and administration of cyberspace. The prevalent tendency among cultural critics is to describe cyberspace phenomena (such as navigating the Internet or participating in electronic communities) as the triumph of the smooth model. In a more nuanced approach, Nunes shows how "smooth" administrations tend to seek support in the structures of striated space, and how these structures, in hierarchical organizations, tend to dissolve into fluid relations. In their mutual dependency and periodical infiltration by the other, smooth and striated topographies remind us of the dialectical relations between chaos and order. For the literary theorists, the significance of Nunes's contribution resides primarily in his reading of the World Wide Web as a giant text and in the implications of the two models of space for the phenomenology of reading. Striated space suggests a view of the text as a unified work structured once and for all by the mind of the author, while smooth space models meaning as the unstable, unmappable product of an anarchic field of energies. Striation suggests furthermore a goal-oriented, utilitarian reading, while smoothness opens the mind of the reader to the surprise discoveries of wandering for pleasure in a gigantic fair where all texts are on display.

Have you ever wondered what cyberspace is, why everything that happens there is labeled virtual, and how this virtuality relates to

"goggle-and-glove" VR? I tackle these questions in the next chapter, "Cyberspace, Virtuality, and the Text," by tracing the history of the word "cyberspace," from its origin in William Gibson's novel *Neuromancer*, through its adoption as marketing device by VR developers, and finally to its extension to networking phenomena, when the Internet displaced VR as the hottest topic in electronic culture. Returning to the etymological source of the word "virtual," and relying on the work of Pierre Lévy, the distinguished French theorist of electronic culture, I distinguish two meanings, the fake and the potential, which correlate to the two constitutive features of the VR experience: immersion and interactivity. In these two features, we hold the cornerstones of what could become a phenomenology of reading encompassing both classical and cyberage textuality. Through immersion in a fictional world we become in make-believe a member of this world, a situation which enables us to relate emotionally to the situations depicted in the work, while through an active encounter with the text, we actualize its semantic potential into an individuated imaginative experience.

The second section focuses on an issue of compelling existential and ethical relevance: how identity is affected by electronic technology, and how it can be constructed through electronic writing. The predominantly anti-Cartesian mood in contemporary culture seeks identity in gender, race, and sexuality—all attributes anchored in the body. If cyberculture matters for the question of identity, it is because electronic technologies have the power of producing virtual doubles of the human body, such as the enhanced (and to some, diminished) bodies of VR, or the textually created character-descriptions of the MOOs. In a culture that worships the slick surface of things, that equals being to presenting, that replaces the idea of a true self hidden in the depth of interiority with a decentered self acting out its many roles in public performance, identity is tied to the body, and the body is an image molded from the raw material of inherited physical properties. Bodies are now conceived as changeable, disposable commodities, and stepping into a new body means adopting a new identity. Officially classified as a disorder, "multiple personalities" is being touted by the prophets of cyberculture as the hippest of mental conditions. But the relation computer/body is far from univocal. Lovers of the Codex book complain that electronic textuality robs the reader of any sensuous, body-involving relation to the material support of the text. As an often repeated argument goes, you cannot smell the paper of the electronic book, you cannot feel its texture, you cannot flip the pages, you cannot take the computer to bed. Partisans of electronic textuality reply that through the gesture of clicking, the body is actively involved in the reading experience, and

that the cursor on the screen represents an extension of proprioceptive boundaries (it often takes the shape of a grabbing hand). The same dichotomies of opinions nourish the controversies that surround VR. Opponents argue that VR is a disembodying technology because it imprisons the physical body in cumbersome equipment and reconfigures its sensorium according to the system designer's specifications. Compared to walking around town, exploring a virtual world through headset, datagloves, or wired bodysuit is a significant loss of corporeal freedom. Proponents of VR claim on the contrary that compared to sitting at a terminal and typing on a keyboard, VR is a tremendous liberation of physical energy, since it uses the entire body as interface. As Brenda Laurel argues, VR is the only technology that makes it possible to take your body with you into worlds of the imagination ("Art and Activism" 14). These ambiguous relations between electronic technology and the body carry equally ambiguous implications for the issue of identity. In one frame of mind, identity must be conquered in a battle against the disembodying effect of electronic technology, while in the other, electronic technology is a tool for the design of freely chosen identities.[15]

The first of four variations on the theme of what may be called "cyberbodidentity," Barbara Page's "Women Writers and the Restive Text" stresses the liberatory potential of electronic writing. The essay describes some features of recent women's print literature that foretell the adoption, by other women writers, of a hypertextual format. (This does not mean, as Page is careful to warn, that the print texts would have been more successful as hypertexts.) In recent years—especially since the publication of Peter Brooks's influential book *Reading for the Plot*—the Aristotelian description of narrative/dramatic structure as exposition, complication, climax, and resolution has come to be perceived as the expression of a male (and to some, Western) pattern of sexual experience. As the sexual analogy has gained currency in critical discourse, a number of woman writers have rejected the linearity of traditional narrative patterns and explored alternative forms of writing as expression of female subjectivity: stopping what Carol Maso calls the "incessant march forward of the plot" through silence (represented graphically as blank space) and discontinuities; letting discourse radiate in many directions, so that story may "blossom like a flower" (Maso again); incorporating multiple voices so that the text will realize a communion of subjectivities; and renouncing the strategies of persuasion that impose one's image at the expense of the other's. It is easy to see how hypertext favors these tendencies. In the new writing technology, some of the women writers discussed by Page see an unspoiled form that has never been used as an instrument of oppression, not just because it has hardly been used at all, but also because its open structure welcomes dialogue and dissident voices. The dream of a new identity begins with new forms of expression, but language itself is not inimical to woman's interests; if it were, silence would be the only option. What has to be sacrificed for women to articulate their own values is the literary forms inherited from the past, because these forms retain the memory of the symbols and narratives through which women have been forced into a role and an image. But Page resists the temptation of promoting the new writing medium as a panacea for all forms of domination. As it orchestrates multiple voices, does hypertext maintain their individual force and urgency, or does it absorb them all in a harmonious concert that covers up conflict and tames their resistance?

In Thomas Foster's "The Souls of Cyber-Folk," electronic technology comes through both as an instrument of alienation for the self and the body, and as a challenge that leads to the conquest of a new sense of identity. Through the reading of a comic-strip version of the myth of the Cyborg, this modern-day inversion of the myth of the Golem (since here humans become machines rather than machines acquiring human power), Foster examines the problem of racial identity and its problematic relation to, or inscription in, the visible body. In the comic strip in question, *Deathlok*, an African-American scientist's brain is suctioned out of his organic body and placed into the frame of a machine. Foster reads *Deathlok* as an allegory of slavery, as well as a warning against the futility of attempting to recover a lost wholeness lodged in the organic body. But if the protagonist cannot reject his Cyborg body, he can use it as material for self-creation. Relying on Allucquere Rosanne Stone's distinction between physical and virtual attributes of the body (those that are given and those that are chosen), Foster suggests that racial identity is not a mimetic representation (or natural expression) of physical properties, but a performance through which a "virtual body" is projected out of a physical one, as a more or less individual, more or less shared core of biologically given properties is complemented by the enactment of potential features. This approach is consistent with the position currently favored by anthropologists. In the new scientific orthodoxy, race is no longer regarded as a discrete set of biological features inherited through a separate origin, but as a manifestation of human variability grounded in a fuzzy set of physical properties which become stereotyped through cultural interpretation. Foster's essay points toward a better possible world in which cultural stereotyping would be replaced by individual performance.

Once upon a time books were to the text what the body was to the soul: solid objects serving as temporary support for a spiritual entity

whose existence was regarded as transcending its particular form of embodiment. Is it a coincidence that just as the Cartesian conception of the duality of mind and body came under attack, the body of the text began to lose its solidity? In "The Disturbing Liveliness of Machines," Christopher Keep reads hypertext and the forms of textuality found in Codex books as metaphors (or arguably as *causes*) of certain experiences of corporeal existence. Keep argues that the material form of the codex book—a self-contained, discrete, solid object extending in space and providing tactile pleasure—configures subjectivity as a unified and intelligible self unproblematically lodged in a spatially bound body. This sense of self and of embodiment is associated with the form of textuality most commonly encountered in the codex book: the realistic novel. Through its immersive quality, the realistic novel offers to the reader's fictional self the cozy refuge of an intelligible surrounding world. In contrast to the codex book, hypertext is not a thing that can be held and fondled, but a volatile entity never apprehended in its totality, and never experienced as habitable environment. Keep relates this quality to Lacan's view of the infantile experience of the body as a dismembered entity (a *corps morcelé*), and to an apprehension of the self as an unstable *assemblage* of parts.

The most pessimistic pronouncement on the impact of electronic technology on our sense of identity is Matthew Causey's "Postorganic Performance: The Appearance of Theater in Virtual Spaces." The chapter investigates the significance of the development of dramatic forms of VR for the concept of performance. Lacking most of the feature traditionally associated with performance (existing in the present, resisting repetition, and above all, involving the physical presence of bodies), what Causey calls "postorganic performance" invites a fundamental revision of performance theory. But if performance theory "fails postorganic performance," the reverse is also true. Taking a somber view of VR, Causey argues that theatrical performance would irremediably lose its force as event if the live presence of the actors were replaced by simulated bodies. Causey looks toward a dramatic work, Jean Genet's *The Balcony*, and its depiction of a character deliberately locking himself up in a world of simulacra, for an allegory of what the theatrical experience would become if deprived of its organic component: not the metaphysical shock advocated by Tadeusz Kantor, nor the therapeutic cruelty to the flesh and the self envisioned by Artaud, but the painless, fleshless experience of an incessant parade of images, in which identity would be reduced to its external signs. In this essay, Causey is looking at postorganic performance from the point of view of organically embodied life. But one wonders what would happen if the late-millennium

myth of the Cyborg became reality. Would the hybrid of man and machine toward which we are headed (if we believe the myth) still yearn for an encounter with the Other, for cathartic involvement, for the renewal of the self through violence and the contemplation of Death, all conceivable effects of the "organic" theatrical performance, or would the posthuman subject's idea of aesthetic fulfillment be the smooth run and continuous image production of the VR machine?

The third section moves from the performing body to writing itself as performance. Allucquere Rosanne Stone attributes the current tendency to turn scholarly writing into "performance texts" to the impact of cyberculture, but the conception of writing as a free play with language has been in the air even longer than it has been in cyberspace. The influence of Derrida on contemporary thought led to a general erosion of traditional epistemological, generic, and disciplinary boundaries—fact and imagination, history and myth, science and fiction, philosophy and literature, literary criticism and creative writing—which prepared the ground for a blossoming of monstrous hybrids. It is now (almost) acceptable to blend criticism with autobiography, to make theoretical claims by means of make-believe, or to turn academic writing into a dialogue of many voices. This spirit of anarchy spread across the computer world, where it found new forms of expression: the role-playing of the MOOs, the typographical creativity of the World Wide Web, the rhizomatous and parallel structures of hypertext. Through their flaunting of the norms of academic writing, the three texts of this last section complete a process of cross-fertilization with their subject matter, as they import into print the concern of the practitioners of electronic writing for new forms of encounter between the text and the reader.

Katherine Hayles's "Artificial Life and Literary Culture" continues the project of her earlier books: to track down isomorphisms between various disciplines and reveal the hidden unity of the intellectual landscape, or *episteme*, of contemporary culture. Delineating its two voices with graphic contrasts, her text interweaves the narration of an investigator who takes the reader on a tour of the world of contemporary AI with the reflections of a literary theorist who draws an analogy between the idea of artificial life and the postmodern conception of the text. The main point of the analogy lies in the ability of both the text and the artificial life system to generate new life forms on their own, without intervention by the creator. The description of the text as "self-organizing system" may seem at first sight to exclude the reader, but Hayles keeps her distance from the position of those overly radical disciples of Saussure who regard meaning as exclusively produced by language. If

she describes the text, particularly hypertext, as a "self-modifying system," it is because the reader is regarded as an integral part of the system. The reader provides the input that enables the pattern of the text to evolve in ways not foreseen by the creator. There are two types of life: the ability of an organism to duplicate itself as pattern of information, and the ability to evolve into new forms. Texts are alive in the latter sense through the relatively unpredictable element injected by the reader into the pattern encoded by the "programmer." Another lesson to be learned from this metaphor of the text as evolving organism is that not all readings are equally viable: in evolution as in interpretation, some new forms present the capability to reproduce themselves (to be accepted and disseminated in a community), while others are dead ends on the tree of life.

A book devoted to cyberspace textuality would be incomplete without a discussion of the foundational text. In a print imitation of hypertext techniques, Lance Olsen takes apart the matrix of the concept of cyberspace: the thirty-three-word passage in which William Gibson inaugurates the term and exposes the idea of the Matrix. As it lets the critic trace a hermeneutic circle between the passage under scrutiny and the whole of Gibson's work, the hypertextual format reveals itself an outstanding instrument of close reading. Olsen interprets the text in the light of two concepts discussed by Gibson in private conversations with the author (themselves borrowed by the novelist from an essay by the film critic Manny Farber): "white elephant art," which "embraces the idea of a well-crafted, logical arena," and "termite art," which "embraces freedom and multiplicity."[16] Itself an exercise in termite criticism, the essay adds yet another item to the list of dichotomies introduced in this volume: smooth and striated space, immersion and interactivity, aporia and epiphany. All of these pairs are inspired by cyberculture phenomena, but their relevance reaches well beyond the domain of electronic literature.

For all their playful attitude, Hayles's and Olsen's contributions remain on what is for literary theory the "proper" side of the fictional divide. The last essay crosses over. In Jon Thiem's "Myths of the Universal Library: From Alexandria to the Postmodern Age," the author emulates the role-playing of the MOOs, as he vanishes behind a fictional persona. Thiem's evocation of the life and death of the Universal Electronic Library is a didactic *tale-à-clefs*, a spoof, a fiction in the spirit of Borges replete with literary allusions that looks at contemporary phenomena from the perspective of the next millennium. Sparing neither Techies nor Luddites, neither Pomos nor Retros, the satire surveys with amused detachment the various sects born out of the cultural war between the Book and the Electronic Text: Anonymists, Apocryphers, Borgesians, Luddies, Nousers, Refusers, and Users for Alpha. Behind the many masks, however, one senses a Luddite nostalgia for the golden age of print literature. This contrapuntal voice is included in the present volume as the grain of salt that should bring out the flavors gathered in these pages.

Notes to Introduction

1. As Jacques Leslie puts it: "Ambiguity Machines. Precision, hah! Computers are better at poetry than they are at math" (lines 452–53).
2. Internet users can talk to Julia at this telnet address: telnet fuzine.mt.cs.cmu.edu; log in as julia.
3. General resources and links to projects on collaborative literature can be found at this Internet address: http://www.cliq.com/literata/coop.html
4. The Hypertext Hotel can be reached through: telnet duke.cs.brown.edu:8888
5. Internet address: http://www.thespot.com
6. This point is made by Jean Clément (67).
7. As reported by Julian Dibbell in "Net Prophet" (Interview with John Perry Barlow), *Details*, August 8, 1994. Quoted by Slouka, 174.
8. Quoted from Cayley's home page on the World Wide Web: http://www.demon.co.uk/eastfield/in/
9. Gibson collaborated with conceptual artist Dennis Ashbaugh on *Agrippa: A Book for the Dead*, a CD-ROM work that erased itself while being read. Within twenty-four hours of its appearance, however, hackers broke the code and put it on the Web in a non-self-destructive form. The ASCII version is available at: gopher://gopher.well.sf.ca.us/oo/publications/poetry/agrippa
10. On the artistic side, the exploration of the properties of the Codex book is pursued in the rich tradition of "Artists' Books." In Johanna Drucker's characterization, artists' books are not books containing reproductions of works of art, but works of art conceived as books (94). In addition to using text and graphics, these works exploit such features as the discontinuities created by the division into pages; the dynamics of the page-turning mechanism (flip-books creating a cinematic effect); the tactile and olfactory sensations provided by the type of paper; or the resistance of the bound spine to a flat opening.
11. These aspects of Joyce's writing are discussed by Donald Theall in *Beyond the Word, Joyce's Technopoetics*, and "Beyond the Orality/Literary Dichotomy."

12. Here is the latest cyberspatial avatar of the mythical wreader (and newest form of collaborative literature): "Toward the end of June [1997], four novelists will each submit the first paragraph or so of a story to a [Microsoft Network] site, four social commentators will submit the beginning of an essay, and four artists will submit a sketch. The networks' subscribers will vote on which one in each category they prefer, and the professionals will then send in a new contribution or sketch that will be a continuation of the winning choices in their category. The process will be repeated twice a week for thirteen weeks, resulting in three complete works" (Collins 33).
13. Cf. the title of an essay by Jean-Marc Lepers: "Hypertext as a Thought Construction Kit."
14. "The Speaking Clock" is actually a pun on the expression of real time: "This (silent) speaking clock in software composes from a given text according to quasi-aleatory procedures and actually tells the 'real time' " (Quoted from Cayley's home page).
15. See Penny on VR as disembodying technology, Laurel (1993) for opposite arguments, and Hayles (1997) on the involvement of the body in electronic writing/reading. See also Turkle for a general discussion of identity in the electronic age.
16. Quoted from Olsen's abstract for the edition of the essay in *Style* 29.2 (1995), iii.

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