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The Poetics of Interactivity

Margaret Morse

A HOPELESS TASK?

Interactivity once was a useful term for distinguishing art that has been influenced and shaped by a media-saturated and computerized contemporary world from painting and sculpture. However, as Marjorie Franklin said in an interview, *interactivity* now means *too* many things. It does not comprise a genre or even many genres of art. Rather, it identifies a mode of engagement between ourselves and machines—usually but not necessarily involving communicating with a computer—that finds expression over a wide range of forms and techniques. It is expressed not only in art but ubiquitously in every sphere of contemporary life where chips reside, from automatic tellers and garage-door openers to computers that access discs, CD-ROMs, and the World Wide Web.¹ Even traditional art forms are now displayed and presented “interactively” in ways that address the gallery visitor via audio or computer, offering information at the visitor’s own pace at the click of a button. Adding further to the confusion, the critical discourse on “interactivity” is ideologically loaded, even schizophrenic in its tension between pejorative connotations and utopian values and expectations.² Received notions extend polarized, normative criteria for evaluating interactive art to the critic even before we as a culture are quite sure what possibilities, functions, and aesthetics could be or have been realized in such work—or, for that matter, not realized.

We have to go back in time to a fundamental break in culture that occurred in the late 1960s and the 1970s to see *interactivity* as a cultural novum. An egalitarian impetus opposed one-way and hierarchical relations in society at large. In the arts, the proscenium between performers and the public was lowered, sculptures descended to floor level, and images exited the frame and entered into everyday life. In conceptual, pop, performance, body, and video art, artists explored the ephemeral and shifting experience of the here and now. With the goal of vacating their privileged relation as authors and creators, artists invited spectators to become participants in art events, from happenings to closed-circuit and recorded video installations.³ The liberatory associations of interactivity with mutuality and reciprocity owe much to the presentational and participatory arts of this era.³

This was also a period of struggle by women and minorities for entry into and validation by the art world. Beyond their advantages as a means

of expression, new art forms without set conventions and entrenched practitioners also promised new opportunities for women. Despite revolutionary shifts in technology, there are continuities of person, themes, and practices between the live and analog art in the earlier period of media art and the digital interactivity of the 1990s to be discussed below.⁴ Both second- and third-wave women in technology art have faced the difficulties of pioneers and transgressors in ideological and practical domains defined and controlled by men. Women encountering strong external obstacles and constraints are also likely to have internalized resistances and ambivalencies toward their own artistic means of production. Such psychic distancing is advantageous, for these tricksters and thieves of cool fire are more likely to produce *metainteractive* work that foregrounds the contradictions and mystifications of interactivity itself, while devising ways to animate its liberating potential.

Whatever it may be in the larger socioeconomic and cultural sphere, artists have chosen to inflect prosaic interactivity to their own expressive ends. Metainteractive aesthetic strategies—like poetry, with its rhythms, assonances, and figures—does not merely transport us to another scene or world but is itself an experience charged by semantic and formal values of expression. Interactivity is not just an instrument or a perhaps irritating interval between clicking and getting somewhere else but an event that brings corporeal and cognitive awareness to this increasingly ubiquitous feature of the contemporary world.

DEFINING INTERACTIVITY NEVERTHELESS

Reception theory tells us that the reader of a novel and the theater- or filmgoer have always *cognitively* “interacted” with the text by filling in the gaps.⁵ Audience studies tell us how fans of mass-culture print, sound recordings, television, and radio have actively received, revised, and extended texts without, however, changing the text itself in real time. However, the interactive user/viewer *corporeally* influences the body of a digital text itself—that is, a database of information and its manifestation as display of symbols⁶—in real time.

Inter-—from the Latin for “among”—suggests a linking or meshing function that connects separate entities.⁷ Unlike *intra-*, a prefix for connections or links within the same entity, *inter-* joins what is other or

different together. That liaison between mind, body, and machine, between the physical world and the other virtual scene, requires a translator or *interface*, most often hardware that includes a keyboard (or, for instance, a motion sensor or other tracking device), a monitor, and a controller such as a mouse, as well as software programming. One interacts by touching, moving, speaking, gesturing, or another corporeal means of producing a sign that can be read and transformed into input by a computer.

The common graphical user interface (GUI) or screen display of icons or graphical symbols and menus of commands, conventionally organized by the prosaic desktop metaphor, is also, confusing enough, often known as the *interface*.⁸ The communication links between hardware and software and between the user and the computer compose a layered, complex site of exchange that is virtual as well as physical in multiple dimensions. The symbols to be manipulated may be text, graphics, images, and audio. They may appear on a screen—on CD-ROM, on digital video disk (DVD), on the Internet, or on the World Wide Web. They may appear in an installation or in a fully immersive virtual reality. With distributed computing, the symbols may even consist of “wired” or computer-controlled objects in physical space. Thus, interaction occurs across an interface or cybernetic frontier between the physical and conceptual, between the human body and the machine, and between biotechnology and communications.⁹

One vision of *interactivity* considers it largely as a tool for getting “into” the other scene presented on screen or projected elsewhere. Conceived in this way, the interface and interactivity may be seen as obstacles or barriers to “immersion”—a concept that conveys the state of being totally inside a created world both virtually and emotionally, in a way comparable to a novelistic or cinematic fiction but, by implication, to a far greater degree. The wish to design an interface that is transparent, and an interaction that is “intuitive,” or that demands little awareness of a user is often expressed in industrial quarters, as well as by makers of fictional texts and scenes, who aim at immersive involvement.¹⁰

However, there is a problem in achieving such aims of immediacy, since interactivity is a level of expression that is not likely to be wished away from conscious awareness. Rather than presenting a story that seems to tell itself or a world that arises of itself, by definition interactivity in-

volves decision making or the active *participation* of a user. (Even the direct computer-brain thought connection of cyberpunk fantasy would need some way of translating choice-making activity.) However, awareness of mediation and its sensory material of expression does not necessarily preclude sinking into fantasy. As in the spheres of poetry and the daydream, there is a middle realm between the capacity for regression into a world of imagination and the waking capacity to select and create such a world out of metaphor.

Face to face

* Participation as an activity is not, however, dependent on technology; it is rather an historical elaboration and transmutation of dialogic modes of encounter, the archetype of which is face-to-face conversation. Now, however, one "interfaces" or communicates by means of a computer-mediated simulation.¹¹ To *interact* is a kind of doing that entails purposiveness, conclusiveness, and agency—qualities that, namely, point to a subject. One might assume that the humans involved in the roles of author, designer, programmer, and user are the subjects of interactivity and that the machine in its various technological configurations is their medium. Indeed, the capacity to involve the *receiver* or *user* in the process, if not the creation of at least second-order selection and linking or assembling of elements displayed on-screen is precisely what differentiates interactive fiction and art from the passive readers and viewers of traditional cultural forms that espouse a one-sided notion of authorship. The utopian claims for interactivity as a liberatory and nonhierarchical praxis are based on the capacity to accommodate multiple and nonlinear links between elements in narration and the potentially more egalitarian or dialogic relation between artists and their audiences.¹²

However, the computer cannot be reduced to a medium of communication between human subjects. Its very capacity to give feedback and the immediacy of its response lends the quality of "person" to what is a computational tool.¹³ This responsiveness allows it (and the virtual entities it displays) to pose or function as subjects—however partial, quasi, imaginary, and virtual—who are involved in the interactive exchange. The degree of influence and control of the interacter varies by design from an immediate one-to-one response to greater complexities, delays, and permutations. Interactivity may even initiate a process that grows out of the user's control into the relative autonomy of "agents" and "artificial life." From the beeps and clicks that acknowledge our touch to its capacity to

mirror the user like a second self,¹⁴ the computer can also function like an exteriorized mind. The "interface" is then a very special mirror that not only reflects but acts on and generates the symbols that we virtually encounter, enter, and process.

In answer to my interview question, "What is interactivity?" Lynn Hershman alluded to the anthropomorphic connotations that surround the term as part of a larger sphere of biological metaphors that structure our relations with machines, especially the computer—however hard we may try to evade them.¹⁵ Qualities of "liveness" or instantaneous responsiveness and the appearance of autonomy and purposive motion support a biological interpretation of computer events, just as the language- and symbol-manipulating and -generating capacities of the computer seem to offer the computer itself as a hazy subject and container for mind that is partly us, partly other people, partly alien machine. Thus, the interface is the consummate arena for exploration and play with the enigmas of persona—including gender—and the mysteries of life and death.

* anthropomorphic

In the 1980s, a well-known model of degrees of interactivity (associated with the laser-disk player) identified three levels—minimal interaction comparable to that of a remote control for television, interaction that allows the user a choice among a set of preestablished narrative outcomes, and interaction that allows the user to alter the final form of the artwork. This ability to change the subject or alter the rules is a feature of *intersubjectivity* or a dialogic relation. Intuitively, we reserve this capacity for human-to-human interaction. Perhaps for this reason, a distinction has arisen between the "interactivity" of hypertext/hypermedia/multimedia (especially on the hard-disk storage medium of CD-ROM and DVD) and the "connectivity" of the Internet and the World Wide Web. In the first instance, our interactive partner machine presents what is ultimately a closed body of information, albeit one that can be accessed in nonlinear order. In the second instance, we tend to envision our partners as human parties who exchange e-mail, chat, MUD, or MOO with us, and design personal Web pages and the like in ways that are open-ended and subject to change. To paraphrase Julia Scher, the space of the Web is enormous, beginning in the entrails or interiority of the computer user and extending out into a virtual universe that is expanding geometrically.

However, hard, binary distinctions between human and nonhuman and between open and closed do not bear close scrutiny. The anonymous

relation between the user and machine enabled by an interface allows humans, agents, bots, and simulations of humans to interact in computer-supported exchange with each other as virtual subjects, whether on the Internet or Web or, for that matter, via teleconferencing systems or satellite. Furthermore, blended forms such as the “interrom” (the Muntadas *Media-architecture* CD-ROM/Web link produced by Anne-Marie Duquet) or hybrid forms composed of interlocking media (Branda Miller’s *Witness to the Future: A Call for Environmental Action*) are more and more common, suggesting that the boundaries between hard and soft are fluid. More fundamentally, one may question the “openness” of sites on the Web, when “visiting” means triggering an increment on the counter of visitors, possibly entering one’s credit card number, but, in any case, leaving a data trail of one’s choices or “cookies” behind that can be used as consumer research (“data mining”). As I have stated elsewhere, “Ongoing surveillance by machines is then a corollary of the feedback of data from interaction with machines.”¹⁶

What, indeed, does *openness* mean? Consider that while interactivity allows associative rather than linear and causal links to be made between heterogeneous elements, these associations are themselves part of a symbolic system that is made up not of endless possibilities but of historically and ideologically produced constraints. While I have distinguished *intersubjectivity* from *interactivity*,¹⁷ in truth they are not so easily identified as a set of fixed oppositions, nor are they that easily separated in the psyche. In any case, the relation between the machines and humans in question is *virtual*, as is the muddle of subjectivities involved.

The theorist Jeanne Randolph has proposed that the primary ideological assumption about technology is that it should work.¹⁸ No wonder the term *interactivity* presupposes a fait accompli—that links in networks of connections have been successfully made. However, unintentional failures of interactive hardware and software and of the humans that design and employ them occur at every level of cybersociety—from AT&T down to the artists who toil, often collaboratively, as pioneers in labor-intensive new media. The term *interactivity* thus refers to a state that occurs after or is incognizant of painful effort and myriad unsuccessful, broken, and invalid connections and attempts to interact that simply don’t work.

The result of an interaction is a change of state or condition—in this case, that of connecting, but connecting to what and to what end? The

answer is not yet entirely in sight, since interactivity is a feature of a great societal and cultural transformation in progress, and, as Julia Scher said in an interview, “the directory is not complete.”

ARTISTS, GENDER, AND METAINTERACTIVE ART

In the following, I briefly discuss instances of media art that foreground interactivity itself in a variety of ways. Interactive art is distinguished by its eclecticism rather than by some cohesive generic quality. I make no implicit claim to common aims or generic unity in interactive media art by women, nor could I possibly aim at comprehensiveness or completeness by singling out just a few examples from a large body of work that has a history of more than two decades. What unites these examples formally is rather the uneasy situatedness of women in the worlds of art and technology that promotes a reflexive and ambivalent relation to media and incites production that self-consciously sets its own premises in question. Informally, these pieces are all linked through my having had to come to terms with them in my own writing, making them long-term objects of reflection.

Persona

I begin with an interactive multimedia essay on CD-ROM that models ambivalence: *She Loves It, She Loves It Not: Women and Technology* (1993) by Christine Tamblyn with Marjorie Franklin and Paul Tomkins. The interface or metaphorical map of the piece is appropriately enough a daisy menu over a twelve-part zodiac.¹⁹ The CD-ROM reader is inducted “inside” the mind of “Christine,” a virtual subject and guide, by clicking on and thus entering through her mouth. “Christine’s” mind is, however, inhabited by many different and contradictory voices. Two of the daisy petals or loops demonstrate her contradictory moods and attitudes.

In the “INTERACTIVITY” loop, “Christine” takes a dim view of her subject: “The much touted interactivity associated with computers often consists merely of pushing a button and getting a predetermined response. This is concomitant to pushing a button on a vending machine and having a Coke delivered into the slot.” A “movie” in the same loop shows a 1950s lady in pearls opening and closing an oven while a male voice of god intones about the “freedom of individual choice.” Ironically,

Tamblyn's own didactic essay is organized along those very principles of button clicking along branching pathways.

On the "LABYRINTH" loop, on the other hand, her text appreciates the "fairytale"-like mystery of "navigating" through (that is, having serial interaction with) digital space: "The reader goes on a journey during which she meets challengers, completes tasks, receives omens, and decodes signs. Movement through a computer program consists of a nomadic reading that always leads to another curious space, another confrontation with demonic agents. The work is never finished."

Her "user" or interacter may also find that some clicking brings surprises. In a "personal letter" to the reader in the "INTERACTIVITY" loop, "Christine" reminisces about a boyfriend who deposited, for example, a salamander leg in the food served up at the automat cafeteria. In another letter, she remembers not being permitted to call a boy on the telephone, offering oblique commentary on the position of the interactive artist as a smitten girl in a teen romance, waiting for a phone to ring. The robot guide is yet another "objective" voice, who deposits the well-known cliché on screen: "In cyberspace, the disembodied consciousness can zoom along data highways with unparalleled mobility. It is a realm in which the mind is freed from physical limitations and thoughts are omnipotent." Elsewhere the robot is an unapologetic mouthpiece for feminism: "In 1980, a United Nations report concluded that while women constitute half of the world's population, they perform nearly two-thirds of its work hours, receive one-tenth of the world's income, and own less than one-hundredth of the world's property."

As a storage medium, the CD-ROM accommodates Tamblyn's simultaneous deployment of mixed-media and found fragments from popular culture, multiple personas and voices, and various modes of data, fiction, and speculation in moods from serious to ironic and allows her to play them off against each other. As retrieval glitches and lags, she welcomed even the "noise" of short loops and jerky animation that fragmented the flow of images as Brecht-like distancing that creates a space for reflection. Nonlinear access also permits a cyclical form that, unlike narrative, allows the end of each complete exchange or segment to return to the center. Thus, paradoxically, the very limits of the medium serve a decentering of the subject "or an identity that is multiply locatable."²⁰

On the other hand, Tamblyn regarded working in the medium as onerous and even agonizing: "The torment of accommodation to preprogrammed routines" was part and parcel of this "Faustian pact we are succumbing to in the rush to embrace prefabricated, if multiple, identities in cyberspace."²¹ What is a persona, and what does it mean when personality (whose?) is invested in a computer? Tamblyn's next CD-ROM builds a "lexicon of received ideas about identity."²² *Mistaken Identities* (1995) maps ten women's biographies—among them those of Catherine the Great, Isadora Duncan, Marie Curie, and Josephine Baker—into a system or paradigm of the strategies that women adopt "to survive and prosper in environments that were not particularly receptive to their precedent-setting endeavors."²³ As the CD's title suggests, these are not canonical or idealistic biographical treatments but self-contradictory and transmutational personalities. Tamblyn's own inevitably subjective role in selecting and editing these lives is emphasized in the "Morphologies" section, which blends her image into one standard portrait pose of each of her subjects. Her final CD-ROM, a synoptic view of her own lifework (*Archival Quality*, completed posthumously in 1999), "made no attempt to separate the personal from the political from the autobiographical from the theoretical. I tried to show they [all these personas] were all closely intertwined in a big scheme."²⁴ Tamblyn claimed all these hybrid and multiple personas. We discover that womanhood is not an identity, just as interactivity is not one apparatus or process.

The play with persona that has become a major theme of anonymous virtual encounters on the Web has precedents in performance-art masterpieces such as *Roberta Breitmore*, an alternate identity with a driver's license and a checking account who inhabited her creator, Lynn Hershman, and multiple other women's bodies from 1971 to 1978. As they pawed through the detritus of Roberta's private life—canceled checks, letters, clothes, trash—in her vacated room at the Dante Hotel in San Francisco in 1973, visitors to the exhibition become uncomfortably aware of their own voyeurism. [Participation is thus a lure that turns the spectator's gaze back on itself.] In Hershman's *Lorna: The First Interactive Laser Artdisk* (1980–1984), visitors change the channels on the "television" of an agoraphobic middle-aged woman, exploring the branching pathways of her life by remote control. In *Deep Contact* (1985–1991), with Sarah Roberts, viewers interact with a luscious "Marion" at her invitation by touching

her on-screen body, each body part unleashing a different narrative path. Encountering the shadow of the camera in the story world causes the visitor's own image to displace what is on-screen. The gaze seeks its target inside a dollhouse of miniatures sets of *A Room of One's Own*, an interactive videodisc installation with Sarah Roberts (1990–1993), only to be unexpectedly confronted with a surveillance image of the visitor's own eye. The theme finds further transmutation as visitors see and interact on the Internet through the eyes of CybeRoberta in *Tillie the Telerobotic Doll* (1995–1998). Thus, participation foregrounds formerly tacit and apparently innocuous features of "passive viewing," while making visitors painfully aware that surveillance is part and parcel of the two-way nature of "interactivity." Throughout this series, the visitor is displaced from intimate physical space to virtual space and from interaction with a virtual persona to inhabiting the virtual persona/avatar of a camera-eyed doll, seeing worlds telematically through the Internet.

The limitations of communicating with and by means of a machine preprogrammed with network of choices can also serve to reveal psychic automatisms and reflexes that limit human-to-human exchange. In Sara Roberts's *Early Programming* (1988), for instance, the computer poses as a bossy virtual "Mom" as expert system with no face but the monitor itself and a neutral voice produced by a DECTalk voice synthesizer. The visitor's interactions with a virtual mom through a series of childhood scenes are governed by an "emotional engine" that cycles through various affects, influenced to some degree by the user's responses to "Mom's" admonishments and cautionary tales. For instance, a fork advances toward the viewer with an enormous Brussels sprout that is "good for you." The visitor selects from a range of potential stock responses to "Mom's" classic line, "Think of all the little children of the world who would be happy to have what's on your plate." Other scenes of the struggle between discipline and desire include a view from floor level of a messy room, littered with socks and toys, as a vacuum roars in the background, small hands practicing at a piano, and a swimming pool that beckons as the virtual child is told, "Don't you go into the water. You just ate." "Mom's" attitude can vary from hilarity through sarcasm and huffiness to raving anger when telling her "child" to go outside on a beautiful, sunny day. Her mood meter is a rectangle in the middle of the screen that shifts from a small, dark block of rage to a bigger, lighter shape.

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While these exchanges are associated with the repressive and controlling force of the reality principle, much about them evokes a poetics of childhood and lyrical sense memories like poking one's hand out of the car window to play with the wind. Far from a dialog based on mutual recognition, communication, and reflection, as Roberts explains, interaction with "Mom" is "an exchange of emotional tokens, not ideas." Thus, the limits of interactivity are perfectly suited to such automatic if not entirely predictable responses.

In fact, such automatisms set some of the more utopian premises about interactivity in question. Though hypertext and hypermedia are often considered subversive in putting different elements—print, sound, and image—together nonhierarchically, are such associative relationships actually subversive or synesthetic? Do they actually succeed in blurring the distinction between writer and reader? Organizing interactivity nonhierarchically through associative relationships may not be so liberating once one considers those associations themselves as a symbolic domain that is socially and culturally constructed.

Links

Collective entities built of electric charges, connections, and rhythmic patterns that shape lives more or less distant in space and even time together are a miraculous feature of the Internet and Web. These creations of the Net deserve their own lengthy and independent exposition. However, interactivity depends on the very act of linking. That act made self-conscious can be the stuff of art.

The ability to choose among linking pathways in a network is the defining feature of hypertext and hypermedia. Such choice is considered liberating, especially when it furthers a path of associations to be formed that allow different stories to be told and different causalities to operate. However, "free" associations are themselves creations of culture and, as Freud's life project demonstrated, of the unconscious. It seems to me that Sonya Rapoport's art is based on strategies of linking that are both playfully nonsensical and revealing about Cartesian and other scientific modes of interaction. In the process, she brings the act of associating itself into awareness. For example, the *Shoe-Field* (1986) interactive installation ultimately results in photos of audience members' shoes laid out into a grid and labeled "Which SHOES would you like to interact with?" The

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"association" work of *Brutal Myth: Are Women the Guilty Daughters of Eve* (1990), a Web site with a "Bitter Herb" menu display inspired by the *Malleus Maleficarum or Witches' Hammer* is a more obvious clue to the artist's project.

Interactivity in Rapoport's *Brutal Myth* extends beyond the computer. According to a given prescription (antique cures), the participant would print and cut out a curative herb described in the artwork, soak it in wine, and then drink.

The Transgenic Bagel, an interactive computer-assisted artwork, invites the visitor to "splice a trait of your choice." *Make Me a Man* and *Make Me a Jewish Man* invite further click-and-paste creations that suggest the absurdity as well as pleasure of such couplings. Another limit on linking as free association is the reach and composition of the system itself and the problem of who has access to the network. Even persons who are part of the global system of an information economy as workers may not be able to participate in it as subjects. It may be a work of art to bring suppressed or disconnected links to conscious awareness. Coco Fusco, among others, has been active in making the association between women workers in the *maquiladoras* strung along the Mexican side of the border with the United States and the goods that compose the material side of a virtual life.

Immersion

The last feature to be addressed in relation to interactivity is immersion. As suggested earlier, immersion as sinking into a fantasy world is often held to be incompatible with interactivity brought to conscious awareness. However, the very notion of a poetics of media art suggests that immersion and interactivity are far from incompatible or inversely proportional. Here, three examples of self-consciously immersive art will be addressed.

Of course, the most "immersive" form of interactivity occurs when the subject navigates within a virtual world. However, the visitor to Agnes Hegedüs's *Handsight* (1993) submerges at most a forearm into an utterly empty transparent globe. *Handsight* breaks elements that are conflated or condensed together in virtual reality into their component parts.²⁵ All three elements in this interactive installation are metaphors for the eye:

a hand-held "eyeball" interface or round Polhemus sensor that tracks hand position; a transparent sphere with an irislike opening for the hand; and, beyond it on the wall, a round projection of an eye.

Once a hand penetrates the empty transparent globe with the hand-held "eye," the projected eye on screen opens into a virtual world. Hand motions are translated instantly (in "real time") into a moving point of view like an "endoscopic eye" (*endo-* = "within," capable of penetrating an interior space) exploring a virtual world, the three-dimensional anamorphic representation modeled on the inside of a "passion jar." Nearby, a narrow-necked bottle of nineteenth-century Hungarian folk art contains—as if miraculously—the tableau of a crucifixion scene. These material objects immersed in the jar have been transformed into brightly colored, spherically distorted geometric shapes "inside" the eye or virtual world. Anamorphic perspective produces precipitous spatial relationships, quite unlike "real" space.

While the late nineteenth-century viewer of the spiritual realm in the passion jar had to be content with looking through the glass to foster imaginary access to the sacred scene, the distinctive feature of late twentieth-century virtual environments is the penetration of the gaze inside "worlds that are otherwise inaccessible by virtue of their two-dimensionality, scale, solidity, immateriality, or imaginarity." What is an ordinarily inaccessible interiority or psychic space of transcendence has been transformed into an externalized virtual space that can be penetrated and explored. In this interactive environment, the "endoscopic eye" or virtual camera is inducted symbolically into the mind itself, not to reveal some objective reality but to display parts of a symbolic system laden with historical and personal resonance. Once entered, this virtual space becomes larger than its apparent container, seemingly monumental, offering a subjective point of view onto precipitous declines and vertiginous shifts of position governed by the visitor's own hand.

The layout of the installation makes the interaction—between the sensor or "interface" (the sphere that the sensor is active in) and the on-screen events—transparent in a way that an "immersive" virtual environment that collapses the three eyes into one point of view obfuscates. (With the head-mounted display of virtual reality, for instance, the position of the sensor, the active area, and the virtual world all overlap.) Using the

hand to "see" leaves the emptiness of the material sphere that is the counterpart of the on-screen world open to view. The eye within an eye within an eye is like a *mise-en-abyme* or metaphor for an irrational space based on incorporation. *Hindsight* offers a metaphor for perception of a virtual realm that is not matched to the physical world but rather is a view of the "mind's eye" or of externalized imagination. At the same time, it exposes the logic of this construction and does not participate in the illusion. In this way, the piece both offers and deconstructs interactivity.

In contrast to this analytic and deconstructive piece, Char Davies's two virtual-reality pieces suggest the experience of diving into a fully immersive virtual world. A harness interface allows the visitor use her breath to navigate up or down in virtual space. Used in conjunction with a head-mounted display, the interface evokes diving gear. I have discussed my experience in a virtual pond within *Osmose* (1993) at some length in *Virtualities*. I was amazed at how different the experience of being inside Davies's subsequent virtual world, *Ephémère* (1998), would be. The virtual worlds to be navigated in *Osmose* were distinguished by an aesthetic of transparency and their delicate figurative rendering of the natural world. In contrast, *Ephémère* was like entering a virtual abstract painting that suggested variously a landscape or the interior of a human body or some microscopic view of plant life. Navigating this abstract space had none of the qualities of ground-covering speed I had experienced in *Osmose*. Because there was no secure index of scale, I experienced virtual space as a more contemplative temporal flow. The interface and user of *Ephémère* was visible to spectators in a darkened theater as a shadow on a translucent screen. Not only could every navigational act be followed like a shadow play; a monocular view of the virtual world in the head-mounted display was projected on-screen in real time. Thus, it was possible to discover differences in navigational style that reflected different movement personalities and that consequently revealed different territories within the virtual realm. In this way, the difference between these two pieces was as significant and revealing as the pieces seen individually.

In a similar way, two of Catherine Richards's pieces are meant to be understood as linked together as contrasting situations. However, in this instance, immersion does not require computerized assistance. We are all immersed in a world that requires no electronic equipment whatsoever

to be "plugged in" to electromagnetic waves that bombard the earth. Picking up a glass heart in Richards's interactive installation *Charged Hearts* (1997) plugs and closes the circuit with the miniature northern lights in a Terrella nearby, and the heart glows with mysterious blue light. One can communicate with another heart with a winking connection created with one's own hands. In fact, to isolate oneself from any link or connection in interaction with the world, the visitor to the *Curiosity Cabinet, at the End of the Millennium* (1995) must enter a Faraday cage of grounded copper wire. The experience inside is one of an absence achieved through the great effort to become unplugged.

NOTES

1. Some interactive programs run completely without human input—through machine-to-machine communication.
2. In *Virtualities: Television, Media Art, and Cybersculture* (Bloomington: Indiana University Press, 1998), I propose this kind of presentational relation of the artwork to the public as a *fiction of presence* to be distinguished from the fictions of the past—of theater, novel, film, painting, sculpture, and other representational arts.
3. In his "Computer-Mediated Interactivity: A Social Semiotic Perspective," *Convergence: A Journal of Research into New Media Technologies* 4, no. 3 (Autumn 1998): 40–58, Paul A. Mayer emphasizes the social ramifications of "interactivity" in enabling the user to enter into the "change and development of social structures in conjunction with new communication media" by offering a medium as "object to think with" and involving the user in forms of social reflexivity.
4. Some artists in new-media art have their roots in second-wave feminist performance and video art, while others are the third-wave students and collaborators of these second-wave feminists. Some were involved with digital technologies from the first, while other women came to interactivity from traditional, noninteractive arts. While women in performance art and video were marginalized in both art and academia in the 1970s and 1980s, after the muddled subjectivities of performance became digital, women could be found setting up and staffing the computer labs in universities and art schools in the 1990s.
5. The common assumption of audiovisual narrators and game designers—that the greater the elaboration of the fictional world, the deeper the immersion into it—may be misguided if reception theory applies here.

6. Timothy Binkley's "Refiguring Culture," in Philip Hayward and Tana Wollen, eds., *Future Visions: New Technologies of the Screen* (London: bfi, 1993), 92–122, offers a lucid explanation of the two-leveled digital text.
7. According to the *Oxford English Dictionary* (2nd ed. 1989), the term *interactive* appears in 1774 as "the short performance between two acts" of a play, in 1832 as "reciprocally active, acting upon or influencing each other," and in 1967 as "pertaining to or being a computer or other electronic device that allows a two-way flow of information between it and a user, responding immediately to the latter's output."
8. Steven Johnson's *Interface Culture: How New Technology Transforms the Way We Create and Communicate* (San Francisco: HarperCollins, 1997) offers a history of the computer interface, especially the GUI.
9. The exhibit *Interface: Encounters with New Technology* at the Museum of Contemporary Photography in Ottawa in fall 1998, curated by Carol Payne, provocatively explored this frontier.
10. In *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (New York: Free Press, 1997), for instance, Janet Murray espouses the ultimate goal of transparency (26).
11. In *Virtualities* (11–14), I explain why even face-to-face conversation in physical space involves simulation.
12. Jaishree K. Odin's "Embodiment and Narrative Performance" (chapter 32 in this book), for instance, describes the implications of nonlinear hypertext for postcolonial and other critical literatures.
13. Mayer, "Computer-Mediated Interactivity," 52, emphasizes this communicative aspect between partners or poles that are not just subjects but both subjects and objects. Each interaction involves a negotiation of the status of the subjects and the meaning of the communication. Thus, interactivity is inherently metacommunication: "Figures like 'the computer,' 'he/she/it' (the application, or a character avatar within a game world) are experienced as interlocutors . . . based on the immediate nature of the responsiveness experience by the user." Byron Reeves and Clifford Nass address these anthropomorphizing tendencies in their *Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places* (New York: Cambridge University Press, 1996).
14. Sherry Turkle's *The Second Self: Computers and the Human Spirit* (New York: Simon & Schuster, 1984), is the most famous expression of this view. Allucquère Rosanne Stone's *The War of Desire and Technology at the Close of the Mechanical Age* (Cambridge, MA: MIT Press, 1995) also addresses identity and masquerade in cybernetic communication.
15. In her e-mail communication, Hershman elaborated on this idea: "Net culture's model is life. It is biocybernetic because we've assigned our own history to it rather than wait until it has time to develop one itself. Most certainly, the Net is alive, and like the universe it is expanding. The language that is used on the Net is usually positive, animated, and abbreviated. It bristles with energy. It is active and volatile with words of Navigate, Link, Browse, Capture, Refresh, and Save."
16. Morse, *Virtualities*, 7.
17. Ibid.
18. In a paper delivered at the International Symposium of Electronic Arts (ISEA 96) in Rotterdam.
19. The petals address the themes of ideology, power, communication, violence, interactivity, representation, control, labyrinth, the other, homunculus, memory—and the credits make twelve. She loves it not.
20. Christine Tamblyn, "She Loves It, She Loves It Not: Women and Technology: An Interactive CD-ROM," *Leonardo*, 28, no. 2 (1995): 99–104.
21. Christine Tamblyn, "Remote Control: The Electronic Transference," in *Processed Lives: Gender and Technology*, ed. Jennifer Terry and Melodie Calvert (London: Routledge, 1997), p. 430.
22. Ibid., 265.
23. Ibid., 261.
24. Christine Tamblyn, interview with the author, 23 December 1997, printed in the insert to Tamblyn's *Archival Quality* (Los Angeles: Framework Press, 1998) distributed by Video Data Bank, Chicago.
25. This description of *Hindsight* was written for *Hardware, Software, Artware* (Ostfildern, Germany: Cantz Verlag and Karlsruhe: ZKM, 1997), 40–41.