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I

"Interactive technology" is one of the hot concepts of the 1990s. Advertisers and entrepreneurs are effectively exploiting its allure to entice consumers to buy products and investors to invest in speculative ventures. The media are hyping the concept to capture readers and viewers. And in the past few years, it has become a powerful magnet for a rapidly growing number of artists with backgrounds in a wide range of disciplines, including the visual arts, music, dance, and theater. Suddenly, interactive computer art is everywhere: theaters, museums, galleries, and exhibitions and performance series associated with large special-interest computer art conferences such as the Special Interest Group for Graphics of the Association for Computing Machinery (SIGGRAPH), the Banff Cyberconf, and the International Symposium on Electronic Arts (ISEA). There is a sense, at least among the computer artists themselves, that something new and important is happening: a new art form is in the making. Is it? Or is "interactive computer art" nothing more than new technology tacked onto old art forms? Underlying this question is a more basic question about interactivity itself: is interactivity, or the type of interactivity we see in computer art, a new phenomenon, and more specifically, is it new to art?

Certainly, something importantly different *seems* to be going on here. Introducing interactive technology into an art form complicates the idea of the "author" and the identity of the "work." For example, interactive computer music blurs the distinction between composer, instrument designer, and performer, with the nominal "composer" often producing not a set musical score, but a complex computer algorithm that generates sequences of music in response to a performer's gestures, leaving the performer free to improvise the gestures. The "composer" in such cases does not compose the music per se, but creates a kind of super-instrument, with built-in intelligence, initiative, and aesthetic sensibility. The performer picks up many of the traditional functions of the composer—and along the way becomes a kind of dancer, as well.

The peculiar role of the composer in such cases is paradigmatic of the artist's function in interactive computer art generally. Insofar as a work is interactive, the artist cedes control over the sequence of events that any given spectator will encounter, allowing the piece to vary with each interaction. Such works often retain the capacity to surprise their own creators, producing sequences of events that the artist never envisioned. The protean and transitory nature of interactive computer art has led critics such as Christine Tamblyn and Timothy Binkley to propose that interactive computer art is a form of conceptual art, and indeed that it represents the culmination of the movement in twentieth-century art history toward what Lucy Lippard famously described as the "dematerialization of art."[1]

This proposal has its appeal. Interactive computer artists do seem to work largely in the realm of ideas, creating logical structures in the medium of software. Interactive computer art, however, can never exist *only* as software. The work must reach out into the world in some way to capture the human interactor's input; the interactor must either make physical contact with a physical object or make movements within an articulated region of real space. And the work must project some sort of stimulus—sound, image, kinetic movement—back into the

world for the audience to perceive. Very often interactive computer artworks incorporate sculptural and scenic elements. For example, Paul Garrin's interactive installation "Yuppie Ghetto with Watchdog" (1989–1993) consists of a video projection of an upscale champagne reception surrounded by real barbed wire, in front of which is a video monitor.[2] As the viewer approaches the installation, a German Shepherd appears on the monitor and barks violently at the viewer. The dog aggressively follows the viewer's movements with its eyes and head. (The system tracks the viewer's position by means of a security camera mounted inconspicuously over the viewer.) Though the artist's programming determines the behavior of this piece, the piece itself exists not only as a "concept," but also as a sculptural installation with both three-dimensional and two-dimensional elements. It relies on the tangible qualities of its images and sounds to create its highly visceral impact.

Interactive computer art strikes Binkley and Tamblyn as "immaterial" because they are taking the visual arts as their normative paradigm: interactive artists do not produce fixed, immutable material objects, and so, the implicit reasoning goes, they must be producing "immaterial" objects. The ontology of interactive computer artworks seems less exotic if we look to the performing arts instead of the visual arts as our point of reference. Performing arts have always given rise to transitory and variable objects of aesthetic attention. This is obviously true in the case of improvisatory forms, such as jazz and improvisational theater, but it is equally true in the most conventional Western theater and music. Playwrights and composers are "conceptual artists" in much the same way as are computer artists: they do not directly produce the tangible stimuli that any given audience will experience, but instead produce what might loosely be described as a blueprint for performances. They produce performance *types* as opposed to performance *tokens*.[3] Each performance of a play or musical composition is unique in its tangible particulars, and different directors' *productions* of the same play exhibit even more extreme variations. Indeed, the works that playwrights and composers produce—plays and musical compositions—in themselves are *less* material than the works of most interactive computer artists. Typically, perhaps inevitably, computer artists conflate the roles of the playwright, the director, the designer, and even the performer. They rarely delegate responsibility for the mise en scène to someone else, as a typical playwright does; Paul Garrin himself is responsible for all aspects of his installations. Moreover, the programs they write do not rely on human performers to interpret them, as scores and playscripts do, but control the computer's performance directly.

The objective of this paper is to define the extent to which interactive computer art is a species of performance. Recognizing that interactive computer art is a close cousin of the traditional performing arts clears up some ontological quandaries about the art form. Moreover, it will put us in a position to see that the fetishization of interactive technology among many contemporary artists and critics relates closely to the role live theater and music themselves still have to play in a technological age. However, as our brief consideration of the role of an interactive composer has already suggested, interactive computer art follows a different logic from that of traditional performing arts. Recognizing the points of continuity between interactive computer art and other performing arts will put us in a position to define more precisely what really is new about this art form. Before I can give substance to this argument, however, I will need to put some flesh on the concept of interactivity itself.

II

What does it mean for a work of computer art to be "interactive"? The mere use of a computer to produce the artwork, for example, to create an image, edit a video, or design a sculpture, is not sufficient. Very generally, for a work to be interactive, the following events must occur in real-time:

1. A sensing or input device translates certain aspects of a person's behavior into digital form that a computer can understand.
2. The computer outputs data that are systematically related to the input (i.e., the input affects the output).
3. The output data are translated back into real-world phenomena that people can perceive.[4]

For example, the computer might instruct a synthesizer to produce musical notes in response to input from a keyboard; it might start a motor when someone moves in front of an ultrasound sensor; it might change a light's intensity in proportion to the volume of sound picked up by a microphone, and the light's color in proportion to the sound's pitch. The computer might use any kind of real-world input to produce any kind of real-world output, since in any case all that the computer is manipulating is digital information.

One might argue that the above definition of computer interactivity in itself settles the question of whether interactive computer art is a performing art. By definition, all interactive computer artworks engage at least one human participant in the live performance of a series of actions. Live performance is precisely the element that characterizes the performing arts. Does it follow, then, that interactive computer art is *by definition* a performing art?

Unfortunately, the problem is not that simple. To say that one cannot experience an interactive computer artwork in the absence of live human activity is not necessarily to say that this activity constitutes a *performance.* After all, one could say that an encounter with an artwork of *any* kind is a "performance" in that very generous sense. Reading books, watching films, and attending art exhibits are complex activities that transpire in real-time and involve living human beings.[5] Books do not leap off bookshelves, open their bindings, and read themselves, nor do videotapes pop themselves into video cassette recorders and watch themselves.

What, then, distinguishes the kind of "live human activity" that performers engage in from the kind that audiences engage in? The simple answer is: performers perform for an audience, while audiences "perform" only for themselves. Whether or not a work of interactive computer art is a "performance," then, depends on whether it is being performed for an audience. We must distinguish works of interactive computer art in which performers interact with the system while the audience looks on from those in which the audience interacts with the system directly. I will call works in the first category "staged interactions," and those in the second "participatory interactions." If we accept "performing for an audience" as the distinguishing characteristic of performance, it follows that all staged interactions are performances, and all participatory interactions are not.

This conclusion is valid as far as it goes, but that is not very far. It contributes nothing to our understanding of interactive computer art per se, since the difference between staged and participatory interactions is not due to any feature inherent in the interactions themselves. Any activity—including the act of reading a book or watching a film—can be performed for an audience, and will thereby become a "performance." The difference between staged and participatory interactions is one of perspective: in the first case, the audience is looking at the interaction from outside the system, and in the second, from within the system. To be sure, this difference has far-reaching aesthetic implications (some of which I will touch on toward the end of this paper). But the nature of interactivity itself—that is, the range of ways that input data might be transformed into output data—is the same in either case.

To assess whether the phenomenon of "interaction" in computer art bears any inherent relation to that of "performance" in the performing arts, we need a richer understanding of performance. The fact that performances take place before audiences does not give us enough to go on. In the performing arts, as in all other art forms, each audience member's encounter with the work is a unique event, and the spectator plays a role in that event as a spectator. But in performing arts, not only is the audience's encounter with the artwork an event, but the work encountered is *itself* an event. Performance is the medium. The live performance of actions is the stuff out of which the art is made. The audience regards the performance as an aesthetic object in its own right.

For the sake of clarity, I will use the term "performing arts" to designate the class of art forms in which one group of people, i.e., performers, perform live before a second group, i.e., an audience. As we have seen, this class includes staged interactions and excludes participatory interactions. I will use the term "performative" to designate the broader class of *all* art forms in which live human behavior constitutes the aesthetic object. This class, too, includes staged interactions, since it encompasses all the performing arts. The question that remains is whether participatory interactive art is perfor-

mative. In participatory interactions, do the interactors perceive their own actions to be aesthetically significant? Does the audience actually become part of the work of art?[6]

No answer to this question follows directly from the definition of interactivity. To make further progress, we must stop considering computer interaction as a unified phenomenon and draw some distinctions between various kinds of interactive systems. Each work of interactive computer art establishes a particular kind of relationship between live interactor and computer-controlled media. The extent to which a work is performative is a function of this relationship. The easiest way to see this point is by briefly considering a range of examples spanning from nonperformative to fully performative.

III

Many interactive systems consist of simple triggers that call up images, blocks of text, extended audio or video sequences, or some combination of these. The triggers themselves typically take the form of a "menu" of words, iconic buttons, or clickable pictures on a computer's monitor, though they can also be mechanical buttons, such as those on many automatic teller machines. The vast majority of commercial CD-ROMs now on the market conform to this model of interactivity. Though these products are hyped as the harbingers of the interactive revolution, they are in fact only minimally interactive. They simply collect together a group of what are, in effect, multiple autonomous presentations. The only choice the interactor has is *which* of these presentations to view *when*. This type of "interaction" is no different in kind from that afforded by a printed anthology or encyclopedia, or, for that matter, a record player, a video cassette recorder, or an audio compact disc player. These systems place the interactor squarely in the role of the reader of a text, or the consumer of mass-produced media; there is no element of live performance in such interactions.

A step up on the interactive ladder is the mode dubbed by Theodor Nelson in the late 1960s as "hypertext,"[7] which later expanded into "hypermedia." This mode of interaction is currently being developed on an enormous scale in the world-wide network referred to as the "World Wide Web." The difference between this mode and the previous one is that in hypermedia there is no division between the "menu" of options and the "content" to which those options refer. The system presents only content with links to more content. For example, a hypernovel, such as Michael Joyce's *Afternoon,* presents the reader with one short passage of text at a time. Each passage has a number of "hot" words or phrases that link to a passage somehow related to it. For example, if a passage contains the sentence "They were waiting for Harry," some readers might select the name "Harry" and read a flashback about that character's feckless youth, and others might select the word "waiting" and read an extended allusion to *Waiting for Godot.* Whichever passage they end up reading will contain a new set of links. In this way, readers choose their own paths through the novel, paths that reflect their own preoccupations and dispositions. Hypermedia, of course, are not restricted to text; for example, what Nelson calls a "hypergram" is structurally identical to a hypernovel, but the content consists of linked images instead of textual passages. Hypermedia interactors are doing more than triggering autonomous media segments. Each chunk of media relates to the previous one in some way, and so the interaction is apt to have a sense of coherence, at least from moment to moment—though it is unlikely to have a linear structure with a clear beginning, middle, and end.

Certainly people who interact with works of hypermedia play an active role in structuring their own experience. Still, this mode of interaction is not inherently performative. A hypermedia interface, to an even greater extent than a hierarchical menu-style interface, gives viewers control over what they will see and hear at any given moment. It allows them to choose their own paths *through* the work. But it does not cast viewers as participants *within* the work itself simply by virtue of employing a hypermedia interface. Neither, one should stress, do viewers truly become co-authors of the work, as hypermedia enthusiasts sometimes like to suggest they do.[8] Stuart Moulthrop pointedly observes that

> the constantly repeated ritual of interaction, with its reminder of discursive alternatives, reveals the text as a made thing, not monologic perhaps, but hardly indeterminate. The text gestures toward openness—*what options can you imagine*—but then swiftly fore-

closes: some options are available but not others, and someone clearly did the defining long before you began interacting.[9]

Notice that spatial metaphors govern the rhetoric of hypermedia: people *move* along *paths* from link to link, *traveling* through *cyberspace.* Rather than functioning either as performers or as authors, hypermedia audiences function as explorers. They are like tourists, rushing through the areas that do not interest them, lingering when they find something that strikes their fancy, meandering down an intriguing alleyway, perhaps getting lost for a while before finding their way back to a familiar landmark. All the while, the interactors keep their eyes on the road. Their object of attention is the *work,* not *themselves in the work.*[10]

From a technical standpoint, virtual reality systems are far more interactive than hypermedia systems. Hypermedia allow interactors to intervene periodically by choosing from among the words and images presented to them, but virtual reality systems must respond to a constant stream of input from the interactor. A virtual reality system strives to create the illusion that the interactor is moving within a three-dimensional image, and it does so by constantly updating perspective renderings to correspond with the changes in direction and velocity that the interactor signifies. (The system, of course, must incorporate some sort of input device to allow the interactor to communicate these choices, such as a mouse, joystick, video-capture device, data glove, or body suit, and the type of input device used will affect the interactor's subjective sense of immersion.) Though virtual reality differs from hypermedia systems in the degree of responsiveness, the underlying mode of interaction is not inherently any more performative. Computer artists can use virtual reality systems to create nonperformative interactions that position interactors as observers external to the aesthetic object.

Imagine, for example, a virtual sculpture garden through which you can roam about at will to scrutinize virtual sculptures from any vantage point.[11] To be sure, there is an enormous difference between viewing a real and a virtual sculpture. Kendall Walton's theory of representation is helpful in pinpointing the differences.[12] According to Walton's theory, a sculpture of a lion is a prop that allows me to imagine that I am seeing a real lion. I do not, however, necessarily imagine that the lion is *in the room* with me; I will probably not imagine (though I might choose to do so) that in addition to my seeing the lion, the lion sees me. When I touch the sculpture's nose, I will not necessarily imagine that I am touching a lion's nose, and so I will not need to invent for myself an explanation for why the lion remains passive (though again, I might choose to do all these things).

How does the situation change if I encounter a lion sculpture in a virtual sculpture gallery? In this case, I imagine that I am seeing a *sculpture* of a lion. I will probably *also* imagine that I am seeing a real lion. (Indeed, on Walton's view, if I recognize the virtual sculpture as being *of a lion,* then at some level I *must* be imagining a real lion.) That is *not* to say, however, that I imagine that I am seeing *two* things, an animal and a sculpture. Rather, I imagine that *the prop that I am using to imagine a lion is a sculpture.* It is the status of this last proposition that distinguishes real sculptures from virtual ones. When I see a real sculpture, the proposition is true; when I see a virtual one, it is fictional.

While this difference is extremely important, both ontologically and phenomenologically, it does not make visiting the virtual gallery any more or less *performative* than visiting an actual sculpture gallery. I might spend hours examining a virtual lion sculpture, admiring both the fine artistry of the virtual-reality rendering and the sculptural form that rendering represents, without imagining that I myself have spent time in the same room with either a real lion or a real sculpture. If I notice that I am not casting shadows on the sculpture, though the sculpture casts shadows on itself, and if I notice that the sun never changes position in the sky, I will not necessarily feel the need to invent a story explaining these facts. I will not even necessarily invent a story explaining why I can walk right through the supposedly solid sculpture. The interactive system might function as nothing more than a mechanism for viewing virtual objects.

Now imagine that you are peacefully contemplating a sculpture of a lion in the virtual sculpture gallery when unexpectedly the lion comes to life, lets out an agonized roar, and extends its virtual paw toward you. Just as you are about to run away, you notice a large thorn sticking out

of its paw. The lion glances briefly at the thorn, then glares imploringly at you. You have no choice but to respond. Even your refusal to acknowledge the lion's behavior would surely provoke some kind of reaction in the lion. Suddenly you are thrust out of the role of external observer and into the work of art. Your imaginative project changes. In Kendall Walton's terms, you become a prop in your own game of make-believe.[13] You become a live performer in the work, and the work becomes performative.

In the case of any art form, what a spectator perceives to be aesthetically significant varies according to the spectator's perspective. For example, insofar as my copy of *Anna Karenina* is an example of the art of bookmaking, properties such as the typeface and the size and texture of the paper are aesthetically significant; insofar as it is a work of literature, they are not. Similarly, as I stroll around a real or a virtual sculpture garden, sway to the beat of a rock band, or surf the World Wide Web, I may or may not perceive my own actions—my own "performance"—as an aesthetic object.[14]

There is an important distinction, however, between those cases in which spectators see their own performances as authorized, even mandated, by a work—as in the case of the animated virtual lion—and those in which they do not. I might imagine that almost any lion sculpture is a living, breathing feline about to pounce on me, and proceed to act out a short drama elaborating on that scenario. Moreover, I might regard the ensuing drama as an aesthetic object, taking delight or finding faults in the dramatic structure and acting. My experience with that sculpture would be performative. The sculpture itself, however, would not be. I would probably, and properly, perceive the performance to be *my own* creation, inspired by a nonperformative work created by someone else. In the hypothetical example of the animated lion, however, the work itself is unambiguously performative. It is clearly designed to give rise to performances, and explicitly accounts for the audience's role within those performances. Some artworks fall somewhere between these two examples, giving the spectator a choice about whether to interpret them as performative. Imagine, for example, a ball suspended from a string, dangling in front of a bell in an art gallery. Some spectators might regard this work as a static sculpture; others might hit the bell with the ball and focus on the sound produced, carefully evaluating the quality of the tone; and yet others might interpret the installation as an invitation to play and begin experimenting with the variety of tones and rhythms they can create. Only in the last of these cases do the spectators perceive the work as performative.[15]

Of course, a work of interactive computer art need not have a virtual reality interface to be performative. A robotic sculpture of a lion might engage a spectator in much the same way as the virtual lion sculpture. Indeed, even the most basic menu-driven computer interface might be used to create an unambiguously performative work.

Consider, for example, Luc Courchesne's installation *Family Portraits* (1993). In this piece, video projections of four people talk among themselves until a participant enters the gallery, at which point one of the figures addresses the participant directly. The participant responds to the figure by selecting phrases and questions from a list on a computer monitor. Depending on the participant's selections, the figure may choose to stop conversing with the participant and turn back to its compatriots (which happens, for example, if you start "talking" to a grandfatherly figure about computers), may establish a formal but cordial relationship with the participant, or may develop a bond with the participant and begin confiding intimate secrets.[16]

Both *Family Portraits* and my hypothetical example of the animated lion sculpture happen to be mimetic, but performative computer art can also be nonmimetic. For example, over many years the jazz trombonist and computer musician George Lewis has developed a complex program called *Voyager* that improvises music. Built into the program are rules for creating music in a number of styles, using a wide range of tonal systems from around the world. The program is perfectly happy to play on its own, making certain choices randomly and others in response to its own previous choices. But when it "hears" another musician (that is, when it receives input from a pitch-to-MIDI converter), it will react to what it hears by, for example, altering its rhythms and tempo, picking up on and modifying melodic lines, etc. While the program is very responsive, its behavior is impossible to predict, even for Lewis himself,

both because of the complexity of the rules the program employs and the element of randomness that permeates its algorithms.[17] Now it is certainly possible that someone playing along with *Voyager* could adopt a mimetic attitude, imagining, for example, that *Voyager* was a human being. Indeed, the impulse to anthropomorphize such a program is hard to resist. But such an attitude is not necessary in order for the work to be performative. People who improvise with *Voyager,* focusing all the while on the reality of the situation, marveling at the ability of the algorithm to produce interesting responses, marking the ways that the program reflected the musical tastes and idiosyncrasies of its maker, are still an integral part of the performance, active collaborators in the making of the music—in their own perception, as well as in the perceptions of any spectators external to the interaction.

IV

The purpose of this brief examination of real and hypothetical examples of interactive computer artworks was to learn something about the relationship between performativity and computer interactivity, especially participatory interactions. We can now draw two conclusions:

1. Some, but not all, kinds of participatory interactions are performative.
2. More significantly, a participatory interaction is performative when the interaction itself becomes an aesthetic object; in other words, participatory interactions are performative to the extent that they are *about* their own interactions.[18]

Up until now, my objective has been to highlight the continuity between interactive computer art and the traditional performing arts. Insofar as interactive computer art is performative, that continuity is deep and important. There is, however, a crucial difference between the role that performance plays in works of interactive computer art and in the performing arts. In nearly all Western performing art forms, and many non-Western ones, *performers perform works.* Actors perform plays; musicians perform music; dancers perform dances; Shamans perform rituals. The work (play, musical composition, dance, ritual) is a direct object. It is what the performer *does.* In "doing the work," the performer brings an instance of the work into the world. The work is a type, and its performance is a token of the type.[19]

This type/token logic breaks down in the case of interactive computer art. To interact with a work of interactive computer art does not produce a token of the work the way performing a dramatic or musical work does. Even when a work of interactive computer art is performative, the work functions as an indirect rather than a direct object of the performer's actions. To interact with Garrin's *Yuppie Watchdog,* Courchesne's *Family Portraits,* or Lewis's *Voyager* is not to perform *Yuppie Watchdog, Family Portraits,* or *Voyager,* but to perform *with* the works. The artists here do not define performance types, but create interactive performance *environments.* Plays, musical compositions and dances define a series of actions to be performed; interactive performance environments provide contexts within which actions are performed.

An apparent exception might be the practice, hardly unknown among computer musicians, of creating a composition for a live musician and a computer. In this case, the composer-programmer writes a score to be performed exclusively with a specific interactive system, and designs the system to function exclusively with a musician playing that score. An example of such a piece is "Hok Pwak," a piece of music for "solo voice and electronics" by Zack Settel. In the case of works such as Settel's, the interactor *does* produce a token of the type by interacting with the system. "Hok Pwak" functions as a direct object of the performer's actions: *the singer performs "Hok Pwak"*—though she cannot do so by herself, but only *with the computer.* The situation here is analogous to that of a violinist who performs a violin concerto with an orchestra. "Hok Pwak," however, is not a genuine counterexample to the principle that interactors do not perform works of interactive computer art, since "Hok Pwak" is not, properly speaking, a work of interactive computer art. It is a *musical* work that *incorporates* an interactive computer environment. That is to say, the musical work combines (1) a score for a musician, with (2) a specification that the score be played in the context of a specific interactive environment. As Settel himself suggests, "Since the electronics are live, the computer is used here as an in-

strument"[20]—albeit an extremely complex instrument custom-designed for just this one composition—and an instrument is not to be confused with the music performed on it. Playwrights and choreographers might similarly create plays and dances to be performed in conjunction with an interactive system, and in these cases, too, what the performers are performing, the play or dance, remains logically distinct from the interactive system itself, which might function as performer, prop, set, or any combination of these.[21] By contrast, works such as *Yuppie Watchdog, Family Portrait,* and *Voyager,* which exist separately from plays or musical scores, are inextricable from the interactive systems that comprise them. The artist presents the interactive environment as a work of art in its own right.

v

What accounts for the current fascination with interactivity? Why does interactivity matter? This question is especially puzzling in the case of staged interactions, that is, when the performer rather than the audience is the interactor. An enormous amount of effort goes into creating elaborate interactive systems with which dancers can dance and musicians can play. Why? While George Lewis has invited other musicians to play with *Voyager,* he mostly uses the program himself, and frequently performs in public with the program. If he simply likes the music that the program comes up with, why does he not just record *Voyager*'s output on a particularly good day and use the tape in concert? Lewis is widely recognized as one of the world's greatest living trombone players. Surely he could effectively simulate a sense of spontaneity if that were all that was required. Does anyone care whether Lewis is playing along with a recording or is *really* interacting with a computer in real time?

Much of the rhetoric surrounding the new technologies suggests not. As far back as 1980, approximately a decade before virtual reality became a household word, Theodor Nelson wrote that

> the central concern of interactive system design is what I call a system's *virtuality.* ... I use the term "virtual" in its traditional sense, an opposite of "real." The *reality* of a movie includes how the scenery was painted and where the actors were repositioned between shots, but who cares? The *virtuality* of the movie is *what seems to be in it.* The *reality* of an interactive system includes its data structure and what language it's programmed in—but again, who cares? The important concern is, *what does it seem to be?*[22]

This attitude is consistent with a semiotic view of aesthetic perception: works of art, including performances, are signs, and what matters is what those signs *represent,* not the reality underlying the signifiers. Such a view of aesthetic perception is incomplete at best. Aesthetic properties are not limited to what we can see and hear; they are vitally influenced by what we know and believe.[23] The reality of an interactive system such as Lewis's *Voyager* does not encompass only the internal workings of the program, but, crucially, the fact that the system is reacting to the human interactor in real time. According to Nelson's logic, this reality should be of absolutely no interest. All that should matter to us are the visual appearance and the acoustic properties of Lewis's performance. But the reality does matter; indeed, the quality of the music plays only a minor role in the fascination this work holds. Lewis's performance with *Voyager* can be most captivating when *Voyager*'s output is the least appealing, and we sense Lewis's attempts to urge the system into more satisfying musical territory. The interest here is in hearing the system and the live performer adapt to each other's performances, in observing the development of a unique relationship between system and human. In other words, what is most interesting is precisely the feat itself, the action, the event.

The proposition that interactive computer art is a kind of conceptual art, which I rejected in the first part of this paper, may turn out to have an element of truth to it after all, though for different reasons from those Tamblyn and Binkley supposed. In a postmodern, technological age, perhaps *all* performance is a kind of conceptual art. Philip Auslander has suggested that the notion of "live performance" is currently in a state of crisis, as evinced by the scandal that ensued in 1990 when the duo Milli Vanilli was discovered merely to be lip-synching during their concerts—and not even to their own voices, since they had not supplied the vocals for the record-

ings attributed to them. As Auslander observes, "most of the commentary was adamantly opposed to the practice, though virtually all of it also admitted that the main audiences for the performers in question, mostly young teenagers, didn't seem to care whether their idols actually sing or not."[24] The scandal, then, represented a reaction by nostalgic baby boomers—who according Auslander, were playing into the hands of a media industry with a vested interest in maintaining the cult of the individual superstar—to a rapidly spreading epidemic of indifference toward live performance in postmodern culture.

Since Benjamin's seminal essay on "The Work of Art in the Age of Mechanical Reproduction," we are inclined to associate technological art with reproduction and simulacra. Perhaps the current fascination with interactive technologies is, in fact, part of the reaction *against* postmodern alienation, a nostalgic revival of the modernist quest for presence and immediacy. In the 1960s, this desire for presence became an end unto itself. Actors in companies such as the Open Theater and Performance Group acted, at least in large part, for themselves, and often resisted public performance as long as possible. Such companies celebrated the process over the product. Participatory theater and happenings represented an attempt to invite audiences into the process, but rarely was that actually possible. As Richard Schechner, a key player in this movement, himself noted in retrospect, the gap between the performers—whose relationships and performances had developed over a long time—and the "outsiders" was often too great to overcome.[25] Participatory interactive computer art, rather than marking the beginning of a new era, marks a renewed attempt to realize the 1960s goal of a participatory environmental theater.

If that is, in fact, the goal, is it doomed to fail? Could participatory computer interactions succeed where participatory theater failed? There are reasons to think that it might. Participatory interactions have at least two potential advantages over participatory theater.

While trained actors often have difficulty truly opening up to strangers and letting them into their ranks, a computer will welcome anyone into its circle and give each person its complete attention. Ironically, the computer's very lack of sentience makes it, in some respects, a better actor, that is to say, a better interactor, than a sentient human being. The computer will not become "stale" (one might say that its performance is "always already stale"); it will never anticipate out of habit. When people perform a sequence of actions repeatedly, those actions become easier, increasingly "automatic," second nature.[26] This process of habituation is hardwired into people. It must be programmed into a computer. And writing a program that learns from its past experiences is vastly more difficult than writing one that approaches each interaction afresh. The basic stupidity of a computer is its greatest asset. Computers never cheat, get lazy, or tire, unless they are explicitly designed to do so. One might say that people's actions naturally become automatic, while computers' actions automatically remain natural. A computer will automatically exist in the here-and-now and respond in the moment, without even a day of Zen or Meisner-style training.

A second problem that arises with participatory theater is that audiences are apt to become self-conscious. Environmental theater was celebrated for its transformation of viewers into participants, but less remarked upon was its equally radical transformation of actors into audience. Actors, being sentient human beings, do not merely act and react, but also perceive. In a discussion following one of Schechner's environmental performances, a participant-spectator confessed that "the expectancy of it all makes me feel numb." The spectator had good reason to feel pressured. In the same discussion, an actor complained about a previous performance: "I was so disappointed in the motel after our performance in Baltimore. The show was so good—and then all these people showing their droopy personalities!"[27] Actors in participatory theater can hardly help but judge the spectators' performances, since the success of their own performances depends on them. The computer, by contrast, has no real subjective presence. When you interact with it, it is not really aware of you, and despite a programmer's best effort to create an illusion to the contrary, you know that it is not aware of you. I have proposed that participatory computer interactive art is *performative* but not a *performing art.* This may be its greatest strength. Freed from the need to "perform," an interactor may well be freer to do and

to experience. This freedom, however, is gained through a devil's bargain. The modernist ideal of presence and immediacy is achieved only by surrendering another ideal that the theatrical avant-garde of the 1960s pursued with equal passion: the establishment of authentic human contact and a renewed sense of community.[28]

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1. Christine Tamblyn, "Computer Art as Conceptual Art," *Art Journal* 49 (1990): 253–256; and Timothy Binkley, "The Quickening of Galatea: Virtual Tools or Media," *Art Journal* 49 (1990): 238.

2. This work has been installed at a number of sites. My description here is based on an installation at the Kitchen Video Annex at Thread Waxing Space in New York City, January 13–February 11, 1995.

3. I discuss the application of the type/token distinction to theater in depth in "When is the Play the Thing?: Analytic Aesthetics and Dramatic Theory," *Theatre Research International* 20 (1995): 266–276.

4. This definition is relatively informal. A rigorous definition would need, at the very least, to unpack the expressions "real-time," "translates," and "systematically related to the input."

5. Roman Ingarden argues (unconvincingly in my view) that in the case of literature, the aesthetic object is not the text itself, but the process of reading that text. See Ingarden, *The Literary Work of Art,* trans. George Grabowicz (Northwestern University Press, 1973), p. 336.

6. Insofar as interactors become the focus of their own aesthetic attention, they function simultaneously as audience and performers. That is, they become an audience for their own performance. Interactors, then, perform for an audience after all, and our original justification for denying that participatory interactive art might be a performing art is gone. Nevertheless, I have deliberately defined the distinction between performing and performative arts so that it remains workable, slipping in the condition that the performers and the audience consist of different groups of people, under the conviction that we are better off having an excessively fine set of distinctions at our disposal than having one that is not fine enough.

7. Theodor Nelson, "The Crafting of Media," in *Software; Information Technology: Its New Meaning for Art,* exhibition catalogue (New York: Jewish Museum, 1970), p. 17.

8. George Landow argues that hypermedia embody the principles articulated by poststructuralist theorists such as Derrida and Barthes, giving rise to texts that are radically "open" and "writerly." Though his description of hypermedia is sometimes naively utopic, he is surely right to draw parallels between the literary theory that flourished in the 1970s and early 1980s and the ideals of hypermedia, which after a long incubation period finally came of age in the late 1980s. George P. Landow, *Hypertext: the Convergence of Contemporary Critical Theory and Technology* (Johns Hopkins University Press, 1992).

9. Stuart Moulthrop, "You Say You Want a Revolution: Hypertext and the Laws of Media," in *Essays in Postmodern Culture,* eds. Eyal Amiran and John Unsworth (New York: Oxford University Press, 1993), p. 82.

10. With interactive role-playing games such as *Myst* we do begin to see an element of true performativity. The mode of interaction in such cases is complex and ambiguous—the games often hover on the border between hypermedia and performative interactivity—and requires a much more careful analysis than I have space to provide here.

11. David Smalley, Bridget Baird, Noel Zahler, and Don Blevins are currently developing such a virtual sculpture gallery at Connecticut College.

12. See Kendall L. Walton, *Mimesis as Make-Believe* (Harvard University Press, 1990).

13. Specifically, you become what Walton calls a reflexive prop. See Walton, p. 117.

14. In the 1960s, artists such as Alan Kaprow and Yoko Ono specifically designed a number of conceptual works to encourage spectators to perceive their actions in this way. I will consider the relationship between performance art in the 1960s and today's interactive computer art toward the end of this paper.

15. Insofar as we regard music simply as being an acoustic structure, we are not regarding music as a performing art. When I listen to a musical recording, I hear music. In many cases, I am *also* hearing a recording of a performance of the music, that is, an event that took place in another place and time. Musicians, however, often create music in a recording studio by laying down a large number of separate tracks, in which case the final musical work never existed as the aural component of a single performance event. A composer might even program a computer to create music directly, eliminating the need for any live performance. Some philosophers have defined music entirely in terms of acoustic structure; others have made the performance event integral to their notion of music. For an extreme example of the former type of theory, see Nelson Goodman, *Languages of Art* (Indianapolis: Hackett, 1976); for an example of the latter type, see Arnold Berleant, *Art and Engagement* (Temple University Press, 1991).

16. Courchesne's piece is described in Allissa Diane Schoenfeld, "Toward an Art/Human Interface: Interactive Art in the Light of Postmodern Theory and as Vehicle for Social Change" (master's thesis, SUNY–Stony Brook, 1994), pp. 20–22.

17. I am grateful to George Lewis for allowing me to examine some of the program's copious code.

18. Note the difference between saying that a work is "about its own interaction" and saying that it is "about the fact that it is interactive." I am not making the sort of claim about performative interactions that critics such as Clement Greenberg made about abstract expressionist painting; that is to say, I am not proposing that performative interactions refer self-consciously to their own medium. Some works may, but not as a direct consequence of either their interactivity or their performativity.

19. This relationship between work and performance holds even in the case of most improvisatory forms. Commedia dell'arte players performed a limited set of scenarios, though they varied the dialogue. Jazz musicians typically perform pre-existing songs, improvising the arrangement and adding variations. And even if they created an entirely new piece of music on the fly, and even if that piece of music were never played again, it would still be true that they *played the music.*

20. This statement is in the program notes for a performance at Connecticut College on Saturday, March 4, 1995.

21. The underlying distinction here is between what I call "lyric" and "dramatic" modes of interactivity. In the former, the computer becomes an extension of the performers themselves, augmenting their expressivity; in the second, it enters into the dramatic scene with the performers as an agent in its own right. A detailed analysis of different kinds of performative interactions, however, must await another occasion; the project of this paper is to distinguish performative from nonperformative interactions and to explore some general features of performativity.

22. Quoted in Howard Rheingold, *Virtual Reality* (New York: Simon and Schuster, 1991), p. 177, original italics.

23. This insight, of course, is one of cornerstones of Arthur Danto's philosophy of art, hence the central importance Danto places on works such as Warhol's *Brillo Box* in *The Transfiguration of the Commonplace* (Harvard University Press, 1981).

24. Philip Auslander, "Live Performance in a Mediatized Culture, Part Deux," *Theatre Annual* 47 (1994): 3.

25. See Richard Schechner, *Environmental Theater* (New York: Hawthorn Books, 1973), pp. 40–86.

26. Joseph Roach has explored the way theories of acting have accounted for, and taken advantage of, this fact about human nature. See Roach, *The Player's Passion: Studies in the Science of Acting* (University of Delaware Press, 1985), especially chap. 5, "Second Nature: Mechanism and Organicism from Goethe to Lewes," pp. 160–194.

27. Schechner, *Environmental Theater,* p. 75.

28. I would like to thank Philip Auslander and Kendall Walton for their helpful comments on earlier drafts of this paper.