



**UNIVERSITY OF
ILLINOIS PRESS**

The Ontology of Interactive Art

Author(s): Dominic M. McIver Lopes

Source: *The Journal of Aesthetic Education*, Winter, 2001, Vol. 35, No. 4 (Winter, 2001), pp. 65-81

Published by: University of Illinois Press

Stable URL: <https://www.jstor.org/stable/3333787>

REFERENCES

Linked references are available on JSTOR for this article:

https://www.jstor.org/stable/3333787?seq=1&cid=pdf-reference#references_tab_contents

You may need to log in to JSTOR to access the linked references.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



University of Illinois Press is collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Aesthetic Education*

JSTOR

The Ontology of Interactive Art

DOMINIC M. McIVER LOPES

Novelty is never so effective as a repetition that manages to suggest a fresh truth."

Marcel Proust

Developments in the art world such as Duchamp's ready-mades, environmental theatre, and Cage's 2'33" seem always to keep one step ahead of philosophical attempts to characterize the nature and value of art. A pessimist may conclude that theories of art are doomed to failure. But those more optimistic about the prospects for progress in philosophy may retort that avant-garde art does philosophers a great service. It helps us to ensure that our generalizations are true, our conceptual analyses are adequate, and that the theories in which our generalizations and conceptual analyses are embedded enjoy maximal explanatory power.

Arguably the most important engine for artistic innovation in recent years has been the new information technologies, especially multimedia, hypertext, and the Internet. These technologies have made possible not only new means for distributing art but also new kinds of art, including "interactive art." While interactive art raises many interesting questions that a full account of it must address, a good start can be made by examining its ontology. Indeed, most questions about interactive art cannot be properly addressed absent a rough outline of its ontology. Moreover, it is not obvious what we should say about the ontology of interactive art. For instance, David Saltz has argued that the type-token distinction (which is widely taken to account for the relationship between works of literature, music, theatre, and drama on one hand and instances or performances of them on the other) does not apply to interactive artworks.¹ I shall argue to the contrary that interactive artworks are types whose tokens are produced by our interaction with them. Showing that this is the case will, however, require a

Dominic M. McIver Lopes is Associate Professor in the Department of Philosophy at the University of British Columbia. Recent publications include two books, *Understanding Pictures*, and *The Routledge Companion to Aesthetics* (coedited with Berys Gaut).

Journal of Aesthetic Education, Vol. 35, No. 4, Winter 2001
©2001 Board of Trustees of the University of Illinois

new or, at least, expanded account of how artwork types can be instantiated. As a result, my argument, if sound, has implications for the ontology of art as a whole. For the benefit of those who are afraid this will be a barren exercise in metaphysics, I should add that my argument also touches on the aesthetics of interactive art. The purpose of an ontology of art is to provide a framework of concepts used to account for facts about the nature and appreciation of art, and this I take to be an important constraint on ontologies of art. By examining its ontology, we ought to learn something about the character and value of interactive art.

Interactive Art: An Overview

Before going further, we should put in place a working conception of the sorts of art that may be described as “interactive,” and we should proceed gingerly, for two mutually reinforcing reasons. First, computer-based art, particularly Internet-based art, remains in its formative stages, and little definitive can be said about what shape it is likely to take when, or if, it reaches maturity. A great deal of what is written about computer-based art is pure speculation and is likely to be proved baseless. It is good practice to be wary of taking views on phenomena when few cases exist. Second, “interactivity” is a buzzword used rather indiscriminately to describe everything from computer games to Internet shopping, and it is not the case that all computer-based art is interactive in any interesting sense. Indeed little of it is.

This is confirmed by a survey of the main types of computer-based art. Since computers can be programmed to perform the functions of other, purpose-built devices, they can be made to emulate many of the tools traditionally used to make and transmit art. Computer networks broadcast text, images, or sounds, as do books, television, and radio. Computers have been built as instruments for creating or performing artworks. Word processors are obviously used to write novels and plays, and synthesizers to compose, notate, and perform music. More interestingly, musical “hyperinstruments” enable their users to produce sounds by manipulating a variety of input devices—for example, by drawing pictures, waving batons, or squeezing and stretching soft objects (see <http://www.media.mit.edu/hyperins> and <http://creatingmusic.com>). Finally, computers have been programmed to perform the function, hitherto reserved to human beings, of creating works of music and stories. David Cope’s program *EMI* outputs new musical works in the styles of classical composers.² George Lewis has written a program called *Voyager* that outputs improvised music in real time and with which Lewis has jammed in public performance (*AI*, 122).³ This is a case of a human artist collaborating with a computer. Computers can also be used as communication channels by means of which many artists may

collaborate, as in the creation of Tod Machover's *Brain Opera* (see <<http://brainop.media.mit.edu>>).

Such uses of computers in making and distributing art are frequently touted as "interactive," but this is true in only a trivial and uninteresting sense. After all, what activity is not interactive? Playing a hyperinstrument is interactive in just the way playing a violin or piano is interactive. Both require that the player act upon her knowledge of how to play the instrument in order to achieve the desired sound, and an important component of this know-how is her ability to modulate her manipulations of the instrument in response to the way the instrument sounds. Similarly, listening to a computer-generated concerto, though it may differ in many ways from listening to a manmade one, involves the same kind of audience participation. Both demand and reward the audience's input, from attention to structure and nuance to knowledge of musical context.⁴ Collaborating with other artists by means of a networked computer may be more efficient than collaborating in a studio, especially if the number of collaborators is large, but I see no reason to describe it as more interactive than the collaborations of Gilbert and Sullivan. And while jamming with a Power Macintosh is certainly more interactive, in an obvious sense, than using it to play CDs, it surely involves no more give and take, no more sharing and challenging of musical ideas, than jamming with a human musician. In truth, computers used to emulate art-making instruments and activities are likely neither to be more interactive than what they emulate nor to be interactive in a new way.

That we interact with computers in the making and appreciation of art is hardly remarkable once we realize that making and appreciating art are always interactive activities. If attributions of interactivity are questionable, it is not because computer-based art is not interactive, but because just about any process for making or experiencing art is interactive. (The concept of interactivity is a good candidate for hype just because its boundaries are so diffuse.) Thus if any notion of interactivity is to be worth serious attention, it must be rather more refined a notion than the ordinary concept of interaction. In what follows I propose just such a narrow definition of interactivity and then describe some works of computer art that might plausibly be thought to comply with it.

A good place to start is with the standard computer science definition of interactive media as those that allow users to control the sequence in which they access content. What computer scientists often have in mind here is hypertext. In hypertext, the index or menu that allows a user to access content is integrated into the content itself — there is no distinction in layout or design between menu and content. Some websites do not have a menu or table of contents but rather consist of passages of text, parts of which are links to other passages of text. Similarly, "image maps" are hypertext because

they have “hot spots” which when selected by a user call up new content. But, by the standard definition, hypertext is only one case of interactivity. Rubrics, tables of contents, indices, card catalogues, and even the scholarly footnote are also interactive since they are tools for navigating content. Thus it is unlikely that the standard definition can help us isolate works of art that are interactive in any interesting and new sense. There is no difference in kind between the interactivity of hypertext and that of a concordance or table of contents. For this reason, I shall say that the standard definition applies to “weakly interactive” media. By “weakly interactive media” I mean those that give users control over the sequence in which they may access content.

One paradigm of “strong interactivity” is a game. What is engaging in a good game is that the course of the game depends on the players’ choices. Their choosing some moves over others is part of what makes each playing of a game unique. Games are “strongly interactive” because their users’ inputs help determine the subsequent state of play. Whereas in weakly interactive media the user’s input determines which structure is accessed or the sequence in which it is accessed, in strongly interactive media we may say that the structure itself is shaped in part by the interactor’s choices. Thus strongly interactive artworks are those whose structural properties are partly determined by the interactor’s actions. By a work’s “structural properties” or (more briefly) “structure” I mean whatever intrinsic or representational properties it has the apprehension of which are necessary for aesthetic engagement with it — sound sequences in the case of music and narrative content in the case of stories. It should be kept in mind that what is in question here is not the structure of a work as its user *experiences* it, for that is “interactive” in some broad sense for all works of art, but the structure of the work itself. Only the structure of strongly interactive artworks is partly determined by what the interactor does in accessing the work. By contrast, the structure of merely *weakly* interactive works is independent of how that structure is accessed.

As it happens, some uses of hypertext are strongly as well as weakly interactive. That is, under some conditions, the sequence in which users experience parts of a work partly determines the structure of the work they experience. To see why, consider why most hypertext is *not* strongly interactive. Imagine a hypertext novel which narrates a sequence of events but has links allowing the user to read the novel in any order. Although the user may read about the narrated events in any order, this does not change the order of the narrated events themselves, nor, indeed, the order in which they are narrated, and it is these that comprise the structure of the work. Whatever *Ulysses* is about is not altered by my reading it in order of, say, chapter length. The point generalizes to works in the temporal arts. The structural properties of the *Goldberg Variations* are not changed by my setting

my CD player to randomly shuffle the order in which it plays the tracks (though my experience of that structure is changed). This is because its structure comprises the sequences of sounds that comply with the score. The structure of most temporal artworks is comprises their canonical order of temporal parts; the structure of most narrative artworks comprises their canonical narrative order. (Indeed, this principle flows from any reasonable account of communication, upon which what I say does not depend on the order in which you register my words.)

Yet this also allows that hypertext works may be strongly interactive just in case they lack a canonical temporal or narrative order. Lacking a canonical order, their structure may be shaped in part by the path a user takes through them. Damian Lopes's *Project X 1497-1999* is an online epic, in an amalgam of verse, prose, and images, whose subject is Vasco da Gama's voyage in 1497 from Portugal to South Asia (<http://bitwalla.com/project_x>). While each screen contains text, often narrating individual episodes from da Gama's voyage, there is no overarching structure tying the text on each screen into a single narrative. The interactor traverses the work by hypertext links: every word of the verse links to another part of the work, and although there are navigation buttons, they are unpredictable in their function. Moreover, the opening screen is randomly selected, and if the user declines to interact (or interacts by doing nothing), the screen is again changed in a random fashion. The result is not merely that different interactors access the parts of the work in a different order—that can be achieved with any literary work. It is that there is no reason to think that the structure of any one path through the work can be identified as the canonical structure of work. The work *says* something different with every exploration of it.

Strong interactivity can also be achieved without hypertext. An example is *Transformator*, an "audioactive" musical composition by the Electrica collective (<www.electrica.de>). This work is made up of an image of an abandoned factory, over which the user is to allow her mouse to wander. The spatio-temporal path taken by the mouse over the image determines, by means of an algorithm working with a given set of parameters (roughly, some basic musical ideas), what sounds are played by the user's computer. Using *Transformator* is not like playing an instrument, since the algorithm and the parameters it is given constrain the melodic and rhythmic materials out of which the sound sequence the user hears is constructed. The interactor cannot use the program to play any given melody or rhythm on it. Nor do the movements of the interactor's mouse merely reshuffle a predetermined set of musical phrases. Rather, the interactor's gestures are taken by the computer program as input to generate, on the basis of certain rules, new musical phrases. Thus there is nothing like a single sound or note sequence that could with good reason be identified as this work's canonical

structure. Running it on different occasions, interactors hear different sound sequences. The work's structure is aptly described as protean.

The difference between works that are strongly interactive and those that are not may be brought out by means of an analogy.⁵ I have used the metaphor of exploration to characterize encounters with works of art. An explorer may traverse a piece of territory from any of a number of directions, perhaps by following her whim or perhaps by allowing salient features of the landscape to lead her. Different visits will provide her with different experiences of the landscape. However, the landscape itself (its structure) is not constituted by her explorations. There can be partial explorations that are partial because something is left unexplored. Most works of art are like landscapes. I may listen to part of a piece of music such that there is some part of the music to which I have not listened. I may listen to the parts of the music in any order, but the order in which I experience the sounds making up the work does not constitute the order of the sounds constituting the work itself. "Exploring" a strongly interactive artwork is *not* like exploring a landscape; a different metaphor is needed. It is not possible to explore a game as one explores a landscape, for there is no part of the playing of a game that goes unplayed. One might wonder how a game might have gone if one drew three cards instead of two, but this is to consider a different playing of the game, not an unplayed part of the game that was played. The next section extends this rough comparison of interactive art works to games.

I admit that there may be alternative, better descriptions of the interactivity of *Transformator* and *Project X*. As I mentioned above, I want to be sensitive to the fact that art that is interactive in any interesting and new sense remains in its formative stages. Nevertheless, I am going to suppose that things stand as described: that some works are strongly interactive because varying paths can be taken through them on different occasions, thereby endowing them varying structures. For this, if true, spawns the ontological questions I wish to address. In describing instances of strong interactivity I have assumed that in each we are confronted with a single work. What reason is there to believe this? Why not say that *Project X* and its ilk are not themselves works but rather devices for generating many distinct works? Saying this would, after all, preserve the thought that every artwork has a unique content. Moreover, if only one work is in question, how is it related to its instances? It is only once we have answered these questions that we can hope to discern what it is to author such a work and how we are to take into account the activity of interactors.

Works and Games

I have already noted that one paradigm of strong interactivity is the game. I believe that the ontology of strongly interactive artworks may usefully be

modeled upon that of games. This proposal harmonizes interactive artworks with other multiple-instance works, such as works of literature, performance works, and prints. At the same time, it sheds light on what is new and distinctive of strongly interactive art. For the sake of simplicity I shall focus mainly on the case of interactive music, though what I shall say carries over, with adjustment, to other interactive media.

A consensus has developed that works in some art forms have a dual ontology: the works are types whose instances are tokens.⁶ On this view, musical performances, for example, are tokens of types that are musical works. The relationship between artwork types and their tokens can be described metaphysically or epistemically.⁷ The work type determines the properties which anything must possess in order to count as instances of it. Indeed, multiple-instance artworks are norm-types, as they determine the properties their instances must possess in order to count as *correct* instances.⁸ But at the same time, we can come to know the work only through its instances. In the case of music, we must abstract the musical work from performances of it by stripping from them properties of the performances themselves.

Thus the type-token distinction provides not merely a salve to our intuition that performances of “Buffalo Soldier” are performances of some generic entity. The distinction’s true value lies in its enabling us to explain how it is possible for a work and its instances to have different as well as shared properties, especially different aesthetic properties. In particular, it accommodates the fact that we evaluate performances as aesthetic objects in their own right, since, as is obvious, properties of a token need not be possessed by its type (a maple leaf may hang on my flag pole but this is not a property the type, maple leaf flag, satisfies). It also accommodates the fact that we can evaluate a work performed independently of evaluating any performance of it, since a property of a type need not be one its tokens possess (a property of *Canis lupus* is that it ranges from the northern United States to the Canadian high arctic, but no member of the species has such a range.) Accordingly, a good work can be given poor performances and a poor work given performances that are, qua performances, good but not redeeming.

It is not enough to note that some artworks are types whose instances are their tokens. An ontology of these artworks must at a minimum consist in giving criteria for identifying artwork types and instances of them. It must have something to say about the kinds of properties objects or events must possess in order to count as instances of works. Multiple-instance artworks are identified by a combination of two kinds of features, genetic and structural.⁹ A work’s genesis is the relationship that obtains between its structural properties and an act of authorship. “Summertime” is essentially composed by Gershwin; Twin “Summertime” composed on faraway Twin Earth by Twin Gershwin is a different work, as is any other structurally

similar work. At least, however, the genetic relation has the same character across works in different multiple-instance art forms. The relation that obtains between “Summertime” and Gershwin is of the same kind as that obtaining between Twin “Summertime” and Twin Gershwin. This is not the case as regards the structural features identifying works. These vary from one art form to another, and tell us something about the nature of each art form. Even so, they can be roughly ordered into two categories. In one category fall artworks whose identifying structural features are indicated by an exemplar or model which is copied in order to produce instances of the work. Photographs, prints, and bronze sculptures are examples of works whose structural properties are indicated by models — photographic negatives, printing plates, and stones, and the plaster originals used in casting respectively. The second category consists of works of performing art, including musical works. Their work-identifying structural properties are typically indicated by instructions for performance, such as, in the case of some musical works, a score. The work is not, I think, identical to the instructions for tokening it. Musical works tokened by following scores are not identical to their scores; they are structures whose properties are *indicated* or described by their scores. The properties so indicated are those against which candidate performances are judged as correct or incorrect instances of the work.

Both the kinds of instructions by which works are identified and the kinds of structures the instructions indicate vary from one type of performing art to another, and sometimes from one genre to another within a performing art. There are four predominant views about works of music.¹⁰ Anti-Platonists hold either that a musical work is identified by its genesis together with a structure of sounds indicated by a score or that it is identified by its genesis together with a structure of sounds indicated by a score and a performance means. Platonists drop the genetic condition. Yet all four views share a quite narrow construal of the kinds of instructions that indicate a musical work. A musical work, on this narrow construal, has the structural properties indicated by means of a score (or a potential score, if the work is not notated).

If the narrow construal is correct, then an alleged “work” of strongly interactive music cannot in fact be one work, but must be a means for generating many works. Each interaction is a playing of whatever work is indicated by a score of the sounds generated by the interaction.

However, the narrow construal may not be correct even for traditional musical genres. James Young and Carl Matheson claim that many improvised jazz performances are instances of works — jazz standards — even though performances of a jazz standard vary so widely in structural properties one from another that they do not conform to a single score. Young and Matheson define an improvised performance as one whose structural

properties are “not completely determined by decisions prior to the time of performance.”¹¹ Some improvised performances are completely spontaneous. They are on-the-spot composition of new works. But most jazz improvisations are not completely spontaneous. They conform to tacit guidelines, which constitute the jazz standard of which they are performances. Young and Matheson observe,

The guidelines can be quite loose and can provide musicians with a great deal of scope....Nevertheless, the performer who opts to follow the guidelines is under some constraints. If these constraints are violated, the performer is no longer performing a particular jazz standard.”¹²

The character of the guidelines determining what counts as a correct performance of a jazz standard vary from one jazz genre to another. The details need not concern us.¹³ It is important to note that Young and Matheson propose a plausible model of the identification of works for improvisation and performances of them that does not adhere to the narrow construal of the identity of musical works. This is good, since performances of a jazz standard do not comply with a common score (they may not even share a melody). If their proposal is correct, identity of musical structure as indicated by a score is not necessary for performances of a musical work.

Defenders of the narrow construal may simply deny that jazz performances that we think are performances of a jazz standard are in fact performances of the same work. They may claim that each performance is the composition of a new work. Young and Matheson defend their ontology of improvised musical works on the ground that it accords with our intuitions. With this I am in agreement. We do normally think of Thelonious Monk’s and John Coltrane’s versions of “Bemsha Swing” as improvisations of the same work. They share a title; they are both attributed to Monk as the composer; nobody would complain that a request to hear “Bemsha Swing” goes unsatisfied by a playing of either. However, if this is the only argument, then comparisons between the ontologies of jazz improvisation and strongly interactive music are not likely to be fruitful, as our intuitions about the latter are not sufficiently settled to need accommodating.

As I noted at the outset, however, I take it to be a constraint on an ontology of artworks that it provide the concepts which must figure in accounts of aesthetic engagement with or judgment of artworks. Thus I suggest that the structural features of improvised sounds do not exhaust the aesthetic attention of listeners literate in jazz traditions. If they are to appreciate properly what they hear, these listeners must attend both to an additional feature of the token performance and also to certain features of the work type performed. They must attend to the improviser’s act of improvising — to the act of making something new (a new improvisation) before their

ears.¹⁴ And they must take note of properties of the jazz standard itself, as they are revealed by the improvisation.

Nicholas Wolterstorff observes that “in listening to a symphony, one hears two things as once, the symphony and a performance of it.”¹⁵ In listening to a jazz improvisation, one hears three things at once: the jazz standard, the improvisation upon it, and relations between them. This fact is relevant to the aesthetics of improvised jazz in three ways. First, there is a pleasure in hearing something familiar take a new form, and this is part of the pleasure to be derived from an improvised performance of a jazz standard. The pleasure depends on hearing a performance *as a performance of a familiar work*. Second, the quality of a jazz improvisation upon a jazz standard is to be judged not only by the musicality of its structure and not only by its novelty, but also by its success, or lack of success, in affording a fresh take on the jazz standard. This judgment also depends on hearing the performance as a performance of a single work. Thus Coltrane’s rendition of “My Favorite Things” is remarkable not only for its intrinsic musical character but for what it reveals about a musical work that hitherto seemed sentimental and trite. Third, proper appreciation of the improviser’s act of improvising upon a jazz standard requires an appreciation of the performer’s ability to create sounds given the limited materials upon which she improvises — that is upon the jazz standard. This appreciation depends upon hearing the sounds created as a version of the standard.

If any of these three claims are true, then it can be explained only upon the hypothesis that jazz improvisations token jazz standards. The hypothesis also explains why it is not the case that all jazz improvisations take the form of spontaneous composition (and indeed why remarkably few do). The jazz standard is not a source of musical ideas to be mined anonymously; it, alongside the improvisation, is an object of aesthetic attention. (The hypothesis might also explain why the full appreciation of most jazz requires knowledge of the jazz tradition. That is, it explains why “Giant Steps” is not suitable material for elevator music.)

That the narrow construal of what identifies a work of music is incorrect does not of course show that interacting with certain sound-producing computer programs is generating instances of a single work. However, it does give us independent reason to jettison the narrow construal of the identity of musical works (or to restrict it to only some musical genres). So all that is now required is an account of what could possibly identify interaction-instances as instances of works, together with an argument to show that the concept of a work of which interaction-instances are tokens is needed to explain our aesthetic engagement with and judgments of interactive art.

I believe the narrow construal is a symptom of a tendency to model the identity conditions of artworks on those of natural kinds. Natural kinds are identified by simple structural or genetic properties. For example, the

essence of a substance like water is its chemical structure. Anything is a sample of water if and only if it is H_2O . Biological taxa are identified genetically. An animal is a member of *Canis lupus* if and only if it has a certain ancestry. Moreover, natural kinds are not norm-types. There are no correct or incorrect instances of water or wolves. But artworks are artifacts; they are the products of human practices. Their ontology is likely to parallel that of such norm-types as sentences of English, philosophical monographs, and baseball games. Of these, the ontology of games is the most perspicuous, and I suggest it provides a useful model for the ontology of strongly interactive art since games are also strongly interactive.

The playing of a game unfolds in time and consists of a succession of states. Each of these states has properties by means of which we track the progress of the game. The properties of each state of play depend upon earlier states of the game and partly determine later states of the game. They also depend upon the rules of the game and the players' moves. As a result, when taken together with the game's rules, the current state of play determines what moves are appropriate for players to make. And the rules can be described as prescribing what moves are appropriate given each possible state of play. In addition, the moves players make, if legal and when taken together with previous states of play, determine the current state of play. For example, a simple game of tic-tac-toe (or noughts and crosses) consists of a sequence of states, each of which is describable by an ordered nontuple, each member of which is a value corresponding to a square's being in one of three states: empty, containing an X, or containing an O. Suppose that after two rounds of play the state of a game is $\langle X, O, X, \text{empty}, \text{empty}, \text{empty}, \text{empty}, O \rangle$. The rules of tic-tac-toe specify what moves are legal and which states (or ordered nontuples) count as wins. Tic-tac-toe is, of course, an extremely simple game, as playings of it can progress through only a relatively small number of possible state-sequences. Playings of most games, like baseball or chess, can progress through an indefinite number of sequences of states. This is a key feature of games worth playing. Our enjoyment of games depends on their future states being unpredictable (which is why tic-tac-toe is no longer enjoyable for children beyond a certain age). This unpredictability is sometimes the result of rules incorporating elements of randomness, but in most games it is also the result of the players' choosing what moves to make, and this requires skill. All but games of pure chance, such as craps, are strongly interactive. Nevertheless, playings of a game are tokenings of a type.

This description of the playing of a game provides the materials needed for an account of how game-playings are tokens of a game type. The rules of a game lay down what counts as a correct playing of the game. Thus two playings are correct instances of the same game only if they conform to the same rules. It is not state-sequences that must be identical across of playings

of a game but rather the rules to which the state-sequences of the playings conform. But while the identity of a game is determined in part by its rules, it also has a genetic component, for two reasons. First, two sequences of states that can be described as conforming to the same rules may not be playings of the same game. Students at the Lyceum who might have played a game with rules identical to those of cricket were not playing cricket. Games have a history. Playings of them are part of a tradition, and the playing of a game with the same rules but which is not part of the tradition is the playing of a different game. The second reason all playings of a game must share a common ancestor is that the rules of a game can change. It is fair to say that this changes the game, but playings of the game under new rules remain playings of the same game.¹⁶

If computers do anything, they implement algorithms — or follow rules. Even strongly interactive works of computer music or hypertext literature are implementations of rule-following algorithms. An interaction-instance of an interactive artwork consists in a sequence of states. Each of these states presents a structure — text or image displays, video clips, or sounds — and makes available some means of interaction, such as mouse inputs or hypertext links. What state a playing of a strongly interactive work is in is determined by its previous states and determines its future states in conjunction with the algorithm and users' interactions. Like a game, the states a user experiences when exploring a sufficiently complex work of this sort will vary from one interaction-instance to another, either because some randomness is built into the implementation of the work's algorithm or else because of differences in the user's interactions. But although a program may generate an indefinite number of distinct interaction-instances, they are generated by the same algorithm. After all, the algorithm just is the function that maps any one state of an interaction-instance onto the next state, given an interactor's gesture and the sequence of previous states. Thus two interaction-instances are correct instances of one work provided that they are correctly generated by the same algorithm.¹⁷

This is but a necessary condition for interactive work-identity: not all programs running the same algorithm generate instances of the same work. Type-distinct programs may run the same algorithm fortuitously, or as a result of an attempt at forging an interactive artwork. What is required in addition is a common genesis. Two interaction-instances are correct instances of the same work if and only if they are run on programs that implement the same algorithm and that have a provenance connecting them to the same author.

The Aesthetics of Strongly Interactive Art

I have proposed that strongly interactive works of computer art are similar to games in ways which aid us in understanding how it is possible for

multiple interaction-instances to be tokens of one interactive work. But I have not yet shown that interactive art has the ontology proposed. Users' intuitions, such as they are, can offer little guidance. Moreover, those who construe the identifying features of works narrowly as structural properties will demur. An argument is needed. I believe the rationale for attributing to interactive art a type-token ontology must be an aesthetic one.

An alternative account of interactive works founders on this point. One might worry that algorithms are entities too abstract to identify interactive works. Why not identify them with the computer programs that run them? As a practical matter, this is what their creators and users do. The problem with this proposal is that unless programs are identified with the algorithms they implement, type-distinct programs may implement the same algorithm. For example, an algorithm may be implemented by programs compiled from code written in different programming languages or compiled for different operating systems or for different processors running the same operating system. Yet we would not want to say that instances of programs running on Windows and a Macintosh are always instances of different works. The reason is that what program implements a work is aesthetically irrelevant. Properties of the program itself have no more aesthetic relevance than properties of a videotape have to watching a movie recorded on videotape. Noël Carroll has argued that films are types whose tokens are screenings, but screenings are mechanically generated by tokens of "templates" such as film prints, videotapes, or DVDs.¹⁸ The film type, not the template, is the object of aesthetic attention. Similarly, interaction-instances of a work of computer art are mechanically generated from the computer programs on which they are run. The programs are the works' templates; the algorithm they implement is the work.

I therefore suggest that the ontology of interactive art must reflect the fact that interactors, in fully appreciating what they are interacting with, must be responsive not only to aesthetic properties of interaction-instances but also to aesthetic properties of interactive works themselves, as they are revealed by interaction-instances. And there is reason to believe that proper aesthetic appreciation and judgment of interactive works does require interactors to regard interaction-instances as instances of a work, attending to properties of each and to the relation between them.

First, strongly interactive computer art invites and indeed prescribes repeat encounters, and interactors expect and are attuned to differences between interaction-instances (which are sometimes ensured by the use of randomizers to prevent interactors retracing their steps through a work). Of course, any work or performance of a work is different from all other works or performances. A performance of "My Favorite Things" is different from a performance of Bach's *B Minor Mass*. This is not very interesting. Differences only become interesting when they are perceived as differences among things which there is some aesthetic point in taking to be of a kind.

Thus differences among performances of the *B Minor Mass* are interesting. Moreover, it is disappointing if the similarities and differences between one interaction-instance of a strongly interactive work and another appear random. The point of repeated interactions must be to discover in the work some hint of coherence or unity. This point is lost either when interaction-instances resemble each other so much that acts of interaction become gratuitous or when their differences are too great to indicate anything about the work itself. Repeated interaction is not only a source of pleasure for interactors but is also a basis for evaluation. *Project X*, for example, is constructed as a metaphor both for exploration and for the under-determination of historical accounts by historical events.¹⁹ The interactor is meant to regard her encounters with the work as reenacting the exploration of unknown realms and replicating the multiple recollections of the original explorers. (Of course, just this point can be gleaned in an instant; the value of the work lies in the metaphor's unfolding from instance to instance.) Interactors are to view what changes from one interaction-instance to another as the presentation of different facets of a single work.

A second reason interactors must regard interaction-instances as instances of a single work has to do with the attitude interactors are expected to take to their own contribution.

Saltz defines interactive artworks as those which involve "performative" interactions, those in which "the interaction itself becomes an aesthetic object" (*AI*, 123). He claims that the aesthetically relevant properties of performative interactions are not properties of works but of the *interactor in the work* — in performative interactions, "you become a prop in your own game of make-believe" (*AI*, 122). Paradigm cases of performative interactions with computers are role-playing games, such as *Myst*, in which the interactor assumes a persona who acts in a fictional world, and the cases of interactive art Saltz discusses all have elements of role-playing. Having defined interactive artworks as necessarily prescribing performative interaction, Saltz concludes that "to interact with a work of computer art does not produce a token of the work the way performing a dramatic or musical work does (*AI*, 123). This is because interactive computer programs merely "provide contexts in which actions are performed" (*AI*, 123).

Saltz's argument is not very clear, but it parallels an argument given by Philip Alperson concerning jazz improvisation.²⁰ Alperson defines improvisation as an action. This action can be evaluated aesthetically, for example, as virtuosic, allusive, or derivative. From this Alperson infers that improvisation "is the spontaneous creation of a musical work as it is being performed," not the instantiation of a multiple-instance work.²¹ "This emphasis on the productive activity of musical improvisation," he adds, "may seem peculiar to one who thinks of music in terms of a certain kind of product, viz. a potential or actual structure of sounds."²² Taking Alperson's

argument as a model, then, Saltz's argument is this: an artwork is whatever is the object of aesthetic attention; and in performative works, the object of aesthetic attention is the token act of interaction; so a performative or improvised work is the token process of interaction or improvisation. Performative interactions are not tokens of work-types.

This argument ignores the salient virtue of the application of the type-token distinction to art, namely that it allows for dual objects of aesthetic attention. It is possible, indeed usual, to attend simultaneously to properties of a performance qua performance and to properties of the work performed. There is no reason to think we cannot attend to both process and product at one and the same time. The fact that we direct our attention upon interactive processes, or upon our own actions as interactors, does not show that we cannot and do not simultaneously attend to properties of a work-type with which we are interacting. Moreover, just as appreciation of an act of improvisation depends on knowledge of the work a musician is improvising upon as well as of other improvisations upon the work, proper appreciation of one's interaction with an interactive artwork depends on the knowledge that one can trace many paths through the work and thereby learn something about the work. To appreciate properly one's action as an interaction, one must regard it as an interaction by means of which one may discern the work's properties.

I conclude that the appreciation of interaction-instances of interactive art depends on regarding them as instances of works. Some of the implications of this conclusion for aesthetics are worth noting. For if interactive works are as I have described them, if they have the ontology I have proposed they have, and if appreciating and evaluating them have dual aspects, then some of our art-theoretic concepts require realignment. One such concept is that of authorship. In the case of music, for example, it is usual to say that composers bring works into being by making formative decisions about how their instances shall sound. But this is too narrow. In some cases, creating a work is like creating a game. Some composers create works having an indefinitely large set of possible interaction-instances with different sound structures. Moreover, composing such a work does not require an awareness of the sound structure of every interaction-instance. Composers of interactive works can be surprised by interaction-instances of their works and can thereby learn things about their works in a way that composers of non-interactive music cannot.

Similarly, the role of the interactor is not well-understood in terms of the traditional notions of "audience," "performance," "interpretation," or "playing." Taking again the case of music, strong interaction resembles neither playing an instrument nor playing a CD player or tape machine. Wolterstorff proposes that these are extremes on a spectrum. Moving along the spectrum from playing an instrument to playing a tape machine,

there is less and less *feedback* from what the operator of the instrument *discerns* to be the acoustic properties of the sound-sequence produced, to what he actually does with his instrument subsequently; as indeed there is less and less *adjustment* of what he does to his instrument in the light of what he *anticipates* will be the results if he does this or that to his instrument.²³

Strong interaction, on this view, is not merely playing a tape machine. But neither is it playing an instrument in the traditional sense, since the interactor has little if any intentional control of the melodic, rhythmic, or even dynamic properties of the sounds produced. For the same reason, strong interaction is not a case of the performance of a work. Performance is an intentionally directed action in ways that strong interaction is not. To perform a work is to have beliefs about how the work should sound and to enjoy a reasonable measure of success in bringing it about that the sounds one produces are those one believes the work has. But only those who are familiar with the full range of possible interaction-instances of a work satisfy this condition. Most interactors do not have any beliefs about how a work of interactive music should sound (beyond the trivial belief that the work should sound however it does in fact sound when the machinery is operating correctly). Moreover, it hardly needs saying that if strongly interactive works are not, in the main, performed, then they cannot be interpreted. But although interactors do not play or perform interactive works, they are not like audiences of traditional works. Certainly, the beliefs and cognitive capacities of art audiences help shape their *experiences* of instances of a work, but interactors, through their actions, help shape the properties of the interaction-instance *itself*.

John Cage once described music as “a social art, social in the sense that it has consisted...of people telling other people what to do, and these people doing something that other people listen to.” His own aim, probably never realized in his own work, was to create “a situation in which no one told anyone what to do and it all turned out perfectly well anyway.”²⁴ Strongly interactive art has the potential to realize this goal. The reason has to do with the distinctive nature of interactive artwork types and also the distinctive way in which interactive artworks types are tokened.

NOTES

1. David Saltz, “The Art of Interaction: Interactivity, Performativity, and Computers,” *Journal of Aesthetics and Art Criticism* 55 (1997): 123. This article will be cited as *AI* in the text for all subsequent references.
2. David Cope, *Experiments in Musical Intelligence* (Madison: A-R Editions, 1996).
3. The claim that computers create works of art is admittedly tendentious. Computers do not have, at present, the intentional states that one might plausibly hold to be necessary for artistic creativity. Nothing hinges on the point here.

4. It is true that appreciation in one case depends on knowledge that the music is composed by computer while in the other it depends on knowing that it was composed by Bach, but then appreciating a concerto may depend on knowing that it was penned by Stravinsky and not Pergolesi. The beliefs may differ in content, but both kinds of appreciation are interactive in the sense that they require the listener to make a doxastic contribution.
5. I thank Saam Trivedi for suggesting this analogy.
6. Richard Wollheim, *Art and Its Objects*. 2d ed. (Cambridge: Cambridge University Press, 1980); Nicholas Wolterstorff, *Works and Worlds of Art* (Oxford: Oxford University Press, 1980); Stephen Davies, "The Ontology of Musical Works and the Authenticity of their Performances," *Nous* 25 (1991): 21-41; and Noël Carroll, *A Philosophy of Mass Art* (Oxford: Oxford University Press, 1998).
7. Davies, "Ontology of Musical Works," 28-29.
8. Wolterstorff, *Works and Worlds of Art*, 58.
9. Jerrold Levinson, "What a Musical Work Is," in Jerrold Levinson, *Music, Art, and Metaphysics* (Ithaca: Cornell University Press, 1990).
10. An exception is Wolterstorff, *Works and Worlds of Art*.
11. James O. Young and Carl Matheson, "The Metaphysics of Jazz," *Journal of Aesthetics and Art Criticism* 58 (2000): 127. This will not quite do since jazz performers sometimes plan and practice their improvisations prior to performance, or repeat them in successive performances. In recording sessions, they typically play improvisations refined in live performance.
12. *Ibid.*, 129.
13. *Ibid.*, 129-31.
14. Philip Alperson, "On Musical Improvisation," *Journal of Aesthetics and Art Criticism* 43 (1984): 17-29.
15. Wolterstorff, *Works and Worlds of Art*, 41.
16. This account is somewhat oversimplified. The rules of a game may change from one time period to another or from one context to another. In professional ice hockey there have been changes to the rules setting out legal play within the crease and, due to the absence of boards, pond hockey has some rules that professional ice hockey lacks. What we should say is that a set of rules are constitutive of the same game only if they belong to a lineage. Correct analyses of "same game" and "same rules" both have a genetic component. This is not, however, a complication of which we must take note when exporting the ontology of games to that of artworks.
17. Strongly interactive computer artworks are closely related to strongly interactive computer games, especially role-playing games. A game like *Myst* projects a fictional world, but what is fictional within any playing of the game depends partly on the user's interactions. The fiction cannot be identified with the imaginings it prescribes, since what imaginings are prescribed in a particular playing of *Myst* depends on the course of the playing. Nevertheless, the playings are instances of the same game. The reason is that the fictional worlds projected are implementations of what might be called the *Myst* algorithm.
18. Carroll, *A Philosophy of Mass Art*, 212-13.
19. Damian A. Lopes, "The Art of Navigation: The Technological Narrative of *Project X 1497-1999*," *Open Letter*, 2000.
20. Alperson, "On Musical Improvisation," 17-29.
21. *Ibid.*, 26.
22. *Ibid.*, 27.
23. Wolterstorff, *Works and Worlds of Art*, 79.
24. Richard Kostelanetz, *Conversing with Cage* (New York: Limelight, 1988), 74.