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## **Abstract: AESTHETICS AND INTERACTIVE ART**

Many, perhaps most, questions about the aesthetics of interactive art are still open.

For instance, a number of artists have said that the properties of the visual or musical product, or art object, are irrelevant. What matters is the nature of the interaction itself. But is that a reasonable position? If so, just what sort of interaction is to be valued here? A number of different criteria have been suggested, some of which are opposites.

Does interactive art raise any questions about the identity of the "artist" which aren't raised by other (non-interactive) examples of computer art?

Perhaps the fundamentally new technologies involved demand a radically new aesthetic? If so, to what extent should that reflect specific properties of the technology as such? Or perhaps we can/should rely, to some extent at least, on familiar principles of aesthetics to evaluate interactive art?

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## **AESTHETICS AND INTERACTIVE ART\***

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## **I: Introduction**

As a practice, interactive art--wherein the form of the art object is partly determined by the actions of the audience--is by now well-established. It's not mainstream, to be sure. But it's a recognizable genre (e.g. Krueger 1991; Candy and Edmonds 2002; Ascott 2003; Whitelaw 2004). Most, though not quite all, depends on the interaction of one or more human beings with a computerized system.

A caveat, before we begin: I just referred to "the form of the *art object*", by which I meant the images/sounds that actually result from a given interaction, or series of interactions. One might

argue that the "art object", in this context, should be regarded instead as the program (plus attached equipment), with all its myriad potential. If we were to take that line, then the issues about artist's identity that we'll explore in Section IV would hardly arise--for there's normally no ambiguity about who designed, and usually also wrote, the program. ("Normally", because evolutionary art is arguably an exception: see Section V.) However, they repeatedly do arise, within the writings of the interactive artists themselves. Accordingly, I'll continue to use "the art object" to mean *the forms that happen to arise when interactive art is put into action*.

Some interactive artists avoid talk of art objects or artworks. Instead, they recommend the term "art system", to cover all of the participating entities: namely the program, technical equipment, relevant aspects of the environment, and the human viewer/participant (Cornock and Edmonds 1973). So what I call the art object is just one part of the art system. These writers point out that many art systems involve interdisciplinary teams--comprising artist, programmer, engineers, lighting technologists and so on. The "creativity", they say, is distributed over all these team-members, even if it is mostly inspired by the so-called artist. Under their usage, then, the issues about artist's identity discussed in Section IV still arise.

This genre has been developing for over fifty years, since Gordon Pask, Edward Ihnatowicz, Roy Ascott, and Ernest Edmonds first experimented with it in the 1950s and 1960s (Boden 2006: 4.iii.e and 13.vi.c). That development has been part-driven by internal aesthetic principles. But it has depended also on technological advances in AI and human-computer interfaces, for in the vast majority of cases the interaction involved is mediated by a computer.

Ihnatowicz created a sensation with his "SAM" mobile, a metallic "flower" that moved towards the source of sound--and even more so with his giraffe-like "Senster" of the early 1970s (Zivanovic 2005). This Meccanoish (steel-strut) creature would move its neck and lower its head towards someone whom it heard walking or speaking in its vicinity. A loud shout, however, would make it retreat--and stay timidly dormant for a while. The emotional effects of these lifelike interactions on the human participants were startling, and as Senster's fame spread it spawned a constant pilgrimage to Phillips, Eindhoven, where the sculpture was installed for several years.

The highly creative cybernetician Pask, from 1950 on, was especially prescient. For instance, he planned a cybernetic theatre, in which audience reaction would influence the unfolding of the plot on stage--an idea that's now being claimed as "new" by enthusiasts for interactive media and virtual reality. He led the team of scientists and artists planning Joan Littlewood's 'Fun Palace Project', which would provide a host of challenging diversions not found in ordinary theatres (Ascott 1966/67: 119). He suggested how an architectural space (room, building, public arena...) might, in effect, *learn* and *adapt* to some of its users' goals, and their physiological and psychological reactions (Pask 1969). Some of this learning and adaptation could be automatic (using sensor technology, variable lighting, and moveable walls/screens), some would require feedback-driven modifications by human architects. This work anticipated today's ideas on "intelligent buildings", and is regarded by some as one of the "critical writings for the digital era" (Dong 2003; Spiller 2002: 76f.).

As well as making visionary plans for the future, Pask built some functioning (and sometimes malfunctioning) interactive technology. One example was his 'Musicolour' system for dance

halls, an array of coloured lights that adapted to the musicians' performance. (This was installed in a couple of Mecca dance halls in the early 1950s, but didn't catch on because it often broke down.) Another was his 'Colloquy' of mutually adaptive mobiles. Descendants of 'Musicolour', these mobiles communicated by both sight (colour and pattern) and sound (pitch, rhythm, and simple phrases). They also provided an "aesthetically potent" environment for interactivity, enabling humans to include meaningful interpretation in the loop (Pask 1971). The 'Colloquy' was exhibited in 1968 at the seminal 'Cybernetic Serendipity' conference, the world's first international exhibition of computer art. (Although most interactive art is computer-mediated, not all computer art is interactive; Pask and Ihnatowicz were almost alone in showing *interactive* examples in this exhibition: Reichardt 1968.)

As the list of Pask-projects indicates, the potential scope of interactive art is huge. In this paper, all my examples will involve interactions between the audience and a computerized system. But interactive theatre and video shouldn't be forgotten.

Nor should one forget the Greek-Australian artist Stelarc, who has been exploring the notion of self-as-cyborg for over twenty years (Stelarc 1986, 1994, 2002a,b; Smith 2005). He began (in the late 1960s) with non-electronic man-machine linkages: meat hooks inserted into his skin, and attached to pulleys (Stelarc 1984). More recently he's focussed on human-computer interfaces, for instance by linking/integrating his own muscles with robots, or with random or human-originated messages from the Internet--so that his body becomes a prosthesis for other people. Stelarc is normally labelled a performance artist, but he could also be seen as the pioneer of an especially intimate--and philosophically challenging--form of interactive art. Indeed, we'll see in Section IV that interactive art in general can be regarded as a variety of performance art, for the prime interest is less in the sensory qualities of the product than in the mental and/or bodily processes that produced it.

I said, above, that interactive art is part-driven by internal aesthetic principles. It might have been better to say that each interactive *artist* is part-driven by aesthetic considerations. For there's no generally agreed aesthetic in this area. As Linda Candy has put it: "[A] satisfactory critical framework of new forms in art technology has yet to be developed" (2002: 266). This isn't merely a question of different artists having different signatures, or even different styles. The point, rather, is that many--perhaps most--questions about the aesthetics of interactive art are still open.

For instance, many interactive artists aim to end up with final products that are aesthetically pleasing and/or interesting--even though they may differ (as "ordinary" artists do) about just what counts as aesthetically valuable. In that sense, they're doing old-fashioned art in a novel (computer-based) way. By contrast, a number of their colleagues--including Ascott, Edmonds, and Myron Krueger (1977)--have explicitly claimed that the properties of the visual or auditory product are aesthetically secondary, even irrelevant. What matters is the nature of the interaction itself.

Is that a reasonable position? And if so, just what aspects of the interaction should be assigned aesthetic value? Why should one type of interaction be valued above another? And does interactive art offer (as some of its proponents claim) a radically new view of the identity of the artist?

Before considering those questions, we must ask why it is that the answers are so undecided. In other words, what is so *new* about interactive art, which leaves its aesthetics still so *open*?

## II: What's new?

If one merely looks at (and/or listens to) the final products of interactive art, it's not immediately obvious that there's any special aesthetic problem. One may warm to them or not, as one may or may not warm to the work of a newly-discovered painter hung on a gallery wall. But there's no huge surprise, no instant recognition of a brand new genre--especially if one is already familiar with video art. There's no disorientating shock comparable, for instance, to that experienced on first encountering conceptual art (Boden 200\*\*\*).

Conceptual artists, like some (but not all) interactive artists, explicitly deny the importance of the sensory qualities of the art object. That's partly why the movement has been described as seeking "the dematerialization of the art object" (Lippard 1973). Accordingly, they deliberately downplay the artist's making-skills. Only two things are held to be important. One of these is the interest of the particular idea, or concept, involved. Indeed, the art object itself (if one can speak of it in that way) may be made accessible *only* as an idea.

For example, consider Walter de Maria's 'Vertical Earth Kilometer'. This is a perfect cylinder, made of highly polished solid brass, exactly 5 centimetres in diameter and 1,000 metres long (and weighing nearly nineteen tons). But instead of displaying its finely-crafted material splendour to admiring eyes, de Maria buried it in the earth so that it's invisible. The only indication of its existence is its 5-centimetre-wide circular top, level with the ground and kept free of grass by its "keepers". (Later, de Maria constructed 'The Broken Kilometer', a mathematically precise layout of 500 brass cylinders with the same diameter, and the same overall length and weight. Still on display in Manhattan, this easily visible sculpture can't be properly understood except by reference to the earlier, invisible, one.) In short, the aesthetic interest is held to lie in the *concept* of the buried object, not in any visual/tactile experience of it.

The second challenging aspect of conceptual art is its lack of concern with the artist's making-skills. In orthodox art, these are admired insofar as they can generate aesthetically valued (sensory and symbolic) properties in the object. In conceptual art, they're typically held to be irrelevant (although the appeal of the 'Vertical Earth Kilometer' surely lies partly in the fact that its manufacture is known to be so materially perfect). On the one hand, this allows for the exhibition/celebration of ready-mades, as opposed to hand-crafted unique objects--for example, Marcel Duchamps' urinal 'Fountain', or de Maria's manufactured brass cylinders. On the other hand, anything which is in fact hand-made doesn't have to be made "skilfully". Tracey Emin's embroidered tent, for instance, which carries the names of all her past lovers, isn't supposed to be judged by the skilfulness of her embroidery.

Interactive art is different. It doesn't denigrate making-skills--although, as we'll see in Section IV, it does sometimes interpret and value the "making" in a new way. Nor does it (usually) ignore the sensory/symbolic properties of the product--although, again, it often sees them as much less important than they are normally taken to be.

The making-skills of orthodox art are material skills. An obvious example is the adept use of

paint, whether in meticulously detailed 16th-century images of formal ruffs and Dutch interiors, or in the rougher paint-marks of the post-impressionists, or Jackson Pollock's carefully controlled (yes!) action paintings. The making-skills of interactive art, one might say, aren't material skills at all, but technological/computational abilities--in a word, programming.

To be sure, they result in a visible and/or audible (occasionally, seemingly tactile) end-product, which has many sensory properties comparable to those of orthodox art. But that end-product is a form of virtual reality, not something one can pick up or use as a doorstop. It's a computer-generated image, or series of images, displayed on a VDU screen or projected onto the walls. Or it's a set of sounds with no visible instrument being visibly played. In the extreme, it's an episode in a multisensory immersive virtual reality, in which the audience (wearing special gear) can *feel* the result much as one can feel a real sculpture, and even--so it seems--pick it up and heft its weight.

If the introduction of new making-skills were all, however, our topic would be less interesting than it actually is. It would be like the introduction of a new material, or of a new medium for pursuing already-accepted artistic aims: oil paint, for instance, or photography, or animation using drawings or plasticine. Each of these developments required artists to learn new skills, and each--especially photography--raised new aesthetic questions too. But interactive art goes beyond those examples, in two ways.

First, while introducing the skill of designing (programming) novel possibilities for human-computer interaction, it also suggests that much or all of the aesthetic interest lies in *the nature of that interaction itself*. The focus, in other words, is not (or not primarily) on the intrinsic properties of the final product, but on the interactive processes which led up to it. Second, it suggests that the "human" in this human-computer interaction needn't be thought of only as *the person who has laboriously acquired the new skills* (i.e. the "artist"), but also as *the participatory audience*, whose voluntary and/or involuntary actions help determine the perceptible form of the virtual art object.

Both these points arise out of the key novelty of the genre, which distinguishes it from all others: the constructive interaction between audience and art object. The viewer isn't just a viewer, but a playful participant--even a co-creator. As one practitioner has put it, interactive art is therefore *"a whole new field of creative endeavor that is as radically unlike each of [the] established genres as they are unlike each other"* (Ascott 1990: 245; italics added). It's even a radical departure from most computer art, which uses computers merely as "rather complicated tools, extending the range of painting and sculpture, performed music, or published literature" (ibid.).

In short, since it's the audience/art interaction which is new, the new aesthetic problems--unsurprisingly--are located there. In the next Section we'll explore the first point noted above: that the *nature* of the interaction is held to be aesthetically relevant. Then, in Sections IV and V, we'll consider the second point: how the fact of interaction suggest a new understanding of the identity of the maker, or "artist".

### **III: What sorts of interaction should be valued?**

The nature of the audience/art interaction is typically held to be more important than the (conventional) aesthetics of the product because, as we've just seen, the fact of there being any interaction at all is what's new, and special. But it doesn't follow that the conventional aesthetics are wholly irrelevant. Even if (and it's an arguable "if") it's not strictly necessary for the product to have any intrinsic value, one might still reasonably regard an interactive artwork which produces conventionally pleasing and/or interesting products to be aesthetically superior to one which does not.

But perhaps some particular conventional values are to be favoured over others, in this new artistic context? Should the presence of interaction, and/or of some specific type of interaction, lead us to expect that such-and-such a property (of the product) is even more--or even less--important than we've conventionally taken it to be?

For instance, suppose that there are certain aspects of music which are especially hard to achieve in interactive art (as opposed to fully automatic computer composition: e.g. Cope 2001, 2005). One example might be the type of polyphony where several melodies, either different or the-same-with-time-delay, are generated alongside each other. Should we regard this achievement as relevant to aesthetics, or only to technology and/or the IQ of the artist-programmer? In other words, is *difficulty* aesthetically relevant?

Turning now to the interaction itself, there's no "conventional" aesthetics to be considered. That's primarily because the occurrence of any interaction at all is relatively novel. It's not surprising, then, that questions about what effects the interactive artist should aim for still remain unsettled.

There's a second reason why such questions are unsettled--indeed, why one might say that *they needn't even arise*. Namely, by the turn of the millennium conventional aesthetics had died the death with respect to art in general: postmodernist pluralism reigned. Accordingly, any notion of laying down an aesthetic convention for others to follow (as opposed to following it oneself) was anathema. It wasn't acceptable to say that the artist "should" aim for such-and-such effects. (Even so, various characteristics became favoured, if not quite *de rigueur*, their presence/absence being specifically praised/lamented by art critics. One was the deliberate juxtaposition of images and symbols from far-distant cultures around the world, an expression of or comment on late-twentieth-century globalization--Stallabrass 2004: ch. 2.)

However, even if a question needn't arise, it doesn't follow that it won't arise. The question "What should the interactive artist aim for?", or at least "What makes for a successful/satisfying interactive project?", was often raised by the pioneering interactive artists (before the rise of pluralism in art), and it's sometimes still raised now. So, despite the general art-world's flight from aesthetics, it's not unreasonable to take it as our "text for today".

Asking what aspects of the interaction are especially valuable isn't a question that's easily answered. For there are many possibilities--and many actualities too, in the sense that not all interactive artists would give the same reply.

Consider attributability and predictability, for example. Some interactive artists say that the changes in the computerized product/environment should be clearly attributable by the human

person (i.e. the audience) to his/her own actions. The artists may or may not deem it acceptable for this attributability to dawn slowly on the person concerned, as opposed to being near-instantly recognizable. But for other artists in this genre, it is enough that the visible/audible changes be actually caused by the audience, irrespective of whether the audience realizes that fact.

The changes may be, and perhaps (?) they aesthetically should be, surprising. For instance, they may be types of change that are normally beyond our control. In some virtual worlds, the movements of the audience can counter the usual effects of gravity, or cause an object to move from one spot to another without transversing the intervening space. Is that merely entertaining gimmickry, or does it have intrinsic artistic value?

Irrespective of the nature of the changes, one common position holds that it should be clear to the human being, at least after playing around with the artwork for a while (how long is too long?), that it's *their* actions which are causing the changes to happen. I say "actions", but initially they will be involuntary movements, or actions which are *not* directed at causing the changes in question. Only after the attributability link has been established can the viewer *act* so as to cause specific types of change. According to this view, a recognizable direct dependence, even (perhaps?) the growth of predictability--and therefore of creative control--as the audience becomes more adept, is the name of the game.

Others disagree. Some interactive artworks are deliberately designed to make such predictability impossible. But here too, there's room for aesthetic manoeuvre. The artist may aim for near-complete unpredictability. Or the aim may be to entice the human participant to build up expectations over time, only to negate them (repeatedly?) once they've developed. There are many specific ways in which these general points could be implemented. How are we to compare those, in assessing their aesthetic merits?

For example, one artist programmed a VDU maze, to be explored with a cursor. The viewer has some fun in trying to approach the centre ... but then, all of a sudden, the maze reconfigures itself. The cursor remains at the same spot as before, but it's no longer just one or two turnings away from the goal. In effect, the viewer must start all over again. That type of teasing unpredictability will probably win one's approbation--but only for a while. When the maze reconfigures itself a second time, approbation and amusement are likely to give way to frustration and boredom. Is it reasonable to regard an art object that can be enjoyed *only once* as something of high aesthetic value?

For another example of unpredictability, consider the installation 'The Living Room', built in 2001 by Christa Sommerer and Laurent Mignonneau. Here, the movements and speech of the viewer causes images drawn from the Internet to be projected onto the walls, and Internet sounds to be broadcast too. But there's no rhyme or reason: the constantly changing images/sounds are picked more or less at random from those current on the Internet at each particular moment. There's therefore no way in which the viewer can control the specific contents of the result (see Section IV).

The unpredictability is much less in 'Plant Growing', the first (in 1992) of several "biological" installations designed by Sommerer and Mignonneau (Whitelaw 2004: 64-71). Five potted plants (ferns and a small cactus) are placed on pedestals, in front of a large video-projection screen.

Initially, the screen is blank. But as the audience brush against the plants, or actively touch them, images of imaginary plants appear--and move and grow, sprouting new leaves and branches as the humans engage with the real plants. (Unknown to the audience, the potted plants are fitted with small electrodes connecting them to the unseen computer.) The graphic "species" depending on any given pot-plant is fixed, but the particular touches of the human viewer determine just what *this* species-member will look like. The determination isn't random, but systematic--so to some extent predictable. Each person can act individually, or a group of people can coordinate their touches to achieve relatively coordinated effects on the screen.

Sommerer and Mignonneau's later work includes a variation of 'Plant Growing' called 'Trans Plant', developed in 1995/96. Here, a jungle forms on the semicircular walls surrounding the viewer as he/she moves around the room. The relations are systematic and predictable: grass grows where the viewer walks, and trees and bushes grow when and where he/she stays still. In addition, the size, colour, and shape of the virtual plants depends on the size and bodily attitudes of the human being. Children will co-create plants different from those brought into being by their parents, although the system can be "cheated" if the child stretches out his/her arms. The colour density will change if the person moves their body slightly backwards or forwards.

Another interactive installation, also inspired by the biological world, is a room with a number of fine strings hanging from the ceiling. The walls bear projected images of trees of various species. When the viewer's body brushes against a string, another tree (or trees) appears, its location and species depending on the particular string and/or movement. It's possible for the viewer not even to notice the newly-appearing trees for a while. When they do, they don't necessarily realize that it's their own movements which are causing the virtual forest to grow. And it may take a long time (if ever) before they realize the systematic relation between their movements and the locations/species of the new trees.

Does the fact that this interactive systematicity is (a) present, and (b) ultimately recognizable, make this installation aesthetically superior to one in which the newly-appearing locations/species would be random? If so, why?

One answer to that question might be justified in terms of the issues discussed in Section IV. Namely, the more voluntary control the viewer has over the movement-induced changes, the more he/she can be regarded--and can regard him/herself--as not merely an active participant but also a creative/guiding one. If (as some claim) the aesthetic of interactive art in general is one which stresses the creative role of the audience, then systematic "tree-planting" is preferable to random placements. (Even so, questions remain about which sorts of systematicity are preferable.)

Alternatively, one might say that clumps of same-species trees are aesthetically preferable to having individual trees dotted around at random--either because this arrangement is more botanically plausible and/or because it gives added visual structure, and therefore interest, to the image. One way of achieving that would be to have certain strings assigned to certain potential clumps, such that the viewer--once they'd realized the "projection rules" involved--could design a multi-species forest more or less at will.

A clue would (or rather, could) be provided if the viewer happened to touch the same string

several times, perhaps because they were standing right next to it while still looking at the original image on the walls. For then a new--or newly-enlarged--clump would "happen" to appear, and catch the viewer's eye. This clue would increase the degree of control and predictability, from the point of view of the audience. If those two dimensions are taken to be aesthetically valuable, then a clue-providing interactive installation, whether this one or any other, is to that extent a "good" one.

Another way of approaching such questions would be to focus on predictability/control not in the abstract, but rooted in human embodiment. Presumably, this would make it easier for the viewer to learn the causal relationships, and also easier to manipulate them once they'd been learnt.

For example, there might be a direct and "sensible" mapping between the human and the computerized end-product. So any movements made by the viewer's left arm or leg, or the lefthand side of the body in general, would cause changes only on the lefthand side of the room; similarly, forward movement of the viewer's body or body-parts could cause visible changes seeming to bring the current focus of interest nearer. Or, instead, there could be a direct but "nonsensical" mapping. For instance, left and right, forward and back, could be systematically reversed: a Looking-Glass world in one's actual experience, unlike the purely imaginary descriptions bequeathed to us by Lewis Carroll. In principle, John Tenniel's illustrations could be borrowed to provide clues as to what was going on.

My guess is that Tenniel's Red Queen wouldn't be needed, because the embodied participant would become aware of the reversal easily enough. Projection rules even more bizarre than straightforward 180° reversal are of course possible. Whether they would be realized by the participants is an open, and interesting, question. (Such exploitations of embodiment would probably work best in room-sized installations rather than VDU-screened videos, but similar principles could be applied in the small-scale versions too.)

Temporal relations could be varied, too. The "sensible" scenarios would have fast and slow body-movements being reflected by fast and slow changes in the display. "Nonsense" would, up to a point, map fast onto slow and vice versa. In a fully immersive virtual world, the absence of time-faithful mapping would be especially disconcerting.

But what's wrong with disconcerting one's audience? It's a common artistic strategy, at least in modernist and--especially--postmodernist art. If (and as we've seen, this is a genuine "if") what one seeks to achieve is predictability, then my guess would be that the more the viewer's embodiment is systematically emphasized in the ways sketched above, the sooner the predictability will be recognized. To that extent, reflections of embodiment would be aesthetically valuable. (One might still argue, however, that the recognition shouldn't be too prompt, that the participant should do some "work" to gain the insight.)

The artist might have additional reasons for respecting, and drawing the audience's attention to, human embodiment. For the topic, or theme, of the artwork might be embodiment *as such*. If so, the semantic content of the images (and the accompanying verbal text, if any) could somehow draw attention to bodies and/or to the general human experience, or predicament, of being embodied. The rules of image-change in such cases would be body-grounded (though not

necessarily "realistic"), as discussed above. But now, they wouldn't stand alone. Rather, they would reinforce the body-centred semantics, or theme, of the installation.

Body-grounded rules of projection need not be fixed: they could change occasionally. For instance, one might start out realistically, on this side of the Looking Glass, but go through to the other side after ten minutes or so. Is that inherently interesting, and aesthetically desirable? Or is it confusing, a sort of artistic sadism inflicted on the audience?

However, if the artist is seeking to convey some specific concept or message, as opposed to presenting a contentless but entertaining series of images, then any changes in the projection-rules should be semantically coherent with meaningful changes happening in the images being shown. (This leaves open the question of how far "coherence" should be regarded as an aesthetic value in its own right; Marc Chagall's dreamscapes, for instance, are incoherent by everyday standards.)

Do apparently boring things such as the speed of computation matter? Certainly, the experience one has in interacting with a virtual environment or a robot will be very different depending on whether its responses are speedy or sluggish. Too slow, and the audience's causal responsibility may not even be recognized. Too fast, and it may not be analyzable--so cutting down on the delicacy of control. Just right (perhaps), and the viewer will sense an unfolding rather than an immediate response--which may or may not be regarded as a valuable aspect of the art object.

What about multi-media? Is an effective audio-visual example inherently "better" than a purely visual or purely auditory one? If so, why? To be sure, it may display the ingenuity and skills of the artist to greater effect, so that the artist is better satisfied with it as an emblem of ego. But from the point of view of the audience, why (if at all) is a multi-sensory experience aesthetically preferable to a single-sensory one? If the VR example is aiming at verisimilitude, then multi-sensory results (provided that they are plausible) are certainly preferable. And in a training-simulator for an airline pilot, or for a fighting soldier (e.g. the US Army's JFETS, or Joint Fires & Effects Trainer System: see [www.ict.usc.edu](http://www.ict.usc.edu)), verisimilitude is pragmatically desirable. But what's to say that VR designed for artistic purposes has to aim for verisimilitude?

Again, how can one weigh these two types of "unrealistic" installation against each other: (1) a VR environment which is unrealistic in deep ways (such as the absence of gravity, mentioned above) but otherwise very like normality, and (2) a wholly fantastic virtual environment? Is bemusement (as opposed to surprise) on the part of the viewer to be regarded as an aesthetically relevant dimension? If so, is it important that the bemusement can eventually fade, allowing systematic negotiation/creation of even the fantastic world? Or is an endlessly bemusing fantasy, perhaps even having the appearance of chaos, just as acceptable in artistic terms?

You may not even want to try to answer these questions. You may say, instead: "Let a hundred flowers blossom!" And in effect, that's what interactive artists themselves say. For as remarked above, there's no agreed aesthetic in this area. The artists aim for different effects. Some don't make their aesthetics explicit. Others do, but differ in the justifications they give. This discussion isn't aimed at laying down the law about such matters. Rather, its intention is to indicate some of the dimensions that might be thought relevant.

In particular, it's aimed at uncovering dimensions of experience which--unlike the "beauty" of the resulting images, for example--can arise *only* in relation to this new (interactive and computer-based) artistic genre. It's because these possibilities for interaction are so unprecedented that it's plausible to argue that a fundamentally new technology demands a radically new aesthetic.

Whether that aesthetic should reflect *properties of the underlying technology as such* is another question. We'll see in Section V, for example, that some interactive art is based on evolutionary algorithms. Many of the artists concerned regard it as crucially important that the audience be aware of this fact. One must ask why they feel that this awareness has aesthetic relevance.

#### **IV: Audience as artist.**

Interactive art, as remarked above, can be thought of as a form of performance art, wherein the prime interest is in the mental and/or bodily processes that produced it. Arguably, *all* art, even including the 'Mona Lisa', is performance art in that sense (Davies 2004: esp. chaps. 7-10). If so, then interactive art isn't quite as marginal as a more conventional aesthetics would imply. And certainly, all art-audiences are participatory, in the sense that they actively construct their experience and interpretation of what they see or hear. (That's largely what distinguishes the spontaneous enjoyment of craftwork from the culture-based appreciation of fine art: Boden 2000.) Conceptual art, as we saw in Section II, puts a special burden on the active mental engagement of the audience. But interactive art is participatory in an even stronger sense.

In other genres, the art object is made--or, as in some cases of conceptual art, described--by the artist, where the artist's identity is clear. (Or relatively clear: Jeff Koons, for example, is notorious for having "his" canvases painted on his behalf by his assistants.) In interactive art, by contrast, the audience is the maker. Not the only maker, to be sure, for it was the named "artist" (with the cooperation of the engineers) who made the interaction possible in the first place. Nevertheless, the final form of the art object is generated by the actions of the audience.

These actions are highly various, as we've seen. They may be simple button-presses; or noise-making (from footsteps, through humming, to speech); or voluntary/involuntary contact with surfaces or hanging strings; or changes of body-position with respect to the floor; or specific movements of legs and/or arms. Or even, in Stelarc's case, mental volitions--which result in movements of robotic arms attached to and/or directly connected with Stelarc's human body. It is the artist (I'm using this word as a term of convenience here) who determines which actions will be effective, and what their effects will be. But only the audience decides, or unknowingly determines, just which actions--and therefore just which effects--will take place.

This fact has three interesting implications. One is that the audience's sense of active engagement, or participation, is much stronger than usual. Another is that the engagement with the art object becomes "fun", wherein the audience explores and experiments in an open and playful manner. And the third is that the audience can take some responsibility for the creation of the art object--perhaps accompanied by a sense of pride, or perhaps by disappointment and frustration.

Many interactive artists regard this last implication as especially important. Far from jealously

guarding their own creative ownership of the art, they welcome the so-called audience as a partner in the creative act. Ascott, one of the pioneers of the genre, has always been explicit about this.

Ascott's first forays into interactive art didn't involve computers, but canvases with physical items/images on them that could be continually moved around by the viewer. So the "viewer" of the resulting collages was their physical *maker* too. This aspect was retained, and strengthened, in the computerized art that followed. The value of computer-based interactive art, for Ascott, is its ability to engage the viewer/participant *as creator*, in ways much more wide-ranging than rearranging material things on a canvas (Ascott 1964, 1966/1967; cf. 2003). By the same token, he holds that its aesthetic crux is the nature of the interaction itself, not the (visual and/or musical) end result.

Inevitably, the authority of the single artistic signature is undermined. For crucial creative choices are now being made by the viewer. Indeed, the "viewer" may in fact be many viewers. Given the advent of the Internet and the Web, authorship of the "telematic" artwork may be very widely dispersed:

[The] status of the art object changes. The culturally dominant objet d'art as the sole focus (the uncommon carrier of uncommon content) is replaced by the interface. Instead of the artwork as a window into a composed, resolved, and ordered reality, we have at the interface a doorway to undecidability, a dataspace of semantic and material potentiality (Ascott 1990: 237).

Telematic culture means, in short, that we do not think, see, or feel in isolation. Creativity is shared, authorship is distributed, but not in a way that denies the individual her authenticity or power of self-creation, as rather crude models of collectivity might have done in the past. On the contrary, telematic culture amplifies the individual's capacity for creative thought and action .... *Networking supports endless redescription and recontextualization such that no language or visual code is final and no reality is ultimate* (Ascott 1990: 238; italics added).

In short, interactive art as conceptualized by Ascott is a buttress of postmodernism. Instead of "the death of the author" (Barthes 1977), we have the death of the artist--or, perhaps better, the continuous augmentation of the "artist" so as to include one or more (maybe many more) "viewers".

The term "audience" is ambiguous, covering as it does both a single viewer and a group--even one made up of people widely dispersed over time and space. For a viewer who wishes to bask in the aura of creative artistry, of course, the satisfaction will be reduced in cases where there are *many* people determining the final result. Perhaps a committed postmodernist such as Ascott wouldn't want to pander to such individualistic impulses. Others, however, might regard the degree of the individual viewer's control as a positive criterion for an interactive aesthetics. In that case, multiple viewer-creators might be specifically avoided, or allowed only if deliberate cooperation on their part were possible.

Certainly, the intentions of the originating artist, even supposing that they can be ascertained, may not be crucial to the audience's response to the artwork. Any intentions the interactive artist may have had about the final forms that will result may be frustrated to a greater or lesser degree by the actions/choices of the participatory public. The more diverse the system's potential, the greater freedom the audience has. This provides an extra dimension for the new aesthetics involved. In Section III, we considered predictability/unpredictability *from the point of view of the participant audience*. Here, we're concerned with predictability/unpredictability *from the point of view of the interactive artist*.

It's up to the artist to decide whether they want to constrain the possible results within a particular range, or style, or whether they want them to be more open-ended. In other words, there's a choice as to how far the specific intentions of the artist should be evident in the final products. Unlimited open-endedness would swamp them entirely, risking either mere uninteresting chaos or *complete* creative control on the part of the audience. In practice, of course, the range of possibilities is always limited. But there can be genuine aesthetic disagreement about the extent to which the artist's intentions *should* survive the vicissitudes of the interaction.

(To the extent that they don't, does the artist become downgraded to a mere technologist? Compare: the programmers of a PC's operating system, or of software such as PhotoShop, make the user's creative work *possible* --but they're not credited with the results.)

## **V: Interaction and Evolutionary Art**

The vicissitudes of the interactions are especially great in evolutionary art, a genre that has been growing steadily since the early 1990s (Whitelaw 2004). The first examples were done by hand (e.g. Todd and Latham 1992: 2-6), but the term is normally used to apply to a particular type of computer art.

Here, random mutations change the original structure (e.g. image) in various ways, and the artist continually chooses which "descendants" should be selected for further "breeding". As in non-evolutionary interactive art, the programmer can decide whether or not to constrain the results to fit his/her own aesthetic intentions closely.

Sometimes, the allowable mutations can be deep. They may include, for example, nesting an entire mini-program inside another one (Sims 1991). In such cases, the results are hugely unconstrained and unpredictable. In particular, fundamental changes in the nature of the image

can and do happen. There's no recognizable family-resemblance between widely-separated generations, or even (sometimes) between one generation and the next.

Fundamental transformations in general define a type of creativity that's highly valued, whether in art or science, because the results are not merely surprising but seemingly *impossible* (Boden 2004: 5f., chs. 3-4). Since (by definition) some accepted stylistic rules will have been broken in effecting the transformations, there will be disagreement about the value of the novel results. Transformational results are very rarely accepted as valuable by everyone, immediately. Nevertheless, transformational creativity is usually regarded as the most interesting, and mysterious, type (as compared with "combinational" and "exploratory" creativity--Boden 2004: 3-6, chs. 4-6). To that extent, then, this interactive program might appear to be aesthetically significant. And some pleasing images, almost *irrespective* of one's aesthetic preferences, will usually result.

For all that, the artistic interest of such "wild-mutation" programs is small. One *can't* say that an interactive system of this (transformational) type is in general aesthetically preferable to other, less adventurous, ones. For there's no disciplined attempt to achieve a particular (aesthetically valued) aim, or to explore an aesthetically interesting space of possibilities. To do that, the types of mutation that are allowed must be less luxuriant.

That's why William Latham, trained as a sculptor and working as a professional artist, ensured that the evolutionary programs he designed (with Stephen Todd) could make only relatively superficial changes to the existing image (Todd and Latham 1992). Admittedly, even superficial changes, if continued over hundreds of generations, can produce surprises: images which the artist admits he couldn't (not just didn't) imagine for himself. But there are no fundamental transformative changes. All the images are clearly members of the same species, or style. (They are close to exploratory creativity, especially if one allows that exploratory creativity may involve superficial variations, or "tweaking", of the stylistic rules). It follows that if one finds the general style aesthetically pleasing/interesting, one will find all/most of the evolved images valuable too.

Most of the evolutionary artists interviewed by Mitchell Whitelaw (2004) take the biological inspiration of this technology seriously. That is, they see themselves as producing artworks (sometimes, interactive artworks) which celebrate and explore the phenomenon of life. In those cases where their works enable audience participation, they deem it important that people realize the evolutionary nature of the technology, and its biological provenance--namely, life. With respect to the underlying technical details, of course, the audience is faced with a black box. But their knowledge *that the box contains an evolutionary, life-imitating, process* is--according to this aesthetic--crucial.

In principle, the selection at each generation could be done automatically. But even so, the fitness function--the measure of adaptive/aesthetic value--would normally be decided by the human artist. Normally, but not necessarily: the computer might be able to learn, for instance, which colour combinations the artist--or anyone else--prefers, and add that dimension to the fitness function. And/or it might be able to evolve higher-order fitness functions for itself, even though the basic selection criteria had been fixed by the programmer. That might be possible, for example, if there were unanticipated interactions between the environment and the program--or physical robot.

In some cases of automatic evolution, unexpected results of amazing subtlety can arise. For instance, the neural-network "brain" of a simple evolutionary robot can come to include a mini-circuit comparable to the orientation-detectors found in mammalian cortex (Cliff, Harvey, and Husbands 1993). One wouldn't normally attribute this result to the ingenuity, still less the foresight/intention, of the roboticists. Analogously, a surprising but aesthetically valuable result of an "artistic" evolutionary program wouldn't naturally be attributed to the programmer-artist.

The preceding two paragraphs may have been strictly irrelevant to our topic. It's not clear that a fully automatic evolutionary system should be classed as interactive art, since the "interactions" involved all take place within the computer. There's no human choice guiding the evolution of the novel forms. The only "human-computer interaction" is in the original programming. That's not what is usually meant by the term, which is why most computer-based art isn't counted as interactive art--even though it was produced by human movements (finger-taps on keyboards) influencing computers. The interactions concerned must come *after* the programming. In a fully automatic evolutionary system they do, but they aren't *human-computer* interactions.

If a fully automatic evolutionary system doesn't count as interactive art, should it be classed as "art" at all? If it is, then who is the artist? The programmer is the only (human) candidate. (Whether a computer, in principle, could ever generate a work of art is controversial; for those who define "art" as involving human communication, it could not: O'Hear 1995.) But the programmers of the robot mentioned above had absolutely no idea that an orientation-detector might emerge. It would seem perverse to attribute a similarly unexpected result in an apparently artistic medium to the unknowing programmers. Facilitators, they may be. But artists, surely not? Paradoxically, we would have what appear to be artworks, without any artist.

## **VI: Conclusion**

This paper has raised many more questions than it has answered. For taking the aesthetics of interactive art seriously isn't a simple matter. It involves a host of considerations about conventional aesthetics, about technology, about the psychology of perception and creativity, and about the identity/role of the "artist". No doubt, the ingenuity of interactive artists will raise even more questions in the future.

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