

## Ontology and Aesthetics of Digital Art

Many would claim that the traditional idioms of visual art have lost their capacity for large-scale innovation. Arthur Danto, for example, has argued that the exhaustion of innovation is symptomatic of art having completed a historical process of self-investigation (aimed at clarifying its own essence).<sup>1</sup> I have indicated some of the problems with Danto's approach elsewhere.<sup>2</sup> There is no "grand narrative" of art's self-discovery at issue. The exhaustion of large-scale artistic innovation is due, rather, to the fact that the *structural* conventions and properties that constitute pictorial representation are unable to sustain further significant development *at the structural level itself*.

There are limits to new ways in which the representation of three-dimensional material can be achieved within the traditional idioms alone. The emergence of abstract art opened up new possibilities here, but these, too, appear to have now been exhaustively developed in structural terms.<sup>3</sup> In talking of structural factors, I mean specifically two basic conventions and a group of visual properties. The first convention is the *semantic* capacity to project likenesses of three-dimensional items; the second is the syntactic capacity to represent these as spatially connected states of affairs—where, for example, relations of in front and behind can be distinguished from above and below. (Mathematical perspective and its variants are the most systematic forms of this.<sup>4</sup>) The structurally relevant visual properties include transitions from light to dark and the relation between contour, mass, and detail in the delineation of form. In painting, of course, these factors must also be related to color.

Now if we try to explain why a specific artist is so important, or how a new movement or stylistic

tendency serves to extend the scope of visual art, then reference to the role of the structural features is inescapable. Artists and tendencies refine or innovate by reworking the relation between key structural features so as to open up new possibilities for other artists.

The problem is, however, that the physical nature of media such as drawing and painting places constraints on how far the structural features can be taken in new directions. To give an important example (which I will return to in Section I), when creating a picture, an artist operates, *necessarily*, along an axis defined by two logical extremes. The picture can be created either by marking out the *contours* of a three-dimensional object *or* by assembling and blending marks so as to represent its *mass*, or, of course, by combining elements of both.<sup>5</sup> How the artist relates to this axis is a matter of choice, but that he or she *must* relate to it is determined by what a picture is—as a function of line or mass or combinations thereof.

Because this axis is so inescapable, it is hardly surprising that it has sustained a great deal of artistic innovation. An artist who achieves things of substance in relation to this—or other structural properties and conventions—at the same time opens up possibilities of relevance to other artists also. Ingres' drawings, for example, are executed with an economy and a precision of contour that is almost astonishing. They are exemplars of what might be got from a contour orientation. At the other extreme we find someone such as Frank Auerbach, whose paintings show the dramatic visual potential of creating form from mass, by using impastos piled up to such a degree that an element of relief modeling appears.<sup>6</sup> Now artists may come along whose control of contour is even finer than Ingres', or whose creation of mass is

even more painterly than Auerbach. But the point is that they will only be working around extremes that have already defined the broad scope of the contour–mass structural axis.

With more analysis, similar considerations could be shown to hold also in relation to the other structural conventions and properties. Since their basic scope has already been established through the work of many individuals and movements, they cannot be developed significantly further so as to sustain radical new movements or “isms.” Of course, it is still possible for artists to achieve *individual* creative styles. It is also possible for them to use the established idioms in new and interesting ways—often by combining them or linking them to critical ideas about the nature and function of art. But these are creative in terms of how established media are *used*, rather than in terms of developments that expand the very structure of picturing, sculpture, or abstraction, qua modes of representation.

Obviously, the points that I am making require much more substantial argument in order to be compelling. However, if we can accept them as a viable working hypothesis concerning the limits of traditional art, then it becomes possible to contextualize the potential of new—electronically based—media in very interesting ways.

The basic strategy here, is to argue that some aspects of these media actually extend the structural scope of visual representation *per se*. This can involve, on the one hand, significant development of some of the traditional idioms’ key visual properties and related effects (roughly paralleling, for example, the way in which the insistent development of chiaroscuro radically changed pictorial art, from the early seventeenth century onward). On the other hand, it can involve distinctive ontological factors that involve semantic, syntactic, and broader aesthetic features that build on—and then exceed—what traditional representation and abstraction can offer. This would be structural innovation of the most radical kind.

Now, of course, many new media works combine visual, written, and audio material in ways that obliterate traditional boundaries between art forms. However, many other such works maintain a primarily visual emphasis. These will be the focus of my analysis. I will concentrate specifically on key points of interface and difference between the traditional idioms and those *visually oriented images and configurations that are computer*

*generated or depend upon computer technology for their full visual realization.*

It is common practice nowadays to use the term ‘digital art’ in relation to such computer-dependent visual idioms.<sup>7</sup> I will follow this usage. Text-based works will only figure in the analysis insofar as they emphasize the text qua visual.

Section I addresses some specific hybrids of traditional and digital art and the way in which the latter radicalizes some of the structural visual properties noted earlier. In Section II, I identify some ontological features that are distinctive to digital idioms and that extend the structural scope of visual representation and abstraction. Section III explores two further important aspects of this extension, namely, interactive and evolutionary programs and hardware.

In Section IV, I consider, in detail, the implications of the foregoing for how art might be seen as transformed and taken in new directions, in terms of both the structural scope of visual representation and the concept of art itself. In Section V, I reflect on the new kind of “aura” that accrues to digital art and the possibility of new “isms.”

## I

Digital art centers on electronically based technology utilizing mathematical algorithms for the acquisition, storage, processing, and presentation of information. The information in question is often realized in a visual format (rather than through text or numbers alone) and can consist of generated material (based on mathematical formulae or “painted” using bodily held instruments and dedicated hardware) or of information derived from a scanned source (including already existing images that have been converted to a format readable via the appropriate hardware).

In their *discrete* mode (as I shall call it), such images are presented on individual computer screens or larger scale liquid crystal display (LCD) formats directed by computer technology. There are also what I shall call *distributed* modes of digitally generated images or visual environments based on the use of computer-directed optical effects such as light-emitting diode (LED) lights, which are not confined to a single screen, or which are created through linking many such screens and other optical devices. Both discrete and distributed digital imagery have played a decisive role

in the emergence of computer-based art since the 1960s.

As a starting point, I shall address some possibilities presented by hybrid combinations of digital art and traditional idioms, looking at the significant ways in which they modify one another. Two illuminating examples here are Chris Finley's *Goo Goo Pow Wow 2* and Joseph Nechvatal's *birth Of the viractual*, both from 2001. The former work begins with a digital template constrained in terms of shape, form, and color by the imaging program through which it is realized. The compositional elements are combined and varied digitally, and then executed as a painting by the artist himself—working within the formal constraints inherent in the original imaging program. Nechvatal's work involves compositional elements modified by a virus like program. The files of this interaction are then sent via the Internet to a remote location to be painted by a computer-driven robotic machine.

These examples show two basic possibilities—works created by digital programs that issue in artifacts that are hand made or involve some autographic aspect, or works issuing in traditional art-type artifacts but that are entirely digital in their creation and execution. The digital procedures in both cases are aesthetically validated by the fact that they invest the final image with a distinctive character. In this respect, two characteristics are of special importance. First, the capacity to define forms with hyper clarity and sharpness, and second, the opposite capacity to blend forms in masses with unparalleled smoothness, nuance, and at levels of the utmost visual complexity.

It should be emphasized that these are not simply opposites. Rather they are the extreme developments of that contour–mass axis, which I described in my introduction. To reiterate: on the one hand, one can create a picture by marking an outline, or, on the other hand, one can create it by linking and blending marks to define spatial masses. Most pictures, of course, involve elements of both, and there are endless ways of combining them or articulating them individually. However, the digital or digitally informed drawing, painting, or print can deploy either or (in some complex works) both of these definitive factors with a precision and complexity that is alien to normal, exclusively gesture-based, image making.

Some artists, of course, can execute hyper clear outlines or the most extraordinary intricate nuances and transitions of form by hand, but digital

imagery achieves these to a much higher and sustained degree. Indeed, they are the medium's commonplace characteristics and are found in many works that are digitally realized on-screen without being “translated” subsequently into an autographic idiom. It should be emphasized that this clarity and complexity of three-dimensional definition in the most “realistic” digital imagery is so intense that some artists are occasionally described as producing a form of sculpture—even though the image is still projected on a two-dimensional screen.<sup>8</sup> Of course, it is not sculpture really, but such a usage indicates just how intense digital illusionistic effects can be.

The intervention of digital factors is also of the greatest significance for physically three-dimensional work. In this respect, one might consider the importance of *distributed* digital visual configurations (in the sense described earlier) for installation or assemblage art. Such art involves things brought together by an artist so as to define and give content to a specific viewed space, or space for viewing and acting upon. The space in question can be installed or assembled within an existing one (such as a room), or it can actively modify its location by physical intervention upon it or by controlling the conditions of visual access to it.

Installation and assemblage art was once very much avant-garde. However, it has become such a familiar idiom since the late 1950s as to be more or less mainstream in contemporary art practice. The significance of distributed digital imaging (and computers in general) for enhancing the visionary scope of installation or assemblage art has continuously revitalized the idiom. An excellent example of this is Erwin Redl's work. His *Matrice* series (ongoing since 2000) uses string and, as it were, curtains of small LED lights that have been programmed to change color gradually. The series has a dominant twofold structure. In some cases, they seem to open up (or amplify) the *interior* physical space of the room in a way that is suggestive of layers of inner atomic structure; in other cases, they virtually extend the walls *outward* through the suggestion of similar structures.

Now one of the reasons why installation or assemblage art has become mainstream is because it complements a broader characteristic of post-modern culture, namely, a suspicion of fixed categories and the idea of things simply being present

to perception, or to knowledge, as such. (The widespread interest in deconstructive strategies in various forms of literary thought and cultural analysis is one of the most direct expressions of this.) Installation or assemblage art allows something of this impulse to be enjoyed as a sensory spectacle through a kind of optical (or, in some cases, tactile also) deconstruction of the artworks' traditionally unitary visual presence into a function of intersecting elements and layers of meaning.

Digital imagery and control technology is a key factor in such visual strategies. Quantitatively speaking, it enables more visual dimensions to be deployed in the occupied or mediated space; qualitatively speaking, the complexity and nuances of these visual structures are, themselves, only possible through the use of computer-based technology. Redl's work is a splendid example of this.

The function of digital imagery in the work I have considered so far is mainly one of positive intervention upon established artistic idioms. This intervention extends the scope of these idioms, by allowing their fundamental structures to be radicalized in ways that exceed what is available to digitally unassisted artistic practice. However, as well as this interventional role, digital art has more autonomous aesthetic functions. These are based on characteristics that are logically unique to discrete digital imagery. It is to consideration of these I now turn.

## II

The first distinctive factor is of a perceptual kind. Any pictorial representation involves the projection of a virtual third dimension from a virtual two-dimensional base. I say "virtual" here in relation to the latter, because no plane surface is, qua physical object, flat in absolute terms. Such things as pictures and drawings have a flat appearance, but under close examination their physically three-dimensional nature (no matter how attenuated) will emerge.

Now the digital image's LCD and other display screens appear rather more insistently two-dimensional than autographic picturing. They are *physically flatter* than such conventional media. However, ironically enough, this flatness actually facilitates their capacity to project three-dimensional content in an especially insistent way. This is because physical flatness has no overtones

of autographic presence, in a way that even the most well-finished paintings do.

This insistent evocation of intense three-dimensional illusion is enhanced by the (previously discussed) precision and nuanced complexity with which digital imagery can be generated. Such generation involves human intervention and artifice, but because the image is so dependent on hardware and software for its vivid realization, this suspends our sense of its origins in such artifice. It might be thought that since the image is *so* dependent on technological support, this means that we must be always and inescapably aware of its artifactual origins. However, as in the case of film or TV screens, the supporting technology becomes so familiar as to be unnoticed.

A further contrast with autographic representation arises on ontological grounds. The digital image can be realized at as many different times and places as there are devices to activate it. This *nonlocal* possibility of realization is an expression of the digital image's ontological character as a *token* of a *type*. In this, it contrasts with the emphatically individual nature of autographic pictures such as drawings and paintings, whose existence at any one time is tied to a single physical location. Of course, there is a sense in which some autographically created images, namely prints, can be regarded as tokens of a type whose structure is embodied in the original plate. However, the plate qua unique physical object is of a different ontological order from the tokens, even though it bears the type structure that defines those tokens. Indeed, insofar as the tokens are produced by direct causal contact with the plate, it will gradually wear down the more impressions are taken from it.

In contrast to this, the tokens of a digital type do not degrade.<sup>9</sup> This is because the type that they instantiate is of the same ontological order as they—it is a function of mathematical relations and algorithms. The type program is created before the tokens are, but in no other respect is it distinct from them; neither is there any difference between the individual tokens (except externally—when the hardware that realizes them is in some way faulty, or there is a problem with the software program). We have a case of absolute *type-token identity*.

Again, there are broad parallels to this in the way that some sculptures are made in multiple editions according to the artist's specifications, rather than by hand. But here, in ontological terms, the

individual works of any such series must, qua three-dimensional physical objects, differ from one another in some specific details—no matter how minuscule. In contrast to the digital work, in other words, the type–token identity in sculptural multiples is not absolute between the tokens themselves.

The algorithmic basis of digital art issues in a further ontological feature, which is distinctive to digital imagery, namely, the most complete idioms of *morphing*. This allows one form to be changed into another without any perceptible gaps or abrupt changes. Composite images are, of course, familiar in the form of “identikit” images used by law enforcement agencies, and transparent images layered over one another. But the morphed digital still image generates its composite in a single, *continuous* electrical mathematical process.

Through this, the end product is freed of any visual sense of having been constituted from disparate original elements. Whereas nondigital composites are, as it were, visual mixtures, the morphed digital image programs any scanned material into a whole, which is more than the sum of any original scanned material that it may incorporate. This *holistic visual structure* is not a matter of skill in terms of the image’s realization; rather it is something *intrinsic* to the digital mode of generation itself.<sup>10</sup> The distinctiveness of holistic digital morphing is even more pronounced in temporally realized idioms, that is, ones based on visual narratives whose presentation itself involves the passage of time (over and above that which is involved in perceptually scanning the image qua spatial object).

Now it might appear that such imagery should be regarded as an aspect of film or video. Matters are, however, more complicated, and the morphing effect is especially instructive in this respect. Effects of this sort have been attainable in film through cumbersome techniques based on cross-fading. However, digital imagery not only involves a more efficient realization of morphing than film and video does, but also has logically unique aspects.

Temporal realization in film and video is achieved through the successive presentation of individual photographic frames at an appropriate speed. The individual frames have a causal relation to some original visual state of affairs—even though they may make this unrecognizable or in-

corporate special effects through editing or intervening upon the normal filmic process.

The temporal realization of digital imagery, in contrast, does not need a direct causal relation to that which it is an image of in order to be created. Such a relation is involved minimally when a preexisting image is digitized or where a scanning process is involved. But even here, a massive flexibility enters in, which film and video do not have. Once an image is digitized and incorporated in a program, its nature is to be manipulable and temporally realizable in ways that differ from the sampled or scanned original.

Of course, film and video can be adapted—but this is achieved through physically editing the original reels or tapes, or by adding new material to them. In digital morphing, however, the originals are transformed in terms of their appearance by their very function within a single program. Temporally realized morphing, then, is qualitatively distinct from that animation of original units that is the basis of film, video, and, indeed, cartoons. It is much less constrained by the “real.” (This has important aesthetic implications that I will address later.)

There are two other related factors that set digital art apart from traditional visual idioms. They are of great complexity, and will be the subject of the entire next section.

### III

The first factor is the *interactive* dimension. The vast majority of visual artworks allow for alternative viewpoints in how they are perceived, and this will involve active positioning in relation to them. But the audience is not called upon to engage with the work in a way that alters its existing physical and virtual structure by virtue of such repositioning. In some avant-garde tendencies such as Dadaism, surrealism, and conceptual art, objects or scenarios have been created that do solicit such engagement, but this is very much the exception rather than the rule.

With much digital art, matters are the other way round. In the case of digital imagery, significant modifications to the original program can be performed, in principle, wherever and whenever it is realized using the apparatus through which it is realized. The viewer of such digital imagery is, in principle, an active participant in the generation

of the work, rather than a passive observer. This is possible because the digital image's software program, by its nature, allows for further refinement and development. Such a program may become obsolete by virtue of new developments in hardware, but notionally, at least, it is always open to permanent transformation at the user level in a way that film and video are not.

There are five main vectors of interactivity:

- 1) Local and nonlocal interface—the former where one is in physical proximity to the computer, the latter where one accesses it remotely.
- 2) Where the boundaries of interaction are rigidly set by the artist, that is, the user's choice is restricted to such things as pressing 'Enter,' opening or shrinking windows, or choosing between links. It involves no significant creative feedback from the computer.
- 3) Interfacing based on computer responses to an audience, occurring whether or not the audience is aware that an interaction is actually taking place (such as when the computer generates imagery in response to movements by the audience or to other environmental variables).
- 4) By voluntary interface where the user *navigates* a program or exercises choices that are reciprocated through the computer's opening up new creative possibilities of interface in response to them.
- 5) User-transcendent interface—where the user instigates and guides a program that is able to then develop at various levels of autonomy in formulating and projecting visual configurations.

Now while some of these relationships can, in principle, be involved in certain machine-based avant-garde art practices (using VCRs, televisions, telephones, and the like), they are not basic to such practices. However, they are integral to major kinds of digital art, and the last two factors—navigation and user-transcendent autonomy—are unique to it. This is because continuously *evolving* or relatively autonomous functions are possible only through digital technology.

The most developed form of navigational interaction, to date, is virtual reality's (VR) immersion scenarios. Some VR programs involve visual engagement through user headwear, but in projects such as Char Davies's *Osmose* of 1995, the immersion is more total through the user's wearing

a motion-tracking vest that also monitors breathing and balance. *Osmose* offers perceptual virtual vistas of unfamiliar quasi-natural forms and more abstract optical effects. These reconfigure in correlation with the agent's movements and gestures. The sights and sounds thus presented can be projected onto a larger viewing screen for the nonimmersive spectatorial audience.

In user-transcendent programs, a different level of complexity emerges. The highest stage of this is *autonomous evolutionary imaging*, whose structures are spectacularly distinctive to the digital realm. An important example here is Thomas Ray's *Tierra* of 1998. Of this, Christiane Paul remarks:

*Tierra*, essentially a network-wide "biodiversity reserve" for digital "organisms," is based on the premise that evolution by natural selection should be able to operate effectively in genetic languages based on the machine codes of computers. The project explored the possibility of using evolution to generate complex software: the *Tierra* source code creates a virtual computer and a Darwinian operating system, so that machine codes can evolve by mutating, recombining, and ultimately producing functional code. The self-replicating machine code programs were able to "live" in the memory of a computer or even a computer network.<sup>11</sup>

Evolutionary imaging is not tied to biological models necessarily in its program designs. All that is required is the use of algorithms for generating and developing autonomous digital objects and characters capable of continuous development (even in the absence of further interventions from the programmer or user). This has enormous developmental scope in many different directions.

Having identified some of the features that are distinctive to digital imaging, the time has come to consider their aesthetic and artistic implications.

#### IV

It will be recalled that earlier on I noted how digital works had reopened the possibilities presented by the foundational contour-mass axis of pictorial art. Indeed, we also saw how the illusionistic aspect of such representation is massively accentuated through the fact that the digital screen has no autographic surface markings to distract from the projection of its content.

The automated mechanisms whereby digital programs are designed and realized gives them a kind of formal completeness in terms of the basics of projecting three-dimensional forms in two-dimensional media. Their precision and complexity radicalize the contour-mass axis and offer a kind of purer, more absolute illusion of three-dimensional items and states of affairs. One might describe this as an aesthetic of illusionary *purity*.

Another aspect of more traditional art is radicalized by digital work. Earlier I mentioned the modal plasticity of picturing, that is, the fact that it is not tied to the representation of things that actually exist or have the possibility to exist, but can even present nomological *impossibilities*—situations that could never physically be, or that involve combinations of properties in an object or event that would not be possible for it to have in “real life.”

Digital imaging not only extends this to the temporal realm, but also, through its capacity for holistic visual morphing, does so in a way that is psychologically and perceptually more insistent than the modal plasticity of static images. As we have already seen, even photographic or related material that is scanned in the preparation of the program becomes representationally malleable—a vehicle for projections that are developed in scenarios different from those presented in the original scanned material. Its exact causal link to any scanned original is exceeded. In this sense, digital morphing might be said to have a *transcausal* rather than causal relation to reality. Indeed, through its manipulation of abstract or peripheral glimpses of real things (as in Char Davies’s *Osmose* VR program), it can create the optical and auditory impression of *totally* alternative physical and perceptual environments.

All in all, then, the enhanced modal plasticity of digital imaging makes it a more total vehicle for fantasy than static picturing or film and video. It has the power to virtually reconfigure the real in transcausal terms, and to do this in a sustained and ever-transforming way. Through this, an aesthetic of the *quasi-magical* is generated. We have the visually unlikely or impossible presented in the most insistently “realistic” visual terms.

Now while I have emphasized the continuities between digital art and traditional idioms in the foregoing arguments, it is important to emphasize now how digital work extends visual representation in distinctive new directions. These, indeed,

involve potentially far-reaching transformations of the nature of visual art itself. In this respect, it will be recalled that earlier on, I gave some emphasis to the way in which digital art involves a type-token relation based on absolute identity between the type and its tokens. This has some far-reaching implications.

First, it means that the dimension of creativity in digital art is mainly in the dimension of the *design* of programs. This may suggest that the aesthetic dimension assumes a mainly secondary importance. However, the situation is otherwise. Design problems range far beyond questions of mathematical or technological competence alone. The creator must gear his or her creation to the structure and conditions of a specific type of visual realization. Structural factors concern how the imagery will look and relate to basic questions of spatial composition and (where relevant) visual narrative construction. They also involve the endeavor going beyond established imaging programs and outcomes, by refining them in new directions, or by more fundamental innovations.

Some digital programs present a special creative challenge in terms of their dynamic potential for further development. Earlier on I stressed the importance of the interactive dimension of digital art. In its navigational forms, this means that the viewer or user of a program can explore and extend its scope on the basis of choice and (in the case of games) an element of skill. When navigation admits of this evolutionary possibility, there are grounds for saying that the concept of visual art itself is on the threshold of a radical diversification. The traditional artwork involves an individual artist or a creative ensemble who make an individual work. Revisions of it or additions to it are not normally accepted unless they are performed by the original creators or, more exceptionally, by someone else who has been granted permission by them. Even then, such additions or revisions are very unusual.

Now some orally transmitted works—such as Homer’s stories—have been finalized in a form that must have involved changes to the narrative in the course of transmission from generation to generation and place to place. The “final” form might thus be seen as an arbitrary intervention on an artistic idiom that exists through flexible interactions with a core set of narratives and characters. Of course, it is difficult to determine what level of change can be allowed before we find ourselves

with a different oral work than the one started out from. Indeed, the criterion of a “beginning” for such a transmitted work raises issues of some philosophical complexity in its own right.

The navigable digital work avoids these problems. It combines the stability of an artwork that is definitively embodied in physical terms with the openness to evolutionary change of the orally transmitted idiom. In many cases, while the viewer or user makes a necessary contribution to the way in which the work is realized on a particular occasion, there will be no question of this, in itself, making it into a different work of art. There are, however, two contexts in which this does become a possibility. In relation to one of them, the oral tradition is again instructive. Such traditions engender great figures who are noted for their skills of verbal delivery. Their virtuoso role, indeed, is also akin to that of great musical performers.

Now it might be that if the right kinds of digital technology develop, visual idioms may emerge where the virtuoso interpreter takes on something of the same significance as the creator of the work. On these terms digital visual art might move in the direction of musical performance, with the work being increasingly presented as a vehicle for such interpretation rather than an individual visual artwork per se. There would be a gradual realignment in our paradigm of what visual art is.

This possibility is on the horizon. As digital technology becomes cheaper and simpler, and initiation into its use comes in childhood, then game formats and the like might become as central to visual education as drawing and painting have traditionally been. From such game formats much more sophisticated evolutionary possibilities might emerge—possibilities that may demand digital interpreters of virtuoso standard.

In this respect, for example, VR systems have great promise. At present they are very much orientated toward the immersant eliciting responses from the program. But it is easy to conceive of programs where it is not the elicited VR environment that is important, so much as the use to which the immersant puts it. (In this respect, for example, consider how a program attuned to nuances of movement might be realized by an immersant trained to professional ballet standards.)

The second context wherein navigable digital works might challenge existing notions of visual art is in terms of collective authorship and the possibility of open-ended works. Much complex software or hardware already requires teams of

specialists to design and produce it, rather than the usual creative individual of autographic visual art making. However, even such autographic idioms can involve teamwork on occasion (especially in relation to large-scale projects), so if we are to identify the more distinctive possibilities opened up by digital works in terms of collective creatorship, it is to the work itself that we must look.

In this respect, the evolutionary navigational programs discussed earlier should be recalled. If a digital work is capable of constant development, this opens up the possibility that this development can be structured through interfaces with many different individuals at many different times and places. Even if these contributions are carried out within basic parameters established by the original creative individual or team, it may be that the work grows far beyond them, taking on a new identity on the basis of how it is realized by new generations of users.

Of course, such a work might amount to no more than a composite entity where the individual contributions to the whole can be recognized clearly. But the possibility also exists for the evolving whole to completely absorb such contributions. The fact that it takes on a new character at a specific point shows that one identifiable contributor or group has made a major contribution, but the nature of the contribution does not declare itself, independently, within the evolving phenomenal structure of the work.

Here there is a contrast. Collectively created visual works (say ones painted on the walls of a cave over generations) constitute a visual palimpsest, with clearly apparent layers. Even when, say, a team of artists cooperate in painting a single work where the contributions of the individuals are meant to merge perceptually, there is always the possibility of ultra-sensitive forensic instruments that could map these individual contributions.

In the collective visual digital work just described, in contrast, we have a *holistic* phenomenal structure. All individual contributions to its evolution are absorbed seamlessly within the whole. They cannot ever be detected from analysis of the imagery’s visual appearance alone. At every new stage of its development it creates a new type that is then instantiated as a token by the other users. But the purpose of the whole enterprise is to prevent the work from congealing into a type whose characteristics are fixed.

The significance of such an open-ended work is that, in it, creatorship involves membership of a



community—but one whose cohesion is not that of a shared everyday language, location, and culture. The creators are bonded through an artistic structure that can, in principle, continue indefinitely. Here the work offers, in effect, a limited ideal of community, lifted out, through its nonlocal character, from some of the vicissitudes that lead real communities to divide and disintegrate over time. This is not to say that the relationships involved will not develop distinctive tensions of their own. However, the very fact that it is an aesthetic structure that is being created, rather than a purely social one, means that risks such as this might be addressed creatively and taken account of in each new program-modification strategy.

Now the degree to which the distinctive features and transformations of visual art described in this section are developed is contingent on many factors—not least of which is the availability of the appropriate technology on a large scale. It might be thought that some of the factors described are no more than elaborate game playing. But such playing is taken to a higher order when the rules of the game themselves are a major player in its evolving transformations. This may issue in a rather cerebral aesthetic art form rather than one for amusement—the more so if the work's evolving aesthetic structure is able to model broader physical, perceptual, social, and psychological processes.

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Walter Benjamin famously claimed that the mechanical reproduction of images destroyed the “aura” of original works by making them available in times and places other than that defined by their immediate physical presence.<sup>12</sup> This theory is demonstrably false. Indeed, its exact opposite is true. Far from negating the aesthetic impact of the original work, mechanical reproduction has amplified it to the highest degree. Through being reproduced so often in books and on the Internet, and so forth, the original seems even more extraordinary, *vis-à-vis* its very power to have issued in so many mechanical copies. Its aura is not destroyed, but transformed, rather, into a veritable *halo*. It becomes imperative to see the sacred original in direct perceptual terms without the intermediary of reproductions. (The massive expansion of visits to art galleries in late modern and postmodern times, and the incredible market appetite for

original works, are powerful testimonies to this continuing need for acquaintance with the original.)

Given this, it is worth reflecting on the aura of digital works. Because they can be realized in the nonlocal terms described earlier, it may seem that they can have no aura, because there is no perceptually privileged “original”—we have only programs. However, this surely involves aesthetic aura of a quite distinctive kind. Not being tied to existence in one place and time, and, in many cases, being navigable or having evolutionary potential, is something with intrinsic fascination. On the one hand, the work is disembodied in terms of parallels with traditional art “objects,” but at the same time the fact that it can be realized in times and places determined by the user means that it has an intimacy and special status through being realizable very much in one's own personal space. It is embodied as the user wills. . . .

Even if a work is encountered in a gallery, one knows that it can, in principle, inhabit many such spaces simultaneously. It can converge on where and when the viewer is, whereas in traditional art objects, the viewer must seek out the unique space occupied by the object. There is a kind of liberation from physical constraints here that gives the digital work its distinctive aura. Indeed, there is something about—to use a crude metaphor—the aesthetic “feel” of digital art *per se* that has its own special iconological character. Exemplification of, or reference to, the hyperprecision and complex subtleties of the digital image to some degree expresses the visual style of the present age. In its extreme clarity and complexity, for example, the digital image exemplifies the postmodern age's characteristic hi-tech and informational aspects. This is achieved through forms that combine presentational precision and accessibility with a sense of the depth and extensiveness of the digital medium's informational scope.

I have argued, then, that digital art both perfects some structural visual properties that are basic to pictorial art and also takes visual representation into new territories on the basis of its distinctive ontologies. I have argued also that these developments may be signs that the concept of the traditional art object will itself be transformed by such factors.

This being said, there is no reason to rule out the development of tendencies and “isms” of the kind associated with more traditional visual art.

Indeed, those autonomous programs such as Thomas Ray's *Tierra* (discussed earlier) already demand something like the term 'evolutionism' to signify that they are aspects of a shared digital strategy that—whatever its different realizations—moves in the ever-accelerating direction of programs that involve a central dimension of self-creation and development. One might also usefully employ the term 'digitalism' within the more traditional field of painting, to signify those works (such as Finley's and Nechtvatal's, and many, many others) that are possible only through digital interventions. The possibilities of "isms" here are manifold. Large-scale innovation in the visual arts is still possible but is now located in the continuing development and use of digital idioms *and* their relation to the more traditional modes of visual art.

It is important to emphasize this latter relation. For—despite the extravagant claims sometimes made for digital art—such works will never supersede the older autographic modes. The digital "aura" of nonlocal realization has its own magic, but the human subject is embodied, and will always need to find something of its own identity restored through the felicities of touch and individual physical presence. Drawing, painting, and sculpture have always been concerned, in part, with the answering of these needs, and, no doubt, will continue this ministry.

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1. Arthur C. Danto's most sustained presentation of this is in his *After the End of Art: Contemporary Art and the Pale of History* (Princeton University Press, 1997). A rather more focused and philosophically stimulating account of Danto's main thesis can be found in the final chapter of his *The State of the Art* (New York: Prentice-Hall, 1987), pp. 202–218. Here Danto considers the possibility of art's having exhausted itself through having run out of possibilities, but he neither follows this idea up nor considers it as the basis of an alternative to his main thesis.

2. In Arthur C. Danto, "Postmodernism and the Visual Arts: A Question of Ends," included in a number of anthologies, most recently *Contextualizing Aesthetics: From Plato to Lyotard*, ed. H. Gene Blocker and Jennifer M. Jeffers (Belmont, CA: Wadsworth, 1999), pp. 239–251. For some interesting alternative approaches to Danto, see David Carrier, "Danto and His Critics: After the End of Art and Art His-

tory," in the special issue of *History and Theory* 37 (1998): 1–16.

3. I discuss the structural basis of abstract idioms at length in chapter 5 of *The Transhistorical Image: Philosophizing Art and its History* (Cambridge University Press, 2002), pp. 143–165.

4. Of course, it is possible to create or use an image in a context where the distribution of the image's virtual spatial connections is meant to be read on the basis of codes or stipulations that accrue to the context. But the decisive sense of syntax in visual representation is the principle of unity that governs the distribution of virtual spatial relations *within* the work's internal resources. The external codes or stipulations just add an extra level of syntactic meaning to the work.

5. An artist's position on the contour–mass axis is determined on a comparative basis. This means that, while there will always be some artists who are emphatically contour-orientated or emphatically mass-orientated by any comparative standards, there will be others whose orientation in these terms is much more dependent on exactly which other artists they are being compared with.

6. It should be noted that Ingres and Auerbach are by no means the first and certainly not the only artists to work at these respective extremes.

7. An excellent introduction to this topic can be found in Christiane Paul's *Digital Art* (London and New York: Thames and Hudson, 2003). Journals such as *Leonardo* regularly feature discussions of a technical nature concerning digital art. In contrast, the philosophical literature is not as developed as one might have hoped. One source of good material is Patrick Maynard's important guest-edited issue addressing "Special Perspectives on the Arts and Technology," *The Journal of Aesthetics and Art Criticism* 55 (1997). Two articles, in particular, are relevant to the present discussion. Timothy Binkley's "The Vitality of Digital Creation" (pp. 106–116) contains some worthwhile (if scattered and undeveloped) insights on the distinctive character of key aspects of digital phenomena. David Z. Saltz's subtle and searching "The Art of Interaction: Interactivity, Performativity, and Computers" (pp. 117–127) takes things much further. Of particular importance is the fact that Saltz notices that computer works relate significantly to the type–token relation. He does not, however, explore this much except on the analogy between a musical piece and its performance—an analogy that he himself takes (rightly) to break down in the case of interactive computer works.

8. Robert Lazzarini's *skulls* of 2000 is an excellent example of this "sculptural" emphasis.

9. As Lev Manovich points out, there is some degradation when digital images are formatted for transmission. However, if the right technology is used, such degradation is not inherent to digitization in the way that it is to the relation of prints taken from a plate. For more on digital degradation and cognate topics, see Manovich's brilliant book *The Language of New Media* (MIT Press, 2001), pp. 49–61.

10. The most complete account of the technical dimensions of morphing can be found in Ron Brinkmann's *The Art and Science of Digital Compositing*, The Morgan Kaufmann Series in Computer Graphics (New York: Morgan Kaufmann, 1999).

11. See Paul, *Digital Art*, p. 143.

12. See Walter Benjamin, *Illuminations*, trans. Harry Zohn (London: Fontana/Collins, 1973), pp. 222–224.