

Remediation

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"Immediacy is, however, a one-sided determination; thought does not contain it alone, but also the determination to mediate itself with itself, and thereby the mediation being at the same time the abrogation of mediation--it is immediacy."

Hegel

"And, as always, coherence in contradiction expresses the force of a desire."

Derrida

The Double Logic of *Strange Days*

"This is not like TV only better," says Lenny Nero in the futuristic film *Strange Days*. "This is life. It's a piece of somebody's life. Pure and uncut, straight from the cerebral cortex. You're there. You're doing it, seeing it, hearing it . . . feeling it." Lenny is touting a black-market device called "the wire" to a potential customer. The wire is a technological wonder that deserves Lenny's praise. It fits over the wearer's head like a skull cap, and sensors in the cap somehow make contact with the perceptual centers in the brain. In its recording mode, the wire captures the sense perceptions of the wearer; in its playback mode, the device delivers these recorded perceptions to the wearer. If we accept the popular view that the role of media is to record and transfer sense experiences from one person to another, the wire threatens to make obsolete all technologies of representation. Lenny mentions television, but we can extend his critique to books, paintings, photographs, film, and so on. The wire's appeal is [End Page 311] that it bypasses all forms of mediation and transmits directly from one consciousness to another.

Strange Days itself is less enthusiastic about the wire than Lenny and his customers. Although the wire embodies the desire to get beyond mediation, *Strange Days* offers us a world fascinated by the power and ubiquity of media technologies. Los Angeles in the last two days of 1999, on the eve of "2K," is saturated with cellular phones, voice- and text-based telephone answering systems, radios, and billboard-sized television screens that constitute public media spaces. And in this media-saturated world, the wire itself is the ultimate mediating technology, despite or indeed because the wire is designed to efface itself, to disappear from the user's consciousness. Two scenes, in which Lenny coaches the "actors" who will appear in a pornographic recording, make it clear that the experience the wire [End Page 312] offers can be as mediated as a traditional film. And if the wire itself is cinematic, the whole of *Strange Days* is also conscious of its own cinematic tradition, with its obvious debts to films from *Vertigo* to *Blade Runner*. Although Lenny insists that the wire is "not TV only better," the film ends up representing the wire as "film only better."

Strange Days is a compelling film for us because it captures the ambivalent and contradictory ways in which new digital media function for our culture

today. The film projects our own cultural moment a few years into the future in order to examine that moment with greater clarity. The wire is just a fanciful extrapolation of contemporary virtual reality (see [fig. 1](#)), with its goal of unmediated visual and aural experience; and the proliferation of media in 2K L.A. is only a slight exaggeration of our current media-rich environment, in which digital technologies are proliferating faster than our cultural, legal, or educational institutions can keep up with them. In addressing our culture's contradictory imperatives for immediacy and hypermediacy, the film enacts what we understand as a double logic of "re-mediation." Our culture wants both to multiply its media and to erase all traces of mediation: it wants to erase its media in the very act of multiplying technologies of mediation.

In this last decade of the twentieth century, we are in an unusual position to appreciate the double logic of remediation--not only because **[End Page 313]** we are bombarded with images (in print, on television, in films, and now on the World Wide Web and through other digital media), but also because of the intensity with which these two logics are being pursued in all these media. "Live" point-of-view television programs show us what it is like to accompany a policeman on a dangerous raid or indeed to be a skydiver or a race-car driver hurtling through space. Filmmakers routinely spend tens of millions of dollars to film "on location" or to recreate period costumes and places in order to make their viewers feel as if they were "really" there. Internet sites offer stories, images, and now video that is up-to-the-minute, all in the name of perceptual immediacy. Yet these media enact another logic with equal enthusiasm: web sites are often riots of diverse media forms, including graphics, digitized photographs, animation, and video--all set up in pages whose graphic design principles recall the psychedelic 1960s or dada in the 1920s. Hollywood films, like *Natural Born Killers* or *Strange Days* itself, routinely mix media and styles. Televised news programs now feature multiple video streams, split-screen displays, composites of graphics and text--a welter of media that is meant to make the news more perspicuous to us.

What is remarkable is that these seemingly contradictory logics not only coexist in digital media today, but are mutually dependent. Immediacy depends upon hypermediacy. In the effort to create a seamless moving image, filmmakers combine live-action footage with computer compositing and two- and three-dimensional computer graphics. In the effort to be up to the minute and complete, television news producers assemble on the screen ribbons of text, photographs, graphics, and even audio without a video signal when necessary (as was the case during the Persian Gulf War). At the same time, even the most hypermediated productions strive for a kind of immediacy. So, for example, music videos rely on multiple media and elaborate editing to create an immediate and apparently spontaneous style. The desire for immediacy leads to a process of appropriation and critique by which digital media reshape or "remediate" one another and their analog predecessors such as film, television, and photography.

Once we notice this process in our media today, we can identify similar processes throughout the last several hundred years of Western visual representation. Thus, a medieval illuminated manuscript, a seventeenth-century painting by David Bailly, and the website for CNN news are analogous but disparate expressions of a fascination with media. A painting by Canaletto, a photograph by Edward Weston, a "live" television broadcast from the Olympics, and the computer **[End Page 314]** system for virtual reality are different but related attempts to achieve immediacy by ignoring or denying the act of mediation. It is not that immediacy and hypermediacy must both be at work in every period, but that the interplay between the two would seem to define a genealogy stretching back at least to the Renaissance invention of linear perspective. Our notion of genealogy is indebted to Foucault's in the sense that we too are looking for historical affiliations or resonances and not for origins. Foucault characterized genealogy as "an

examination of descent," which "permits the discovery, under the unique aspect of a trait or a concept, of the myriad events through which--thanks to which, against which--they were formed." ¹ Our genealogical traits will be immediacy, hypermediacy, and remediation, and we will examine these traits historically, but with particular attention to contemporary digital media. ²

We will begin by showing how the desire for immediacy is pursued in digital graphics by adapting earlier strategies borrowed from linear perspective painting, as well as photography, film, and television. In examining hypermediacy, we will show how digital multimedia adapt strategies from modernist painting and earlier forms. We will then be in a position to explore more fully the curious reciprocal logic of our third trait, remediation itself. We will conclude with some proposals for remediation as a general theory of media.

The Logic of Immediacy

Virtual reality is "immersive," which means that it is a technology of mediation whose purpose is to disappear. Yet this disappearing act is made difficult by the apparatus that virtual reality requires. In *Strange Days*, users of the wire had only to put on a slender skull cap, but in today's virtual reality systems, the viewer must wear a bulky "head-mounted display," a helmet with eyepieces for each eye (Fig. 1a). In other systems known as "caves," the walls, (and sometimes the floor and ceiling) are themselves giant computer screens. Although **[End Page 315]** less subtle than the wire, current virtual reality systems strive to serve the same purpose in surrounding the viewer with a computer-generated image. With the head-mounted display in particular, virtual reality is literally "in the viewer's face." The viewer is given a first-person point of view, as she gazes on a graphic world from within that world, from a station point that is always the visual center of that world. As the computer scientists themselves put it, the goal of virtual reality is to foster in the viewer a sense of presence: ³ the viewer should forget that she is in fact wearing a computer interface and accept the graphic image that it offers as her own visual world.

In order to create a sense of presence, virtual reality should come as close as possible to the visual world outside. Its graphic space should be continuous and full of objects and should fill the viewer's field of vision without rupture. But today's technology still contains many ruptures, including slow frame rates, jagged graphics, bright colors, bland lighting, and system crashes. Some of these ruptures are apparent even in the single static image that we see in Fig. 1b. We notice immediately the cartoon-like simplicity of the scene, which no user could confuse with the world that greets her when she takes off the helmet. For the enthusiasts of virtual reality, however, today's technological limitations simply point to its great potential, which for them lies in a future not much further removed than *Strange Days*. In fact, Lenny Nero's words could almost have been written by these enthusiasts. The popularizer Howard Rheingold writes that "[a]t the heart of VR [virtual reality] is an experience--the experience of being in a virtual world or remote location." ⁴ Jaron Lanier, a developer of one of the first commercial virtual reality systems, suggests that in virtual reality, "you can visit the world of the dinosaur, then become a Tyrannosaurus. Not only can you see DNA, you can experience what it's like to be a molecule." ⁵ Meredith Bricken, an interface designer, writes that in a virtual environment, "you can be the mad hatter or you can be the teapot; you can move back and forth to the **[End Page 316]** rhythm of a song. You can be a tiny droplet in the rain or in the river." ⁶ All these enthusiasts promise us perceptual immediacy, experience without mediation. They expect virtual reality to diminish and ultimately to deny the mediating presence of the computer and its interface. Bricken's paper is in fact entitled "Virtual Worlds: No Interface to Design."

The logic of immediacy is also at work in non-immersive digital graphics--that is, in two-

and three-dimensional images projected onto traditional (computer, film, or television) screens. Digital graphics have become tremendously popular and lucrative and in fact are leading to a new cultural definition of the computer. If even just ten years ago, we thought of computers exclusively as numerical engines and word processors, we now think of them also as devices for generating images, reworking photographs, holding videoconferences, and providing animation and special effects for film and television. In these new applications, the desire for immediacy is apparent in the claim that digital images are more exciting, lively, and realistic than mere text on a computer screen, and that a videoconference will lead to more effective communication than a telephone call. The desire for immediacy is apparent in the increasing popularity of the digital compositing of film and in Hollywood's interest in replacing stunt men and eventually even actors with computer animations. And it is apparent in the triumph of the "graphical user interface" for personal computers. The desktop metaphor, which has replaced the wholly textual command-line interface, is supposed to assimilate the computer to the physical desktop and materials (file folders, sheets of paper, in-box, trash basket, etc.) familiar to office workers. The mouse (and the pen-based interface) allow the user the immediacy of touching, dragging, and manipulating visually attractive ideograms. It is the supposed immediacy of this interface that was to make this computer interface "natural" rather than arbitrary. Although the standard desktop interface has been two-dimensional, designers are experimenting with three-dimensional versions--virtual spaces in which the user can move in, around, and through information. ⁷ These three-dimensional views are meant to lend even greater immediacy to the experience of computing. What designers often say they want is an "interfaceless" interface, in which there will **[End Page 317]** be no recognizable electronic tools, no buttons, windows, scroll bars, or even icons as such. Instead the user will move through the space interacting with the objects "naturally," i.e., as she does in the physical world. In fact, virtual reality, three-dimensional graphics, and graphical interface design are all seeking to make digital technology "transparent." In this account, a transparent interface is one that erases itself, so that the user would no longer be aware of confronting a medium, but instead would stand in an immediate relationship to the contents of the medium.

The transparent interface is one more manifestation of the desire to deny the mediated character of digital technology altogether. To believe that with digital technology we have passed beyond mediation is also to assert the uniqueness of our present technological moment. For many virtual reality enthusiasts, the computer so far surpasses other technologies in its power to make the world present, that the history of earlier media has little relevance. Even those, like Rheingold, who do acknowledge technological precursors (particularly film and television), still emphasize the novelty of virtual reality. Their view is that virtual reality (or digital technology in general) completes and overcomes the history of media. In the film *Strange Days*, the wire is the last and most powerful technology created before the end of the millennium. However, the desire for immediacy itself has a long history that is not easily overcome. At least since the Renaissance, it has been a defining feature of Western visual (and for that matter verbal) representation, and to understand immediacy in computer graphics, it is helpful to keep in mind the ways in which painting, photography, film, and television have sought to satisfy this same desire. These earlier media sought immediacy through the interplay of the aesthetic value of transparency with techniques of mathematization (linear perspective), erasure, and automaticity, all of which are again deployed in digital technology.

As Albrecht Dürer noted, and as Panofsky reminds us, perspective means a "seeing through" ⁸ and like the interface designers of today, students of linear perspective promised immediacy through transparency. They trusted in linear perspective to achieve transparency because it used the "right" technique to measure the world--because it mathematized space. Martin Jay and others have argued for a close connection between

Albertian perspective and Descartes's spatial mathematics. For Jay, "Cartesian perspectivalism" constituted a peculiar way of seeing that dominated Western culture from the seventeenth [End Page 318] century to the early twentieth by allowing the Cartesian subject to dominate and control space from a single vantage point.⁹ Bruno Latour offers a different take on the significance of perspectivalism's mathematicization of space. Building on William Ivins' important study *On the Rationalization of Sight*, Latour argues that by mathematizing space, linear perspective enabled visual representations to be transported from one context to another without being altered or distorted. By manipulating these "immutable mobiles," practitioners of linear perspective could in effect be manipulating the world itself; the mathematization of space makes the context or medium transparent, and provides immediate access to the world.¹⁰

By using projective geometry to represent the space beyond the canvas, linear perspective could thus be regarded as the technique that effaced itself as technique. As Alberti expressed it in his treatise "On Painting": "[O]n the surface on which I am going to paint, I draw a rectangle of whatever size I want, which I regard as an open window through which the subject to be painted is seen."¹¹ If executed properly, the surface of the painting dissolved and presented to the viewer the scene beyond. To achieve transparency in a traditional painting, linear perspective construction was regarded as necessary but not sufficient, for the artist must also work the surface to erase his brush strokes. Norman Bryson has argued that "through much of the Western tradition oil paint is treated primarily as an *erasive* medium. What it must first erase is the surface of the picture-plane."¹² Erasing the surface in this way concealed and denied the process of painting in favor of the perfected product. Although effacement is by [End Page 319] no means universal in Western painting, even before the nineteenth century, it was one important technique for making the space of the picture continuous with the viewer's space. This continuity between depicted and "real" space was particularly apparent in *trompe-l'oeil* art: for example, in ceilings where the painting continues the architecture of the building itself.¹³ The irony is that it was hard work to make the surface disappear in this fashion, and in fact the artist's success at effacing his process and thereby himself became for trained viewers a mark of his skill and therefore his presence.

A third strategy for achieving transparency has been to automate the technique of linear perspective. This quality of automacity has been ascribed to the technology of the camera obscura and subsequently to photography, film, and television. In the most familiar story of the development of Western representation, the invention of photography represented the perfection of linear perspective.¹⁴ A photograph could be regarded as a perfect Albertian window. In "The Ontology of the Photographic Image," André Bazin expressed this view with untroubled certainty: "The decisive moment [in Western painting] undoubtedly came with the discovery of the first scientific and already, in a sense, mechanical systems of reproduction, namely, perspective: the camera obscura of Da Vinci foreshadowed the camera of Nièpce. The artist was now in a position to create the illusion of three-dimensional space within which things appeared to exist as our eyes in reality see them."¹⁵ Photography was a mechanical and chemical process, whose automatic character seemed to many to complete the earlier trend to conceal both the process and the artist.¹⁶ Stanley Cavell later expanded on and revised Bazin by examining how it was that automatic reproduction called into question the artist as a creative agent: "Photography overcame subjectivity in a way undreamed of by painting, a way that could not satisfy painting, [End Page 320] one which does not so much defeat the act of painting as escape it altogether: by automatism, by removing the human agent from the task of reproduction."¹⁷ For both Bazin and Cavell, photography offered its own route to immediacy: the photograph was transparent and followed the rules of linear perspective; it achieved transparency through automatic reproduction; and it apparently removed the artist as mediating agent between the viewer and the reality of the image.¹⁸

Although Bazin concluded that "[p]hotography and the cinema . . . are discoveries that satisfy, once and for all and in its very essence, our obsession with realism," he was certainly wrong in predicting that these two visual technologies would satisfy our culture's desire for immediacy.¹⁹ Computer graphics has become the latest expression of that desire, and its strategy for achieving immediacy owes something to several earlier traditions. William J. Mitchell claims: "The tale of computer image synthesis in the 1970s and 1980s . . . strikingly recapitulates the history of European painting from the miracle of Masaccio's *Trinity* to the birth of photography. . . . Synthesized images can now be virtually point-for-point matches to photographs of actual scenes, and there is experimental evidence that, for certain sorts of scenes, observers cannot distinguish these images from photographs."²⁰ But even if we cannot always tell synthesized images from photographs, we can distinguish the somewhat different strategies that painting and photography have adopted in striving for immediacy, and we can explore how digital graphics borrows and adapts each of these strategies.

Computer graphics extends the tradition of the Albertian window: it creates images in linear perspective, but it applies to linear perspective the rigor of contemporary linear algebra and projective **[End Page 321]** geometry.²¹ Computer-generated projective images are mathematically perfect, at least within the limits of computational error and the resolution of the pixelated screen. Renaissance perspective was never perfect in this sense, not only because of hand methods, but also because the artists often manipulated the perspective for dramatic or allegorical effect.²² (Of course digital graphic perspective can be distorted too, but even these distortions are generated mathematically.) Computer graphics also expresses color, illumination, and shading in mathematical terms,²³ although so far less successfully than perspective (see [fig. 2](#)). So, as with perspective painting, when computer graphics lays claim to the real or the natural, it seems to be appealing to the Cartesian or Galilean proposition that mathematics is appropriate for describing nature.

Furthermore, to Cartesian geometry, computer graphics adds the algorithmic mathematics of John von Neumann and Alan Turing. Computer programs may ultimately be human products, in the sense that they embody algorithms devised by human programmers, but once the program is written and loaded, the machine can operate without human intervention. Programming, then, employs erasure or effacement, much as Norman Bryson defines erasure for Western painting, or as Cavell and Bryson describe the erasure of human agency from the production of photographs.²⁴ Programmers seek to remove the traces of their presence in order to give the program the greatest possible autonomy. In digital graphics, human programmers may be involved at several levels: the computer operating systems are written by one group of specialists; graphics languages (such as Open GL) are written by others; and applications are programs that exploit the resources offered by languages and operating systems. All these classes of programmers are simultaneously erased at the moment in which the computer actually generates an image by executing the instructions they have collectively written.

The fact that digital graphics is automatic suggests its affinity to photography. In both cases the human agent is erased, but the techniques **[End Page 322]** of erasure are rather different. With photography, the automatic process is mechanical and chemical: the shutter opens, and light streams in through the lens and is focused on a chemical film. The process of recording itself is holistic; it has no defined parts or steps. It is for this reason that many in the nineteenth century could regard light or nature itself as the painter.²⁵ In digital graphics, however, it is not easy to regard the program as a natural product, except in the sense that nature steers the electrons inside the computer chips. Digital graphic images are the work of humans, whose agency, however, is often deferred so far from the act of drawing that it seems to disappear. This deferral is especially

important in real-time animation **[End Page 323]** and virtual reality, where the computer is drawing ten or twenty frames per second, all without the programmer's intervention. The automatic or deferred quality of computer programming promotes in the viewer a sense of immediate contact with the image.

Experts on computer graphics often say that they are striving to achieve "photorealism"--in other words to make their synthetic images indistinguishable from photographs. This comparison may take the explicit form of putting a photograph side by side with a synthetic digital image. In such cases the computer is imitating not an external reality, but rather another medium. (We will argue later that this is all any new technology could do--define itself in relationship to earlier technologies of representation.) To achieve photorealism, the synthetic digital image adopts the criteria of the photograph. It offers a single station point, a monocular point of view, and a photographic sense of appropriate composition. Computer graphics experts do not in general imitate "poor" or "distorted" photographs (exotic camera angles or lighting effects), because of course these distorted photographs are themselves not regarded as realistic or immediate. Instead, such photographs make the viewer conscious of the photographic process. Furthermore, photographs and synthetic images achieve the same effect of erasure through different means. The photograph erases the human subject through the mechanics and chemistry of lens, shutter, and film. Digital graphics erases the subject algorithmically through the mathematics of perspective and shading embodied in a program. (Digital photography, then, is a hybrid that combines and reconfigures these two kinds of automaticity.)

Obviously the test of photorealism can apply only to single, static images. The equivalent for computer animation would be "filmic" realism: a sequence of computer images that could not be distinguished from a traditional film, a feat that is technically even more challenging than photorealism. On the other hand, the very fact that the images are in motion (in computer animation and virtual reality) suggests new strategies for achieving immediacy. For if immediacy is promoted by removing the programmer/creator from the image, immediacy can also be promoted by involving the viewer more intimately in the image. The production of computer animation seems to be automatic, but the viewing can also be interactive, although the interaction may be as simple as the capacity to change one's point of view. In painting and photography, the user's point of view was fixed. In film and television, the point of view was set in motion, but it was the director or editor who controlled the movement. Now computer animation can function like film in this respect, for it too can present a sequence of predetermined camera **[End Page 324]** shots. However, the sequence can also be placed under the viewer's control, as it is in animated computer video games or virtual reality.

In virtual reality, the helmet that contains the eyepieces also typically contains a tracking device. As the viewer turns her head, the tracker registers the change in her orientation, and the computer redraws the image in each eyepiece to match her new perspective. Because she can move her head, the viewer can see that she is immersed--that she has jumped through Alberti's window and is now inside the depicted space. For the virtual enthusiasts, Alberti's window is the plane defined by the videoscreen on the outmoded desktop computer, and it is this plane that virtual reality now shatters. Rheingold claims that "[i]n the 1990s, VR technology is taking people beyond and through the display screen into virtual worlds."²⁶ As Rheingold implies, in graphics delivered on a conventional video screen (for example in computer games), the interface is more obtrusive: the viewer must use the mouse or the keyboard to control what she sees. But even here, the viewer can manipulate her point of view and may still have a feeling of immersion, especially if she can turn in a full circle. It is remarkable how easily a player can project herself into a computer game like *Myst* or *Doom*, despite the low resolution and limited field of view afforded by the screen (see [fig. 3](#)). It is also a creed among

interface designers that interactivity increases the realism and effectiveness of a graphical user interface. The icons become more present to the user if she can reposition them or activate them with a click of the mouse.

Contemporary literary and cultural theorists would take pains to deny any claim that linear perspective painting, photography, film, television, or computer graphics could achieve unmediated presentation.²⁷ **[End Page 325]** For them the desire for immediacy through visual representation has become a somewhat embarrassing (because under-theorized) tradition.²⁸ Outside of the circles of theory, however, the discourse of the immediate has been and remains culturally compelling. And even within the academic community, among art historians and perceptual psychologists, linear perspective is still regarded as having some claim to being natural.²⁹ Meanwhile, computer graphics experts, computer users, and the vast audience of popular film and television continue to assume that unmediated presentation is the ultimate goal of **[End Page 326]** visual representation and to believe that technological progress toward that goal is being made. When interactivity is combined with automaticity and the five-hundred-year-old perspective method, the result is one account of mediation that millions of viewers today find compelling. In making this claim, we do not mean fully to endorse either the contemporary theoretical view or the more "naïve" one. We are suggesting instead that the naïve view is the expression of a long historical desire and that it is one necessary half of the double logic of remediation.

The Logic of Hypermediacy

Like the desire for immediacy, the fascination with hypermediacy also has a history, both as a representational practice and as a cultural logic. In digital media, the practice of hypermediacy is most evident in the heterogeneous, windowed visual style of World Wide Web pages, the desktop interface, multimedia programs, and video games. It is a visual style, in the words of William J. Mitchell, "that privileges fragmentation, indeterminacy, and heterogeneity and that emphasizes process or performance rather than the finished art object."³⁰ Such interactive applications are often grouped under the rubric of "hypermedia." Hypermedia's "combination of random access with multiple media" has been described with typical hyperbole by Bob Cotten and Richard Oliver as "an entirely new kind of media experience born from the marriage of TV and computer technologies. Its raw ingredients are images, sound, text, animation and video, which can be brought together in any combination. It is a medium that offers 'random access'; it has no physical beginning, middle, or end."³¹ This definition suggests that the logic of hypermediacy had to wait for the invention of the cathode ray tube and the transistor. However, we believe the same logic is at work in the frenetic graphic design of cyberculture magazines like *Wired* and *Mondo 2000*, in the patchwork layout of such mainstream print publications as *USA Today*, and even in the earlier "multimediated" spaces of Dutch painting, medieval cathedrals, and illuminated manuscripts.

When in the 1960s and 1970s, Douglas Englebart, Alan Kay, and their colleagues at Xerox PARC and elsewhere invented the graphical user interface and called their resizable, scrollable rectangles "windows," they were implicitly relying on Alberti's metaphor. Their windows opened onto a world of information made visible and almost **[End Page 327]** tangible to the user; their goal was to make the surface of these windows, the interface itself, transparent. However, as the windowed style has evolved in the 1980s and 1990s, transparency and immediacy have had to compete with other values. In current interfaces, windows multiply on the screen: it is not unusual for sophisticated users to have ten or twenty overlapping or nested windows open at one time. The multiple representations inside the windows (text, graphics, video) create a heterogeneous space, as they compete for the viewer's attention. Icons, menus, and toolbars add further layers of visual and verbal meaning. This graphical user interface

was to replace the command-line interface, which was itself wholly textual. By introducing graphical objects into the representation scheme, designers believed that they were making the interfaces more "natural," but they were in fact creating a more complex system in which iconic and arbitrary forms of representation interact. We have only to place [fig. 4](#) beside the virtual environment in Fig. 1b to see that a different visual logic is operating.

Unlike a perspective painting or three-dimensional computer graphic, the windowed interface does not attempt to unify the space around any one point of view. Instead, each text window defines its **[End Page 328]** own verbal, each graphic window its own visual, point of view. Windows may change scale quickly and radically, expanding to fill the screen or shrinking to the size of an icon. And unlike the painting or computer graphic, the desktop interface does not erase itself. The multiplicity of windows and the heterogeneity of their contents mean that the user is repeatedly brought back into contact with the interface. The user learns to read the interface as she would any hypertext. She oscillates between manipulating the windows and examining their contents, just as she oscillates between looking at a hypertext as a texture of links and looking through the links to the textual units as language.

With each return to the interface, the user confronts the fact that the windowed computer is both automatic and interactive at the same time. We have argued that the automatic character of photography contributes to the photograph's feeling of immediacy, but the situation is more complicated with the windowed computer. Its interface is automatic in the sense that it consists of layers of programming that are executed with each click of the mouse. The interface is interactive in the sense that these layers of programming always return control to the user, who then initiates another automated action. Although the programmer is not visible in the interface, the user as a subject is constantly present, clicking on buttons, choosing menu items, and dragging icons and windows. Both the apparent autonomy of the machine and the user's intervention can be interpreted as contributing to the transparency of the technology. On the other hand, the buttons and menus that provide user interaction can also be seen as getting in the way of the transparency of the digital image. If some software designers now characterize the two-dimensional, desktop interface as unnatural, they really mean that it is too obviously mediated. They prefer to imagine an "interfaceless" computer offering some brand of virtual reality. However, the possibilities of the windowed style have probably not been fully explored and elaborated.

One reason that this style has not been exhausted is that it functions as a cultural counterbalance to the desire for immediacy. If the logic of immediacy leads one to erase or automatize the act of representation, the logic of hypermediacy acknowledges multiple acts of representation and makes them visible. Where the logic of immediacy suggests a unified visual space, hypermediacy offers a heterogeneous space, in which representation is conceived of not as a window onto the world, but rather as "windowed" itself--with windows that open onto other representations or other media. The logic of hypermediacy calls for representations of the real that in fact multiply **[End Page 329]** the signs of mediation and in this way try to reproduce the rich sensorium of human experience.

As an historical counterpart to the desire for immediacy, the fascination with multiplicity can be found in such diverse forms and media as medieval illuminated manuscripts, Renaissance decorated altarpieces, Dutch painting, Baroque cabinets, and modernist collage and photomontage. The logic of immediacy has perhaps been dominant in Western representation, at least from the Renaissance until the coming of modernism, while hypermediacy has often had to content itself with a secondary, but nonetheless important status. Sometimes hypermediacy has adopted a playful or subversive attitude,

both acknowledging and undercutting the desire for immediacy. At other times, the two logics have coexisted, even when the prevailing readings of art history have made it hard to appreciate their coexistence. At the end of the twentieth century, we are in a position to understand hypermediacy as immediacy's opposite number, an alter ego that has never been suppressed fully or for long periods of time.

We cannot hope to explore in detail the complex genealogy of hypermediacy through centuries of Western visual representation: we can only offer a few examples that we find particularly resonant with digital hypermediacy today. Some resonances seem obvious: we note that the European cathedral with its stained glass, relief statuary, and inscriptions constituted a collection of hypermediated spaces, both physical and representational. Within the grand space of the cathedral, altarpieces provided a particularly sophisticated form of hypermediacy, because they not only juxtaposed media but also embodied contradictory spatial logics. As perspectival representation came into painting, it is interesting to see, for example, a Flemish altarpiece by Arnt van Kalker, now at the Musée de Cluny in Paris, with a carved representation of the Passion at the center and painted perspectival scenes on both the inside and outside of the cabinet doors. In this altarpiece the closed doors depict on their surface a represented space with depth, but when they are opened they reveal a carved three-dimensional Passion scene that stops at the back of the cabinet. Through this interplay of the real third dimension with its perspectival representation, the Kalker altarpiece connects the older sculptural tradition with the newer tradition of perspectival representation.

Represented and real three-dimensional spaces were also combined in many secular cabinets of the sixteenth and seventeenth centuries, which could have upwards of 50 drawers, doors, and panels, each painted with a perspectival landscape or genre scene (see [fig. 5](#)). The pictures on the doors and drawers of these cabinets ironically duplicated the three-dimensional space that they concealed. **[End Page 330]** Thus, the two-dimensional pictures on the doors opened onto a fictional space, while the painted doors themselves opened on to a physical one. Something similar is happening in cyberspace today: the windowed style is beginning to play a similar game of hide and seek as two-dimensional text windows and icons conceal and then expose three-dimensional graphic images and digitized video. Even the icons and folders of the conventional desktop metaphor function in two spaces: the pictorial space of the desktop and the "informational" cyberspace of the computer and the Internet.

We can also identify the logic of hypermediacy in oil painting, for example, in what Svetlana Alpers has called the Dutch "art of describing."³² With their fascination for mirrors, windows, maps, paintings within paintings, and written and read epistles, such artists as Gabriel Metsu, David Bailly, and especially Jan Vermeer often represented the world as a multiplicity of representations. Their paintings were not strictly multimedia; rather, they absorbed and captured multiple media and multiple forms in oil. This Dutch art has often **[End Page 331]** been contrasted with the paradigm of Renaissance Italian painting with its representation of a unified visual space, in which the signs of mediation were meticulously erased. We can also identify hypermediacy in individual works and individual painters throughout the period in which linear perspective and the paradigm of transparency were ascendant: for example, in Velasquez's *Las Meninas*, discussed by Alpers, Foucault and, because of Foucault, many others.³³ In fact, one could argue--and this would simply be a version of a familiar poststructuralist argument--that hypermediacy was the counterpart to transparency in Western painting, an awareness of mediation whose repression guaranteed its repeated return.

However, according to Clement Greenberg's influential formulation, it was not until modernism that this order of things was powerfully reversed and the paradigm of transparency effectively challenged.³⁴ In modernist art, the logic of hypermediacy could

express itself both as a fracturing of the space of the picture and as a hyper-conscious recognition or acknowledgment of the medium. Collage and photomontage in particular provide evidence of the modernist fascination with media.³⁵ Just as collage challenges the immediacy of perspective painting, photomontage challenges the immediacy of the photograph. When photomonteurs cut up and recombine "straight" photographs, they discredit the notion that the photograph is drawn by the "pencil of nature," as Fox Talbot had suggested. **[End Page 332]** Instead, the photographs themselves become elements that human intervention has selected and arranged for artistic purposes. Photographs pasted beside and on top of each other and in the context of other media such as type, painting, or pencil-drawing create a layered effect that we also find in electronic multimedia. Looking at Richard Hamilton's *Just What Is It That Makes Today's Homes So Different, So Appealing?* (fig. 6), we become aware of the cluttered character of the space and of the process of construction. We become hyperconscious of the medium in photomontage, precisely because straight photography is a medium with such loud historical claims to transparency.

Richard Lanham notes how well Hamilton's piece from the 1950s suits today's "digital rhetoric" and then asks: "Couldn't this--collaged up as it is with clip art and advertising icons--just as well be called : 'Just What Is It That Makes Today's Desktop So Different, So Appealing?'"³⁶ Hamilton shows that collage and photomontage are also hypertextual in the sense that to create is to rearrange existing forms. In photomontage the pre-existing forms are photographs; in **[End Page 333]** literary hypertext they are paragraphs of prose; and in hypermedia they may be prose, graphics, animations, videos, and sounds. In all cases, the artist is defining a space through the disposition and interplay of forms that have been detached from their original context and then recombined. Like Greenberg, Lanham regards collage as "the central technique of twentieth-century visual art," and he makes that claim because he wants to include digital design in the twentieth-century mainstream, which has often created heterogeneous spaces and made the viewer conscious of the act of representation.³⁷

In the twentieth century, as indeed earlier, it is not only high art that wants to combine heterogeneous spaces. Graphic design for print, particularly for magazines and newspapers, is becoming increasingly hypermediated. Magazines like *Wired* or *Mondo 2000* owe their conception of hypermediacy less to the World Wide Web than to the tradition of graphic design that grows out of pop art and ultimately lettrisme, photomontage, and dada. The affiliations of a newspaper like *USA Today* are more contemporary. The paper has been criticized for lowering print journalism to the level of television news. However, visually *USA Today* does not draw primarily on television: its layout resembles a multimedia computer application more than it does a television broadcast. The paper attempts to emulate in print the graphical user interface (see Figs. 7a and b). For that matter, television itself, especially news programs, also shows the influence of the graphical user interface when it divides the screen into two or more frames and places text and numbers over and around the framed video images.

In all its various forms, the logic of hypermediacy expresses the tension between regarding a visual space as mediated and regarding it as a "real" space that lies beyond mediation. Lanham calls this the tension between looking *at* and looking *through*, and he sees it as a feature of twentieth century art in general and now digital representation in particular.³⁸ When the viewer confronts, for example, a collage, he oscillates between looking at the patches of paper and paint on the surface of the work and looking through to the depicted objects as if they occupied a real space beyond the surface. What characterizes modern art is an insistence that the viewer keep coming back to the surface, or in extreme cases an attempt to hold the viewer at the surface indefinitely. We

are making an argument here that is analogous to Lanham's: that in the logic of hypermediacy the artist (or multimedia programmer or web designer) strives to make the [End Page 334] viewer acknowledge the medium as a medium and indeed delight in that acknowledgement. She does so by multiplying spaces and media and by repeatedly redefining the visual and conceptual relationships among mediated spaces--relationships that may range from simple juxtaposition to complete absorption.

Above, we identified the logic of immediacy in computer games such as *Myst* and *Doom*, but other CD ROMs operate according to our other logic and seem to revel in their nature as mediated artifacts. It should not be surprising that some of the best examples of digital hypermediacy (such as the Residents' *Freak Show*, Peter Gabriel's *Xplora 1*, and the Emergency Broadcast Network's *Telecommunication Breakdown*) come out (however indirectly) of the world of rock music production and presentation. Initially, most rock music adhered to the logic of immediacy. However, as early as the 1960s and 1970s, as electric and electronic instruments and recording systems became more sophisticated, performers such as Alice Cooper, David Bowie, and Kiss began to create elaborate, consciously artificial productions. The traditional "musical" qualities of these productions, never very complicated, became progressively less important than the visual and aural spectacle. Today the stage presentations of rock musicians like U2 are often celebrations of media and of the act of mediation, while "avant-garde" artists like Laurie Anderson, the Residents, and the Emergency Broadcast Network are creating CD-ROMs that reflect and comment upon such stage presentations with their seemingly endless repetition within the medium and multiplication across media. For example, in the number "Electronic Behavior Control System," by the Emergency Broadcast Network, the computer screen can be tiled into numerous small windows with shifting graphics, while a central window displays digitized clips from old films and television shows (Fig. 8). This visual multiplicity is synchronized to an insistent rap-music soundtrack. At times one or another digitized character will seem to enunciate a corresponding phrase on the soundtrack, as if all these remnants of old media had come together to perform this piece of music. In a similar spirit, the Residents' *Freak Show* both juxtaposes media and replaces one medium with another as it combines music with graphics and animations reminiscent of comic books and other popular forms.

As Michael Joyce reminds us, replacement is the essence of hypertext, and in a sense the whole World Wide Web is an exercise in replacement.³⁹ When the user clicks on an underlined phrase or an [End Page 335] iconic "anchor" on a web page, a link is activated that calls up another page. The new material usually appears in the original window and erases the previous text or graphic, although the action of clicking may instead create a separate frame within the same window or a new window laid over the first. The new page wins our attention through the erasure (interpenetration), tiling (juxtaposition), or overlapping (multiplication) of the previous page. Beyond the World Wide Web, replacement is the operative strategy of the whole windowed style. In using the standard computer desktop, we pull down [End Page 336] menus, click on icons, and drag scroll bars, all of which are devices for replacing the current visual space with another.

Replacement is at its most radical when the new space is of a different medium--for example, when the user clicks on an underlined phrase in a web page and a graphic appears. Hypermedia CD-ROMs and windowed applications replace one medium with another all the time, confronting the user with the problem of multiple representation and challenging her to consider why one medium might [End Page 337] offer a more or less appropriate representation than another. In doing so, they are performing what we would characterize as acts of "remediation."

Remediation

In the early and mid 1990s, perhaps to a greater extent than at any time since the 1930s, Hollywood produced numerous filmed versions of classic novels--including works by Hawthorne, Wharton, and even Henry James. There has been a particular vogue for the novels of Jane Austen (*Sense and Sensibility*, *Pride and Prejudice* twice, and *Emma*). Some of the adaptations are quite free, but (except for the odd *Clueless*) the Austen films, whose popularity swept the others aside, are historically accurate in costume and setting and very faithful to the original novels. Yet the Austen films do not contain any overt reference to the novels on which they are based: they do not acknowledge that they are adaptations. Acknowledging the novel in the film would disrupt the continuity and the illusion of immediacy that Austen's readers expect, for they want to view the film in the same seamless way in which they read the novels. The content has been borrowed, but the medium has not been appropriated. This **[End Page 338]** kind of borrowing, extremely common in popular culture today, is also of course very old. An example with a long pedigree would be paintings illustrating stories from the Bible or from other literary sources, where apparently only the story content is borrowed. The contemporary entertainment industry calls such borrowing "repurposing": to take a "property" from one medium and re-use it in another. With reuse comes a necessary redefinition, but there may be no conscious interplay between media. The interplay happens, if at all, only for the reader or viewer who happens to know both versions and can compare them.

Marshall McLuhan remarked that "the 'content' of any medium is always another medium. The content of writing is speech, just as the written word is the content of print, and print is the content of the telegraph."⁴⁰ As his problematic examples suggest, McLuhan was not thinking of simple repurposing, but perhaps of a more complex kind of borrowing, in which one medium is itself incorporated or represented in another medium. Dutch painters incorporated maps, globes, inscriptions, letters, and mirrors in their works. All our examples of hypermediacy are characterized by this kind of borrowing, as is also ancient and modern *ekphrasis*, the literary description of works of visual art, which W. J. T. Mitchell defines as "the verbal representation of visual representation."⁴¹ Again, we call the representation of one medium in another "remediation," and we will argue that remediation is a defining characteristic of the new digital media. What might seem at first to be an esoteric practice is so widespread that we can identify a spectrum of different ways in which digital media remediate their predecessors, a spectrum depending upon the degree of perceived competition or rivalry between the new media and the old.

At one extreme, an older medium is highlighted and re-presented in digital form without apparent irony or critique. Examples include CD-ROM picture galleries (digitized paintings or photographs) and collections of literary texts on CD-ROM. There are also numerous World Wide Web sites that offer pictures or texts for users to download. In these cases, the electronic medium is not set in opposition to painting, photography, or printing; instead, the computer is offered as a new means of gaining access to materials from these older media, as if the content of the older media can simply be poured into the new one. Since the electronic version justifies itself by granting **[End Page 339]** access to the older media, it wants to be transparent. The digital medium wants to erase itself, so that the viewer stands in the same relationship to the content as she would if she were confronting the original medium. Ideally, there should be no difference between the experience of seeing a painting in person and on the computer screen, but this is of course never so. The computer always intervenes and makes its presence felt in some way, perhaps because the viewer must click on a button or slide a bar to view a whole picture or perhaps because the digital image appears grainy or with untrue colors. Transparency, however, remains the goal.

Creators of other electronic remediations seem to want to emphasize the difference rather than erase it. In these cases, the electronic version is offered as an improvement

on the older version, although the new is still justified in terms of the old and seeks to remain faithful to the older medium's character. There are, it must be noted, various degrees of fidelity. Encyclopedias on CD-ROM, such as Microsoft's *Encarta* or Grolier's *Electronic Encyclopedia*, offer themselves as improvements on printed encyclopedias. So they provide not only text and graphics, but also sound and video and feature electronic searching and linking capabilities. Yet, because they are presenting discrete, alphabetized articles on technical subjects, they are still recognizably in the tradition of the printed encyclopedia since the *Encyclopédie* and the *Encyclopaedia Britannica*. The Voyager Company has published a series of "Expanded Books" on CD-ROM, an eclectic set of books originally written for printed publication including *Jurassic Park* and *Brave New World*. The Voyager interface remediates the printed book without doing much to challenge print's assumptions about linearity and closure. Even the name "Expanded Books" indicates the priority of the older medium. Much of the current World Wide Web also remediates older forms without challenging them. Its point-and-click interface allows the developer to reorganize texts and images taken from books, magazines, film, or television, but the reorganization does not call into question the semantic character of a text or the ontological status of an image. In all these cases, the new medium does not want to efface itself entirely. Microsoft wants the buyer to understand that she has purchased not simply an encyclopedia, but an electronic and therefore improved encyclopedia. So the borrowing might be said to be translucent rather than transparent.

The digital medium can also be more aggressive in its remediation. It can try to refashion the older medium or media entirely, while still marking the presence of the older media and therefore maintaining a sense of multiplicity or, as we have called it, hypermediacy. This is particularly clear in the CD-ROMs discussed above, [End Page 340] such as the Emergency Broadcast Network's *Telecommunication Breakdown*, in which the principal refashioned media are the recording of music on CD and its live performance on stage. This form of aggressive remediation throws into relief both the source and the target media. In the number called "Electronic Behavior Control System," discussed earlier, old television and movie clips are taken out of context (and therefore out of scale) and inserted absurdly into the rap music chant. This tearing out of context makes us aware of the artificiality of both the digital version and the original clip. The work becomes a mosaic in which we are simultaneously aware of the individual pieces and of their new, inappropriate setting. In this kind of remediation, the older media are presented in a space whose discontinuities, like those of collage and photomontage, are clearly visible. In CD-ROM multimedia the discontinuities are indicated by the window-frames themselves and by buttons, sliders, and other controls, which start or end the various media segments. The windowed style of the graphical user interface favors this kind of remediation: different programs, representing different media, can appear in each window--a word processing document in one, a digital photograph in another, digitized video in a third--while clickable tools activate and control the different programs and media. The standard graphical user interface remediates by acknowledging and controlling the discontinuities as the user moves between media.

Finally, the new medium can remediate by trying to absorb the older medium entirely, so that the discontinuities between the two are minimized. The very act of remediation, however, ensures that the older medium cannot be entirely effaced. The new medium remains dependent upon the older one, in acknowledged or unacknowledged ways. For example, the whole genre of computer games like *Myst* or *Doom* remediate cinema, and the games are sometimes called "interactive films." The idea is that the players become characters in a cinematic narrative. They have some control over both the narrative itself and the stylistic realization of it, in the sense that they can decide where to go and what to do in an effort to dispatch villains (in *Doom*) or solve puzzles (in *Myst*). They can also decide where to look, where to direct their graphically realized points of view, so that in

interactive film, the player is often both actor and director. On the World Wide Web, on the other hand, it is television rather than cinema that is remediated. There are numerous web sites that remediate the monitoring function of broadcast television. These sites present a stream of images from digital cameras aimed at various parts of the environment: pets in cages, fish in tanks, a soft drink machine, one's office, a highway, and so on. Although these [End Page 341] point-of-view sites monitor the world for the web, they do not in general acknowledge television as the medium that they are refashioning. In fact, television and the WWW are engaged in an unacknowledged competition in which each now seeks to remediate the other. (The competition is economic as well as aesthetic; it is a struggle to determine whether broadcast television or the Internet will dominate the American and world markets.)

Like television, film is also trying to absorb and repurpose digital technology. As we have mentioned, digital compositing and other special effects are now standard features of the Hollywood films, particularly in the "action-adventure" genre. And in most cases, the goal is to make these electronic interventions transparent. The stunt or special effect should look as "natural" as possible, as if the camera were simply capturing what really happened in the light. Computer graphics processing is rapidly taking over the animated cartoon; indeed, the takeover is already complete in Disney's *Toy Story*. And here too the goal is to make the computer disappear: to make the settings, toys, and the human characters look as much as possible like live-action film. Hollywood has incorporated computer graphics at least in part in an attempt to hold off the threat that digital media might pose for the traditional, linear film. This attempt shows that remediation operates in both directions: users of older media such as film and television can seek to appropriate and refashion digital graphics, just as digital graphics artists seek to refashion film and television.

Unlike our other examples of hypermediacy, this form of aggressive remediation creates an apparently seamless space. It conceals its relationship to earlier media in the name of immediacy; it promises the user an unmediated experience, whose paradigm again is virtual reality. As we noted earlier, games like *Myst* and *Doom* are desktop virtual reality applications, and, like immersive virtual reality, they aim to inspire in the player a feeling of presence. On the other hand, like these computer games, immersive virtual reality also remediates both television and film: it depends upon the conventions and associations of the first-person point-of-view or subjective camera. The science fiction writer Arthur C. Clarke has claimed that: "Virtual Reality won't merely replace TV. It will eat it alive."⁴² As a prediction of the success of this technology, Clarke is likely to be quite wrong, at least for the foreseeable future, but he is right in the sense that virtual reality remediates television (and film) by the strategy of incorporation. This strategy does not mean that virtual reality can obliterate the earlier visual point-of-view technologies; rather, it ensures [End Page 342] that these technologies remain at least as reference points by which the immediacy of virtual reality is measured. Paradoxically, then, remediation is as important for the logic of immediacy as it is for hypermediacy.

Mediation and Remediation

It is easy to see that hypermedia applications are always explicit acts of remediation: they import earlier media into a digital space in order to critique and refashion them. However, digital media that strive for transparency and immediacy (such as immersive virtual reality and virtual games) are also acts of remediation. Hypermedia and transparent media are opposite manifestations of the same desire: the desire to get past the limits of representation and to achieve the real. They are not striving for the real in a metaphysical sense. Instead, the real is defined in terms of the viewer's experience: it is that which evokes an immediate (and therefore authentic) emotional response. Transparent digital applications seek to get to the real by bravely denying the fact of mediation. Digital

hypermedia seek the real by multiplying mediation so as to create a feeling of fullness, a satiety of experience, which can be taken as reality. Both these moves are strategies of remediation.⁴³

There are two paradoxes at work here. One is that hypermedia could ever be thought of as achieving the unmediated. Consider again the music-spectacle CD-ROMs like the Emergency Broadcast Network with its surfeit of images and sounds that bombard the viewer. The idea of excess has been part of the popular music culture for decades. At first the excess was achieved simply by turning up the volume, until the sound could be felt as well as heard, but more recently, as we have noted, the stage productions of popular musicians like U2 have emphasized visual spectacle often with the acknowledgement of multiple media. The excessive, highly self-conscious video style of MTV is one result, and the music-spectacle CD-ROMs obviously remediate MTV. The excess of media becomes an authentic experience, not in the sense that it corresponds to an external reality, **[End Page 343]** but rather precisely because it does not feel compelled to refer to anything outside itself. As with MTV, the viewer experiences such hypermedia not through an extended and unified gaze, but through directing her attention here and there in brief moments. The experience is one of the glance rather than the gaze, a distinction that Bryson has drawn in *Vision and Painting: The Logic of the Gaze* in order to understand the semiotics of Western painting.⁴⁴ The aesthetic of the glance also makes the viewer aware of the process rather than just the product, both the process of creation and the process of viewing. For example, the Emergency Broadcast Network's CD-ROM conveys the feeling that we are witnessing, and in a way participating in, the process of its own construction. By emphasizing process, hypermedia becomes self-justifying. With its constant references to other media and their contents, hypermedia ultimately claims our attention for itself as pure experience. In this claim, and perhaps only in this claim, hypermedia reminds us of high modern art.

High modern visual art was also self-justifying, as it offered the viewer a visual experience that he was not expected to validate by referring to the external world. Modern art too promised authenticity of experience, and it too emphasized process, e.g., the process of putting paint on canvas. As Greenberg described it in "Towards a New Laocoon": "[Modern] [p]ainting and sculpture can become more completely nothing but what they do; like functional architecture and the machine, they *look* what they *do*."⁴⁵ Digital hypermedia also looks what it does. On the other hand, modern art often worked by reduction and simplification rather than excess. In that sense digital hypermedia (and MTV) are more like the excessive rhetoric of early modernism than the visual practice of high modernism. The rhetoric of cyberspace is reminiscent of the manifestos of Marinetti and the **[End Page 344]** Futurists. Moreover, the cyberspace enthusiasts have a relationship with technologies of representation similar to the relationship that Marinetti and the Futurists had with technologies of motive power.

The second paradox is that, just as hypermedia strives for immediacy, digital technologies of immediacy always end up being remediations, even as, indeed precisely because, they appear to deny mediation. Technologies of immediacy try to improve upon media by erasing them, but they are compelled to define themselves by the standards of the media they are trying to erase. The wire, Lenny claims, "is not like TV only better"; in saying this, of course, he affirms the comparison that he denies. The wire does improve upon television, because it delivers "lived" experience, as television promises and yet fails to do. Similarly, interactive computer games such as *Myst* and *Doom* define their reality through the traditions of photography and film. *Doom* is regarded as authentic because it places the user in an action-adventure movie; *Myst* because of the near photorealism of its graphics and its cinematic use of sound and background music. In general, digital photorealism defines reality as perfected photography, and virtual reality

defines it as first-person point-of-view cinema.

It would seem, then, that *all* mediation is remediation. We are not of course claiming this as an a priori truth, but rather arguing that at this historical moment all current media function as remediators and that remediation offers us a means of interpreting the work of earlier media as well. Our culture conceives of each medium or constellation of media as it responds to, redeploys, competes with, and reforms other media. In the first instance we may think of something like a historical progression, of newer media remediating older ones and in particular of digital media remediating their predecessors. But we are offering a genealogy of affiliations, not a linear history, and in this genealogy, older media can also remediate newer ones.⁴⁶ Television can and does refashion itself in the image of the World Wide Web and film can and does incorporate and attempt to contain computer graphics within its own linear form. What we would not defend is **[End Page 345]** the notion that any one medium can function independently and establish its own separate and purified space of cultural meaning.

We will take as our principle, then, that at our present historical and cultural moment, all mediation is remediation. This is not, however, to suggest that all of our culture's claims of remediation are equally compelling. Nor is this to suggest that we are necessarily aware of (or could identify) all of the ways in which digital media remediate and are remediated by their predecessors. The double logic of remediation can function explicitly or implicitly, and it can be restated in a number of ways. In the remainder of the essay we will elaborate this double logic in the following senses:

1. *Remediation as the mediation of mediation*: All mediation is remediation because each act of mediation depends upon other acts of mediation. Media are continually commenting upon, reproducing and replacing each other, and this process is integral to media. Media need each other in order to be media in the first place.
2. *Remediation as the inseparability of mediation and reality*: Although cyberspace enthusiasts and Baudrillard's logic of simulation and simulacra might suggest otherwise, all mediations are themselves real. They are real as artifacts (but not as autonomous agents) in our mediated culture. Despite the fact that all media depend upon other media in cycles of remediation, our culture still needs to acknowledge that all media reproduce the real. Just as there is no getting rid of mediation, there is no getting rid of the real.
3. *Remediation as reform*: The implicit and sometimes explicit goal of remediation is to refashion or rehabilitate other media. Furthermore, because all mediations are both real and mediations of the real, remediation can also be understood as a process of reforming reality as well.

Remediation as the Mediation of Mediation

The idea of the ubiquity of remediation suggests an analogy between mediation and interpretation and between our analysis of media and the poststructuralist literary theory of the past four decades. Derrida and other poststructuralists have argued that all interpretation is reinterpretation. Just as for them, there is nothing prior to writing, so for our visual culture there is nothing prior to mediation. Any act of mediation is dependent upon another, indeed many other, acts of mediation and is therefore remediation. In his work on postmodernism, Fredric Jameson has traced out an important connection between "the linguistic turn" and what he prefers to call "mediatization." In "Utopianism after the End of Utopia," Jameson describes the spatialization of postmodern culture as "the process **[End Page 346]** whereby the traditional fine arts are *mediatized*: that is, they now come to consciousness of themselves as various media within a mediatic system in which their own internal production also constitutes a symbolic message and the taking of a position on the status of the medium in question."⁴⁷ In other words, Jameson's

mediatization of the traditional fine arts is a process of remediation, in which media (especially new media) become systematically dependent on each other and on prior media for their cultural significance. We suggest that what Jameson describes as mediatization may be true not only of postmodern, new media but also of prior visual media as well. What Jameson identifies as new and truly postmodern may be part of a genealogy of remediation, reflecting an attitude towards mediation that has become dominant today, but that has expressed itself repeatedly in the history of Western representation.

Jameson himself seems to recognize this genealogy in "Surrealism without the Unconscious": "It is because we have had to learn that culture today is a matter of media that we have finally begun to get it through our heads that culture was always that, and that the older forms or genres, or indeed the older spiritual exercises and meditations, thoughts and expressions, were also in their very different ways media products. The intervention of the machine, the mechanization of culture, and the mediation of culture by the Consciousness Industry are now everywhere the case, and perhaps it might be interesting to explore the possibility that they were always the case throughout human history, and within even the radical difference of older, precapitalist modes of production."⁴⁸ Jameson insists that there is something special about the mediatization of our current culture. The paradox for him is that mediatization occurs at the very historical moment when interpretation has asserted a kind of dominance. Visual media now challenge that dominance: the most powerful form of this "critical and disruptive challenge" is video, whose "total flow" threatens the physical and temporal differences that constitute linguistic meaning--even as the "available conceptualities for analyzing" media like video "have become almost exclusively linguistic in orientation." Proclaimed by Jameson the dominant medium of our postmodern age, video simultaneously depends upon and disrupts literary and linguistic theory. What Jameson is suggesting is that literary theory, and by extension the whole current humanist enterprise, is challenged by the popular culture of visual media. **[End Page 347]** We could say that television, film, and now computer graphics threaten to remediate verbal text both in print and on the computer screen--indeed, to remediate them so aggressively that they may lose much of their historical significance.

In *We Have Never Been Modern*, Bruno Latour takes us further in understanding the relationship between the linguistic turn of literary theory and our media-obsessed culture, and he does so by calling into question the very postmodernism with which Jameson is identified. In explaining how literary theory participates in the development of modern technoscience, Latour shows us that the lesson of theory is precisely the lesson of mediation: "Whether they are called 'semiotics,' 'semiology' or 'linguistic turns,' the object of all these philosophies is to make discourse not a transparent intermediary that would put the human subject in contact with the natural world, but a mediator independent of nature and society alike."⁴⁹ Latour claims that contemporary theory transforms "intermediaries" into "mediators": theory makes it difficult to believe in language as an intermediary, as a neutral, invisible conveyor of fully present meaning either between speaker/writer and listener/reader or between subjects and objects, people and the world. Instead, language is regarded as an active and visible mediator, which fills up the space between signifying subjects and nature. In becoming a mediator rather than an intermediary, language operates just as visual media operate in their tasks of remediation. Visual media too are active mediators, not mere conveyors of meaning. For Latour, the phenomena of contemporary technoscience consist of intersections or "hybrids" of the human subject, language, and the external world of things, and these hybrids are as real as their constituents--in fact, in some sense more real because no constituent (subject, language, object) ever appears in its pure form, segregated from the other constituents. The events of our mediated culture are constituted by combinations of

subject, media, and objects, which again do not exist in their segregated forms. ⁵⁰ Thus, there is nothing prior to or outside of the act of mediation. **[End Page 348]**

Remediation as the Inseparability of Reality and Mediation

Media function as objects within the world--within systems of linguistic, cultural, social, and economic exchange. Media are hybrids in Latour's sense and are therefore real for the cultures that create and use them. Photography is real, functioning not just as pieces of paper that result from the photographic process, but as a network of artifacts, images, and cultural agreements about what these special images mean and do. Film is real, and again its reality is the combination of celluloid, the social meaning of celebrity, the economics of the entertainment industry, and the technologies of cameras, editing, and compositing. The reality of digital graphics and the World Wide Web is attested to by the web of economic and cultural relationships that have grown up in a few years around the products from Netscape and Microsoft.

Modern art played a key role in convincing our culture of the reality of mediation. In many cases, modern painting was no longer about the world but about itself. Paradoxically, by eliminating "the real" or "the world" as a referent, modernism emphasized the reality of both the act of painting and its product. Painters offered us their works as objects in the world, not as a representation of an external world. By diminishing or denying painting's representational function, they sought to achieve an immediacy of presentation not available to traditional painting, where immediacy had been achieved by concealing signs of mediation. Modern art was often real, precisely because it refused to be realistic, and the example of modern art reminds us of the need to distinguish mediation and remediation from representation. Although the real and the representational are separated in modern art, modern art is not therefore unmediated. Modern painting achieves immediacy not by denying its mediation, but by acknowledging it. Indeed, as Cavell has noted, building on the work of Greenberg and Michael Fried, one of the defining characteristics of modernist painting is its insistence on acknowledging the conditions of its own medium. ⁵¹

The reality of modernist painting extends beyond the work itself to the space of the real. As Philip Fisher has argued, "[t]he colonizing of this space between the surface of the canvas and the viewer has been one of the most aggressive features of the 20th century." ⁵² As we **[End Page 349]** know from a visit to any traditional museum, the space between viewer and canvas is controlled, institutionalized, and policed as a special, real kind of space, which people walk around or wait before entering. In our own time the colonization of museum space has been extended to the space between a photographer or videographer and the object of her mediating technology. When a tourist is taking a photograph or making a video, for example, we treat the line of sight between the camera and the object as if it were a real obstruction: we walk around it, bend under it, or wait until it is gone. We make these gestures not only out of politeness, but also to acknowledge the reality of the act of mediation that we are witnessing. In this case, the act of mediation functions in a system of pedestrian traffic circulation like a tree, a wire, or a traffic light (which is also an act of mediation whose reality we acknowledge). Mediations are real not only because the objects produced (photos, videos, films, paintings, CD-ROMS, etc.) circulate in the real world, but also because the act of mediation itself functions as a hybrid and is treated much like a physical object.

Finally, even though there is nothing prior to the act of mediation, there is also a sense in which all mediation reproduces the real. Remediation is the mediation of reality because media themselves are real and because the experience of media is the subject of remediation.

Remediation as Reform

The word remediation is used today by educators as a euphemism for the task of bringing lagging students up to an expected level of performance. The word derives ultimately from the Latin *remederi*--to heal, to restore to health--and we have adopted the word to express the way in which one medium is seen by our culture as reforming or improving upon another. This belief in reform is particularly strong for those who are today repurposing earlier media into digital forms. They tell us, for example, that when broadcast television becomes interactive digital television, it will motivate and liberate the viewer as never before; that virtual reality improves upon film by placing the viewer at the center of a moveable point of view; that electronic mail is more convenient and reliable than physical mail; that hypertext brings interactivity to the novel; and that digital audio and video improve upon their analog equivalents. The assumption of reform is so strong that a new medium is now expected to justify itself by improving upon a predecessor: hence the need for computer graphics to achieve full photorealism. Yet the assumption of reform has not been limited to digital media. Photography was seen as the reform of **[End Page 350]** illusionistic painting; the cinema as the reform of the theater (in the sense that early films were once called "photoplays").

It is possible to claim that a new medium makes a good thing even better, but this seldom seems to be the rhetoric of remediation and is certainly not the case for digital media. Each new medium is justified because it fills a lack or repairs a fault in its predecessor, because it fulfills the unkept promise of an older medium. (Typically, of course, users did not realize that the older medium had failed in its promise, until the new one appeared.) The rhetorical virtue of virtual reality, of videoconferencing and interactive television, and of the World Wide Web, is that each of these technologies repairs the inadequacy of the medium or media that it now supersedes. In each case that inadequacy is represented as a lack of immediacy. This seems to be generally true of the rhetoric of remediation. So photography was more immediate than painting; film than photography; television than film; and now virtual reality fulfills the promise of immediacy and supposedly ends the progression. The rhetoric of remediation favors immediacy, even though as the medium matures it offers new opportunities for hypermediacy.

Remediation can also imply reform in a social or political sense, and again this sense has emerged with particular clarity in the case of digital media. A number of American political figures have even suggested that the World Wide Web and the Internet can reform democracy by lending immediacy to the process of making decisions. When citizens are able to participate in the debate of issues and possibly even vote electronically, we may substitute direct (immediate) democracy for our representational system. Here too, as it happens, digital media promise to overcome representation. Even beyond claims for overt political reform, many cyberenthusiasts suggest that the web and computer applications are creating a digital culture that will revolutionize commerce, education, and social relationships. Thus, broadcast television is associated with the old order of hierarchical control, while interactive media move the locus of control to the individual. That digital media can reform and even save society reminds us of the promise that has been made for technologies throughout much of the twentieth century: it is a peculiarly, if not exclusively, American promise. American culture seems to believe in technology in a way that European culture, for example, may not. Throughout the twentieth century, or really since the French Revolution, salvation in Europe has been defined in political terms--finding the appropriate (radical left or radical right) political formula. Even traditional Marxists, who believed in technological progress, subordinated that progress to political change. In America, **[End Page 351]** however, collective (and perhaps even personal) salvation has been thought to come through technology rather than through political or even religious action. Contemporary American culture claims to have lost

much of its naïve confidence in technology. (Certainly postmodern theory is ambivalent if not hostile to technology, but of course postmodern theory is European [largely French] in its origins and allegiances.) On the other hand, the vocal enthusiasts for cyberspace and the whole fringe of rhetorical hangers-on that has grown up around computer technology are defined by their commitment to technological salvation. What remains strong in our culture today is the conviction that technology itself progresses through reform: that technology reforms itself. In our terms, new technologies of representation proceed by reforming or remediating earlier ones, while earlier technologies are struggling to maintain their legitimacy by remediating newer ones. The cyberspace enthusiasts argue that in remediating older media the new media are accomplishing social change. The gesture of reform is ingrained in American culture, and this is why American culture takes so easily to strategies of remediation.

Finally, remediation is reform in the sense that media reform reality itself. As we have argued above, it is not that media merely reform the appearance of reality. Media hybrids (the affiliations of technical artifacts, rhetorical justifications, and social relationships) are as real as the objects of science. Media make reality over in the same way that all Western technologies have sought to reform reality. Thus, virtual reality reforms reality by giving us an alternative visual world and insisting on that world as the locus of presence and meaning for us. Recent proposals for "ubiquitous" or "distributed" computing would do just the opposite, but in the service of the same desire for reform. Instead of putting ourselves in the computer's graphic world, the strategy of ubiquitous computing is to scatter computers and computational devices throughout our world: to "augment reality" with digital artifacts and so create a "distributed cyberspace."⁵³ Its advocates see such a strategy "as a way to improve on the 'flawed' design in ordinary reality," in which "objects are largely 'dead' to distinctions we care about. Television sets and stereo systems are socially insensitive: they do not turn themselves down when we talk on the phone."⁵⁴ Latour has argued, however, that for hundreds of years we have been constructing our technologies precisely to take our cultural distinctions seriously. Although he would probably agree **[End Page 352]** with the enthusiasts for distributed computing that "[t]he 'distinctions' people care about can be viewed as virtual worlds, or . . . information webs," these enthusiasts miss the point when they want to make a categorical distinction between distributed cyberspace and other current and past technologies.⁵⁵ For Latour, the idea of technologies that embody our cultural values or distinctions has been a feature not only of modern but of "amodern" or "premodern" societies as well.⁵⁶

The advocates of ubiquitous computing express grandiloquently the implied goal of all advocates and practitioners of digital media: to reimagine and therefore to reform the world as a mediated (and remediated) space. Again this is not new. For hundreds of years, the remediation of reality has been built into our technologies of representation. Photography, film, and certainly television have been constructed by our culture to embody our cultural distinctions and to make those distinctions part of our reality, and digital media follow in this tradition. Nor will ubiquitous computing be the last expression of remediation as reform--as the burgeoning hype about "push media" already reminds us.

Remediation of the Self

The two logics that we have identified, the desire for immediacy and the fascination with hypermediacy, have a psychological dimension that we have not yet explored (and that we will leave to others to explore more completely). Although we have concentrated on the relationship of the object to the act of representation, our two logics can also refer to the attitude of the subject toward the act of representation. The last two hundred years have witnessed a strengthening of the subject's desire for immediacy in artistic expression and reception. Cavell notes that this desire came from a need to validate

oneself: "[W]hat [traditional] painting wanted, in wanting a connection with reality, was a sense of *presentness*--not exactly a conviction of the world's presence to us, but of our presence to it. At some point the unhinging of our consciousness from the world interposed our subjectivity between us and our presentness to the world. Then our subjectivity became what is present to us, individuality became isolation. The route to conviction in reality was through the acknowledgement of the endless presence of self." ⁵⁷ As Cavell goes on to point **[End Page 353]** out, the strategy for achieving this unmediated relationship shifted with romanticism from an emphasis on the world as object (mimesis) to the viewer as subject (expression): "To speak of our subjectivity as the route back to our conviction in reality is to speak of romanticism." ⁵⁸ If the Enlightenment subject was content to stand and gaze through the window frame, the romantic subject wanted to get closer. And if in turn the romantic was convinced that it was the self's responsibility and was within the self's power to undertake an active search for reality, modernism went further in espousing the "endless presence of the self" to itself.

In their efforts to achieve presence, creators of digital media have adopted both romantic and modernist strategies. When a subject examines a linear perspective painting, there remains a critical visual distance: the window frame separates the subject from the objects of representation by the window frame. There are, then, two ways to reduce this critical distance and so to heighten the sense of immediacy: either the subject can pass through the window into the represented world or the objects of representation can come up to or even through the window and surround the subject. Both of these strategies have been adopted by digital media. Virtual reality adopts the romanticism of the first, in that it allows the viewer to pass through Alberti's window in an active search for reality to examine, and in some cases even to manipulate, the objects of representation. Although this move may have been implicit in illusionistic painting, straight photography, film, and television, the cyber-enthusiasts insist that something new has happened, when the move through Alberti's window becomes explicit and operational. The second more modernist strategy has been adopted by ubiquitous computing and by hypermedia in general. The subject stays where she is, and instead the objects of representation come to her to be appreciated individually. In hypermedia applications, the objects press themselves against Alberti's window and divide it into numerous panes or frames that compete for the subject's attention. In ubiquitous computing, the applications embody themselves as separate machines and appliances and are distributed throughout the environment. The goal is still immediacy through contact, but now the immediacy is achieved as the subject recognizes the multiple and mediated character of the objects before her.

Furthermore, the definition of the subject is similar in either case. In virtual reality the subject is defined by the perspectives that she occupies in virtual space. In this respect she is like the Enlightenment **[End Page 354]** subject who is also defined by the station point that he takes up in front of the canvas, or more generally by the verbal and visual point of view that he holds in his relations with the world. But in her quest for immediacy, the subject in virtual space is not satisfied with a single point of view; instead, she wants to occupy the points of view of other participants and objects in that space. She understands herself not as one unshakable point of view, but as a potentially very rapid succession of points of view, as a series of immediate experiences derived from those points of view. In the same way in the case of hypermedia, the subject is defined as a succession of relationships with various applications or media. She oscillates between media (moves from window to window, from application to application), and her subjectivity is determined by those oscillations. In the first case, the subject is assured of her existence by the ability to occupy points of view, while in the second she is assured of existence by the fact that she can enter into immediate relationships with the various media or media forms that surround her.

The reciprocal nature of immediacy and hypermediacy has a psychological dimension as well. The desire for immediacy would appear to be fulfilled in the first instance by the technologies that deny mediation: straight photography, live television, three-dimensional, immersive computer graphics, and so on. Yet these technologies can never satisfy that desire because, as we have seen, they never succeed in fully denying mediation. Each of them ends up defining itself with reference to other technologies, so that the viewer never reaches that blissful state in which the objects of representation themselves are felt to be self-present. Our culture tries this frontal assault on the problem of representation with almost every new technology (and repeatedly with the familiar technologies). As this strategy always fails, a contrary strategy emerges, in which the subject becomes fascinated with the act of mediation itself. ⁵⁹

The failure to satisfy our desire for immediacy and our resulting fascination with the process of mediation constitutes the self as part of the process of mediation. When we look at a traditional photograph or a perspective painting, we understand ourselves as the reconstituted **[End Page 355]** station point of the artist or the photographer. When we watch a film or a television broadcast, we understand ourselves as the changing point of view of the camera. When we put on the virtual-reality helmet, we understand ourselves as the focus of an elaborate technology for real-time, three-dimensional graphics and motion tracking. And insofar as we are mediated, we are therefore remediated, because in each case we also understand the particular medium in relation to other past and present media. When we watch the filmed adaptation of a novel, we bring to the film a notion of self appropriate to voiced prose. When we participate in virtual reality, we bring to that participation the mediations of the subject that we know from television and film. When we run a multimedia program on our desktop computer, each window containing prose, static graphics, or video offers a different mediation of the subject, and our experience is the remediation of these differences.

This fascination with media in turn explains why the self today is both mediated and remediated. If immediacy were possible, if the self could be left alone with the objects of mediation, then media would not need to enter into the definition of self. We could then be just subjects in the world. But even if that utopian state were ever possible, a supposition that we would in any case take great pains to deny, it is certainly not available to us in today's media-saturated environment. Media are part of our world as much as any other natural and technical objects. Whenever we engage ourselves with visual (or verbal) media, we become aware not only of the objects of representation but also of the media themselves. Instead of trying to be in the presence of the objects of representation, the subject now defines immediacy as being in the presence of media. In this remediation of the self, the fascination with media functions as the sublimation of the initial desire for immediacy, the desire to be present to oneself.

Networks of Remediation

Although our analysis of remediation may appear to have been largely formal, we have throughout assumed the material bases of remediation. When artists and technicians fashion the apparatus for a new medium, they do so with reference to previous media, borrowing and adapting as many materials and techniques as possible. Thus, Gutenberg and the first generation of printers borrowed the letterforms and layout from manuscript technology and constructed the printed book as the "manuscript only better." ⁶⁰ After winning their battle of remediation, printers in the late fifteenth and early sixteenth **[End Page 356]** century moved away from the manuscript model by simplifying letterforms and regularizing the layout. In the case of photography, Fox Talbot, one of the pioneers, justified his invention because of his dissatisfaction with a contemporary device for making accurate perspective drawings by hand, and the name "camera" was his remediation for the camera obscura. ⁶¹ The first generations of film technicians and

producers remediated both photography and the practices of stage plays. The inventors of television remediated the vacuum tube from a device for modulating radio transmissions into a device for transmitting images. In computer graphics, paint programs borrowed techniques and names from manual painting practices. The first generation of World Wide Web designers have remediated graphic design as it was practiced for printed newspapers and magazines, which have now themselves remediated the graphic design of the World Wide Web.

The remediation of material practice is inseparable from the remediation of social arrangements. The new practitioners want to claim the status of the practitioners of the earlier medium. Film stars wanted to be seen as artists, as skilled as stage actors. Film directors wanted to be regarded as *auteurs*, as "authors" of their films. Makers of television dramas still want their work to be accorded the status of dramatic film (stage drama now being nearly moribund). Computer gamemakers hope that their interactive products will someday achieve the status of first-run films; there is even an attempt to lure film stars to play in these narrative computer productions. And although photography remediates painting, it was a more complex historical case. In their rivalry with painting, some photographers (such as Henry Peach Robinson) sought to be regarded as artists, while "straight" photographers (such as Lewis Hine, Edward Weston, and August Sander) promoted themselves not as artists, but rather as social historians or even natural scientists. Their internal disagreements were both over the material basis of their medium and over the social and formal nature of the remediation that photography undertook. Whatever their differences, in each of these cases, the remediation of the social and the remediation of the material go hand in hand.

The social and material aspects of remediation bring with them economic remediation as well. In some senses, this aspect of the rivalry and refashioning among media has already been explicitly recognized. Each new medium has had to find its economic place, either by replacing or by supplementing what is already available, while workers in the new medium have sought to justify their economic [End Page 357] success according to the new medium's status. Thus, web designers command higher salaries than technical writers and older graphic designers, and they justify their value by arguing that digital media can not only replace printed documents, but vastly improve upon them. For web designers, then, the economic aspect of remediation is tied up with its social and material aspects. Similarly, the entertainment industry's understanding of remediation as repurposing reveals the inseparability of the economic from the social and material. As we noted earlier, the entertainment industry defines repurposing as pouring a familiar mediated content into another mediated form: a comic book series is repurposed as a live-action movie, a televised cartoon, a video game, and a set of action toys. Although the goal is primarily economic--not to replace the earlier forms, to which the company may well own the rights, but rather to spread the content over as many markets as possible--repurposing works as remediation insofar as its economic ends are made possible only by material and social means.

These material, social, and economic aspects of remediation enter into Latour's network of relationships, to which we have already appealed in characterizing media as hybrids. Although it is possible to examine each aspect separately, we believe that remediation is a concept that applies to media in their simultaneous character as objects, as social relationships, and as formal structures. A change in the formal character of a medium (for example, the invention of linear perspective in painting) may also change its economic value and its status as a viewed object. In fact, it is artificial to characterize this change as if it were a matter of cause and effect. In the case of linear perspective, the role and status of the artist and the social uses of their creations had already been changing in the fourteenth century, even as artists were experimenting with perspective techniques. ⁶² It

would then be fair to say that the refashioning of a network of relationships is what defines a medium in our culture. Remediation in one dimension of media hybrids always seems both to suggest and to be suggested by remediations in other dimensions.

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Notes

1. "Nietzsche, Genealogy, History," in *Language, Counter-Memory, Practice: Selected Essays and Interviews*, ed. Donald F. Bouchard (Ithaca, N.Y.: Cornell University Press, 1977), p. 146.
2. In tracing the ways in which attempts to deny mediation reemerge as a fascination with media, we are not trying to posit an "essence" of mediation or an "origin" or "identity" at the heart of all media. Nor are we arguing that the available media technologies are autonomous agents or that they necessarily determine how a culture represents the world to itself. In these ways, we are indebted to Foucault. But where Foucault was concerned with relations of power, our proposed genealogy is defined by the formal relations within and among media as well as by relations of cultural power and prestige.
3. Larry F. Hodges, Barbara O. Rothbaum, et al., "Presence as the Defining Factor in a VR Application," GVVU Technical Report #94-06 (Atlanta, Ga.: Graphics Visualization and Usability Center, 1994).
4. Howard Rheingold, *Virtual Reality* (New York: Simon & Schuster, 1991), p. 46. However, a number of recent theorists including N. Katherine Hayles in "The Materiality of

Informatics," *Configurations 1* (1993): 147-170, and Anne Balsamo "The Virtual Body in Cyberspace," in *Research in Philosophy and Technology*, ed. J. Rothschild (Greenwich, Conn.: JAI Press, 1993), pp. 119-139, have argued that virtual reality is not a technology that can deliver lived or embodied experience.

[5.](#) Jaron Lanier quoted in Steve Ditlea, "Another World: Inside Artificial Reality," *PC Computing* 2:11 (1989): 97.

[6.](#) Meredith Bricken, "Virtual Worlds: No Interface to Design," in *Cyberspace: First Steps*, ed. Michael Benedikt (Cambridge, Mass.: MIT Press, 1991), p. 372.

[7.](#) See, for example, S. K. Card, G. G. Robertson, and J. D. Macinlay, "The Information Visualizer: An Information Workspace," in *Proceedings of CHI' 91* (New York: ACM, 1991), pp. 181-188.

[8.](#) Erwin Panofsky, *Perspective as Symbolic Form*, trans. Christopher S. Wood (New York: Zone Books, 1991), p. 27.

[9.](#) Martin Jay, "Scopic Regimes of Modernity," in *Vision and Visuality*, ed. Hal Foster (Seattle, Wash.: Bay Press, 1988), pp. 3-23. Also Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley: University of California Press, 1993), pp. 69-82. Unlike Jay, Samuel Edgerton not only documents a connection between the mathematization of space and linear perspective, but seems to accept it as true. See *The Renaissance Rediscovery of Linear Perspective* (New York: Basic Books, 1975).

[10.](#) Bruno Latour, "Drawing Things Together," in *Representation in Scientific Practice*, ed. Michael Lynch and Steve Woolgar (Cambridge, Mass.: MIT Press, 1990), pp. 19-68. Also, Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, Mass.: Harvard University Press, 1987), Chapter 6. See, too, William M. Ivins, *On the Rationalization of Sight* (New York: Da Capo Press, 1973).

[11.](#) Leon Battista Alberti, *On Painting and On Sculpture. The Latin Texts of De Pictura and De Statua*, ed. Cecil Grayson (London: Phaidon, 1972), p. 55.

[12.](#) Norman Bryson, *Vision and Painting: The Logic of the Gaze* (New Haven, Conn.: Yale University Press, 1983), p. 92. On the concept of erasure, see also Philip Fisher, *Making and Effacing Art: Modern American Art in a Culture of Museums* (New York: Oxford University Press, 1991).

[13.](#) Martin Kemp, *The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven, Conn.: Yale University Press, 1990), pp. 42, 70-72, ff.

[14.](#) For a revisionist view of the relationship of photography and Western art, see Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, Mass.: MIT Press, 1990).

[15.](#) André Bazin, "The Ontology of the Photographic Image," in *Classic Essays in Photography*, ed. Alan Trachtenberg (New Haven, Conn.: Leete's Islands Books, 1980), p. 239.

[16.](#) In fact, photography was often regarded as going too far in the direction of concealing the artist by eliminating him altogether. In the nineteenth and early twentieth centuries, of course, this question was extensively debated: was photography an art; did it make painting and painters unnecessary, and so on? See Trachtenberg, *Classic Essays in Photography* (above, n. 15), pp. vii-xiii.

[17.](#) Stanley Cavell, *The World Viewed: Reflections on the Ontology of the Cinema* (Cambridge, Mass.: Harvard University Press, 1979), p. 23.

[18](#). A similar argument could be made for television, especially for the "live" coverage of news and sporting events, which promises immediacy through its real-time presentation. Stanley Cavell has described what he calls the "monitoring" function of television: see "The Fact of Television," in *Video Culture: A Critical Investigation*, ed. John G. Hanhardt (Layton, Utah: G. M. Smith, Peregrine Smith Books, 1986). The case for immediacy in film is complicated by the intervention of the director and the editor, but film is still experienced as immediate during the time of its showing--an immediacy that greatly troubled Christian Metz, for example, in *The Imaginary Signifier: Psychoanalysis and the Cinema* (Bloomington: Indiana University Press, 1977).

[19](#). Bazin, "Ontology of the Photographic Image" (above, n. 15), p. 240.

[20](#). William J. Mitchell, *The Reconfigured Eye: Visual Truth in the Post-Photographic Era* (Cambridge, Mass.: MIT Press, 1994), p. 161.

[21](#). See James D. Foley, Andries van Dam, Steven V. Feiner, John F. Hughes, *Computer Graphics: Principles and Practice* (Reading, Mass.: Addison-Wesley, 1996), pp. 229-283.

[22](#). See James Elkins, *The Poetics of Perspective* (Ithaca, N.Y.: Cornell University Press, 1994); Kemp, *The Science of Art* (above, n. 13); Margaret A. Hagen, *Varieties of Realism* (Cambridge: Cambridge University Press, 1986).

[23](#). Foley and van Dam, *Computer Graphics* (above, n. 21), pp. 563-604 and pp. 721-814.

[24](#). In computer graphics, as in classic representational painting or photography, it is typically visible signs of agency that are effaced; this is unlike an abstract American artist like Rauschenberg, who makes the act of erasure that which must be effaced; see Fisher, *Making and Effacing Art* (above, n. 12), pp. 98-99.

[25](#). As Fox Talbot did in his book *The Pencil of Nature*: see Estelle Jussim, *Visual Communication and the Graphic Arts: Photographic Technologies in the Nineteenth Century* (New York: R. R. Bowker, 1983), p. 50.

[26](#). Rheingold, *Virtual Reality* (above, n. 4), p. 75.

[27](#). Theorists in the second half of the twentieth century have consistently denied that an image is a more direct presentation of the world than is written or spoken language. Their approach has generally been to textualize the image and therefore to take it into the discourse of poststructuralism--a strategy apparent in works as diverse as Jacques Derrida's *Of Grammatology* (Baltimore: Johns Hopkins University Press, 1976), and in Nelson Goodman's *Languages of Art: An Approach to a Theory of Symbols* (Indianapolis and New York: Bobbs-Merrill, 1968). More recently, in *Word and Image: French Painting of the Ancien Régime* (Cambridge: Cambridge University Press, 1981) and *Vision and Painting* (above, n. 12), Norman Bryson has given us an overtly semiotic account of painting. In *Picture Theory* (Chicago: University of Chicago Press, 1994), W. J. T. Mitchell attempts to break down the dichotomy between words and images by arguing for a hybrid, the "imagetext," but his picture theory finally assimilates images to words more than the reverse. Martin Jay in *Downcast Eyes* (above, n. 9) has shown how almost all the influential French theoreticians of the twentieth century have sought to surround and subdue the image by means of text.

[28](#). In some theorists the embarrassment becomes acute. The "punctum" in Roland Barthes's *Camera Lucida* (New York: Hill and Wang, 1981) is precisely that element in a photograph that threatens to become immediate, to pull the viewer into the photograph itself. Meanwhile, Christian Metz in the *Imaginary Signifier* (above, n. 18) seems appalled at the thought that the "apparatus" of the cinema can lull the viewer into a hypnotic state of apparently unmediated experience. In his analysis of the pernicious reality effect of

cinema, Metz relied on his reading of Lacan's mirror stage and his theory of the Imaginary, in which the individual posits a reality (a sense of wholeness and integration) for the image that he sees in the mirror. In Lacan's view, the desire for this reality (which we are calling immediacy) can thus lead to paranoia or worse.

[29](#). See, for example, E. H. Gombrich's *Image and the Eye* (Oxford: Phaidon Press, 1982), and Margaret Hagen's *Varieties of Realism* (above, n. 22) and *The Perception of Pictures*, vols. 1 and 2 (New York: Academic Press, 1980).

[30](#). William Mitchell, *Reconfigured Eye* (above, n. 20), p. 8.

[31](#). Bob Cotten and Richard Oliver, *Understanding Hypermedia* (London: Phaidon Press, 1992) p. 8.

[32](#). Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: The University of Chicago Press, 1983).

[33](#). *Ibid.*, pp. 69-70; Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Press, 1971), pp. 3-16.

[34](#). As Clement Greenberg puts it in his essay "Modernist Painting": "Realistic, illusionist art had dissembled the medium, using art to conceal art. Modernism used art to call attention to art. The limitations that constitute the medium of painting--the flat surface, the shape of the support, the properties of pigment--were treated by the Old Masters as negative factors that could be acknowledged only implicitly or indirectly. Modernist painting has come to regard these same limitations as positive factors that are to be acknowledged openly. Manet's painting became the first Modernist ones by virtue of the frankness with which they declared the surfaces on which they were painted." (Clement Greenberg, "Modernist Painting," in *The New Art: A Critical Anthology*, ed. Gregory Battcock [New York: E. P. Dutton, 1973], pp. 68-69).

[35](#). Greenberg sees collage as an expression of the tension between the modernist emphasis on the surface of the painting and the inherited tradition of three-dimensional representation ("Collage," in *Clement Greenberg: The Collected Essays and Criticism*, ed. John O'Brien [Chicago: University of Chicago Press, 1986], vol. 1, pp. 70-74). When Braque and Picasso took to pasting scraps of newspaper and wallpaper onto their canvases, they created a hypermediated experience in which the viewer oscillates between seeing the pasted objects as objects and seeing them as part of the painted scene. The viewer is constantly reminded of the materials, the surface, and the mediated character of this space.

[36](#). Richard Lanham, *The Electronic Word: Democracy, Technology, and the Arts* (Chicago: University of Chicago Press, 1993), p. 40.

[37](#). *Ibid.*, pp. 40-41.

[38](#). *Ibid.*, 3-28 and 31-52.

[39](#). As Joyce puts it: "Text reproduces itself; hypertext replaces itself." (Private Communication).

[40](#). Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), pp. 23-24.

[41](#). W. J. T. Mitchell, *Picture Theory* (above, n. 27), pp. 151, 152.

[42](#). Rheingold, *Virtual Reality* (above, n. 4), back cover.

[43](#). The logic of remediation we describe here is similar to Derrida's account of mimesis in "Economimesis," where mimesis is defined not ontologically or objectively in terms of the

resemblance of a representation to its object but rather intersubjectively in terms of the reproduction of the feeling of imitation or resemblance in the perceiving subject. "Mimesis here is not the representation of one thing by another, the relation of resemblance or identification between two beings, the reproduction of a product of nature by a product of art. It is not the relation of two products but of two productions. And of two freedoms. . . . 'True' *mimesis* is between two producing subjects and not between two produced things." Jacques Derrida, "Economimesis," *Diacritics* 11 (1981): 3-25; p. 9.

[44.](#) Bryson, *Vision and Painting* (above, n. 12).

[45.](#) Greenberg, "Towards a New Laocoon," (above, n. 35), p. 34. Greenberg's account of modernism has been challenged by many critics, among them T. J. Clark, who criticizes Greenberg for not recognizing what Clark sees as modernism's essential qualities of negation and ideological critique; "Clement Greenberg's Theory of Art," in *The Politics of Interpretation*, ed. W. J. T. Mitchell (Chicago: University of Chicago Press, 1983), pp. 203-220. Clark's argument is refuted by Michael Fried, who sees Clark as subscribing to a kind of essentialism that Greenberg, too, endorses. For Fried, modernism is not about "the irreducible essence of *all* painting," but rather "those conventions which, at a given moment, alone are capable of establishing [a] work's identity as painting"; p. 227, Michael Fried "How Modernism Works: A Response to T. J. Clark," in *The Politics of Interpretation*, pp. 221-238. As we argue below, remediation is not the irreducible essence either of digital media or of mediation generally, but rather at our particular historical moment, remediation is one of the conventions at work in establishing the identity of new digital media.

[46.](#) It is in this sense of older media remediating newer ones that our notion of remediation can be distinguished from the Hegelian concept of sublation ("*Aufhebung*"), in which prior historical formations (like pagan religions) are sublated or incorporated by newer formations (like Christianity). But as Slavoj Žižek points out, the interesting move in thinking about Hegelian sublation is to look at those moments when the newer formation is still "in its becoming," when it is perceived as something of a scandal. It is in part the attempt to understand remediation at such a historical moment that we are endeavoring in this essay. Slavoj Žižek, *Tarrying with the Negative: Kant, Hegel, and the Critique of Ideology* (Durham, N.C.: Duke University Press, 1993), pp. 284-285, n. 34.

[47.](#) Frederic Jameson, *Postmodernism: Or the Cultural Logic of Late Capitalism* (Durham, N.C.: Duke University Press, 1991), p. 162.

[48.](#) *Ibid.*, p. 68.

[49.](#) Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, Mass.: Harvard University Press, 1993), p. 62.

[50.](#) Prior to *We Have Never Been Modern*, Latour's fullest account of the heterogeneous network that links together humans, language, and the external world is in *Science in Action* (above, n. 10).

[51.](#) For Cavell on modernist painting and acknowledgment, see "The Fact of Television" (above, n. 18), 108-118. The relations among Cavell, Fried, and Greenberg are complex. See, for example, note 45 for Fried's Cavell-inspired criticism of Greenberg and T. J. Clark.

[52.](#) Fisher, *Making and Effacing Art* (above, n. 12), p. 37.

[53.](#) See Wendy A. Kellogg, John M. Carroll, and John T. Richards, "Making Reality a Cyberspace" in Michael Benedikt (ed.), *Cyberspace: First Steps* (Cambridge, Mass.: MIT Press, 1991), pp. 411-433.

[54.](#) Ibid., p. 418.

[55.](#) Ibid.

[56.](#) See Bruno Latour, "Where are the Missing Masses? The Sociology of a Few Mundane Artifacts," in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, ed. W. E. Bijker and J. Law (Cambridge, Mass.: MIT Press, 1992), pp. 225-258.

[57.](#) Cavell, *The World Viewed* (above, n. 17), p. 22.

[58.](#) Ibid., p. 22.

[59.](#) This psychological economy of remediation, in which the desire for immediacy cannot be fulfilled by transparent media, and must therefore be supplemented by technologies of hypermediacy, is analogous to the Lacanian critique of desire. Žižek provides this concise formulation of Lacan's critique: "Desire is constituted by 'symbolic castration,' the original loss of the *thing*; the void of this loss is filled out by *objet petit a*, the fantasy object; this loss occurs on account of our being 'embedded' in the symbolic universe which derails the 'natural' circuit of our needs"; Žižek, *Tarrying with the Negative* (above, n. 46) p. 3.

[60.](#) For this early history, see, for example, S. H. Steinberg, *Five Hundred Years of Printing* (New York: Criterion Books, 1959).⁶¹ Trachtenberg, *Classic Essays in Photography* (above, n. 15), p. 27; Kemp, *The Science of Art* (above, n. 13), p. 200.

[62.](#) For a study of these painters, see John White, *The Birth and Rebirth of Pictorial Space* (London: Faber and Faber, 1987).