Introduction: The Double Logic of Remediation

"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 to a potential customer a technological wonder called "the wire." When the user places the device over her head, its sensors make contact with the perceptual centers in her brain. In its recording mode, the wire captures the sense perceptions of the wearer; in its playback mode, it delivers these recorded perceptions to the wearer. If the ultimate purpose of media is indeed to transfer sense experiences from one person to another, the wire threatens to make all media obsolete. Lenny mentions television, but the same critique would seem to apply to books, paintings, photographs, film, and so on. The wire bypasses all forms of mediation and transmits directly from one consciousness to another.

The film *Strange Days* 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. In this media-filled world, the wire itself is the ultimate mediating technology, despite—or indeed because of—the fact that the wire is designed to efface itself, to disappear from the user's consciousness. When Lenny coaches the "actors" who will appear in a pornographic recording, it becomes clear that the experience the wire offers can be as contrived as a traditional film. Although Lenny insists that the wire is

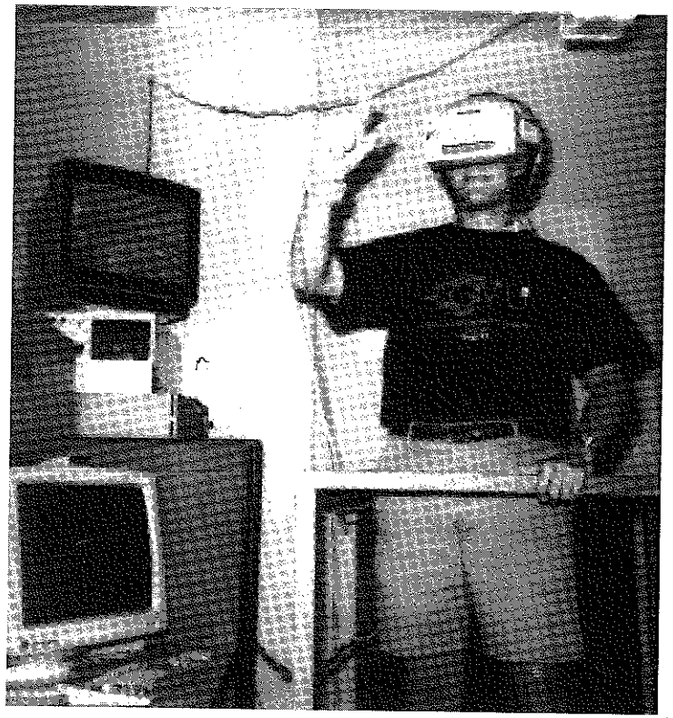

Figure I.1 A virtual reality head-mounted display. Courtesy of Professor Larry Hodges, GVU Center, Georgia Institute of Technology.

"not TV only better," the film ends up representing the wire as "film only better." When Lenny himself puts on the wire and closes his eyes, he experiences the world in a continuous, first-person point-of-view shot, which in film criticism is called the "subjective camera."

Strange Days 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, with its goal of unmediated visual experience. The contemporary head-mounted display of virtual reality is considerably less comfortable and fashionable (fig. I.1), and the visual world it generates is far less compelling. Still, contemporary virtual reality is, like the wire in *Strange Days*, an experiment in cinematic point of view. Meanwhile, 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, this film demonstrates what we call a double logic of *remediation.* Our culture wants both to multiply its media and to erase all traces of mediation: ideally, it wants to erase its media in the very act of multiplying them.

In this last decade of the twentieth century, we are in an unusual position to appreciate remediation, because of the rapid development of new digital media and the nearly as rapid response by traditional media. Older electronic and print media are seeking to reaffirm their status within our culture as digital media challenge that status. Both new and old media are invoking the twin logics of immediacy and hypermediacy in their efforts to remake themselves and each other. To fulfill our apparently insatiable desire for immediacy, "live" point-of-view television programs show viewers what it is like to accompany a police officer on a dangerous raid or 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. "Webcams" on the Internet pretend to locate us in various natural environments—from a backyard bird feeder in Indianapolis (Fig. I.2) to a panorama in the Canadian Rockies (Fig. I.3). In all these cases, the logic

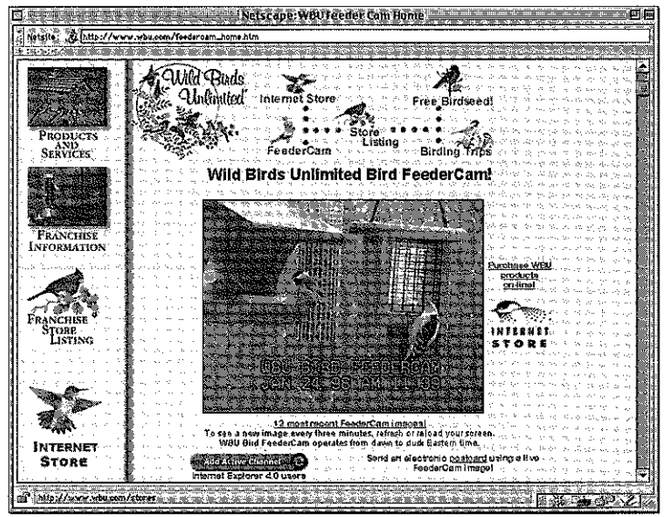

Figure I.2 Bird feeder webcam: the view is updated every three minutes. http://www.wbu.com/feedercam_home.htm January 24, 1998.

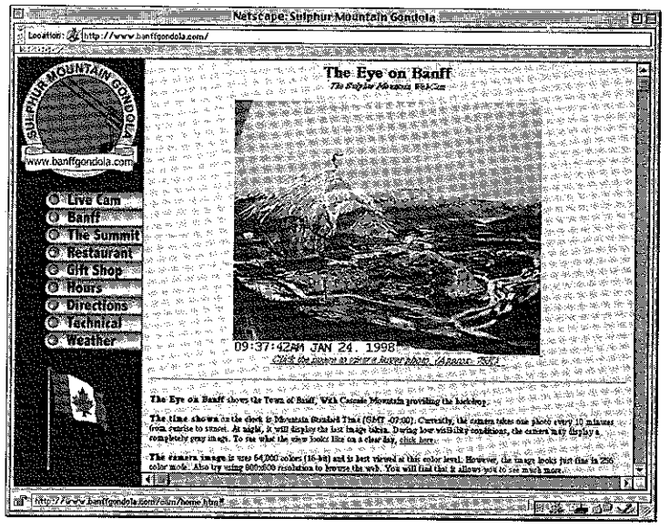

Figure I.3 Sulphur Mountain webcam, providing a repeatedly updated view of a mountain in the Canadian Rockies in Banff, Alberta. http://www.banffgondola.com/ January 24, 1998. © 1998, Sulphur Mountain Gondola. All rights reserved. Used by permission.

of immediacy dictates that the medium itself should disappear and leave us in the presence of the thing represented: sitting in the race car or standing on a mountaintop.

Yet these same old and new media often refuse to leave us alone. Many web sites are riots of diverse media forms—graphics, digitized photographs, animation, and video—all set up in pages whose graphic design principles recall the psychedelic 1960s or dada in the 1910s and 1920s (Fig. I.4; Fig. I.5). Hollywood films, such as *Natural Born Killers* and *Strange Days*, mix media and styles unabashedly. Televised news programs feature multiple video streams, split-screen displays, composites of graphics and text—a welter of media that is somehow meant to make the news more perspicuous. Even webcams, which operate under the logic of immediacy, can be embedded in a hypermediated web site (Fig. I.6), where the user can select from a "jukebox" of webcam images to generate her own paneled display.

As the webcam jukebox shows, our two seemingly contradictory logics not only coexist in digital media today but are mutually dependent. Immediacy depends on 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

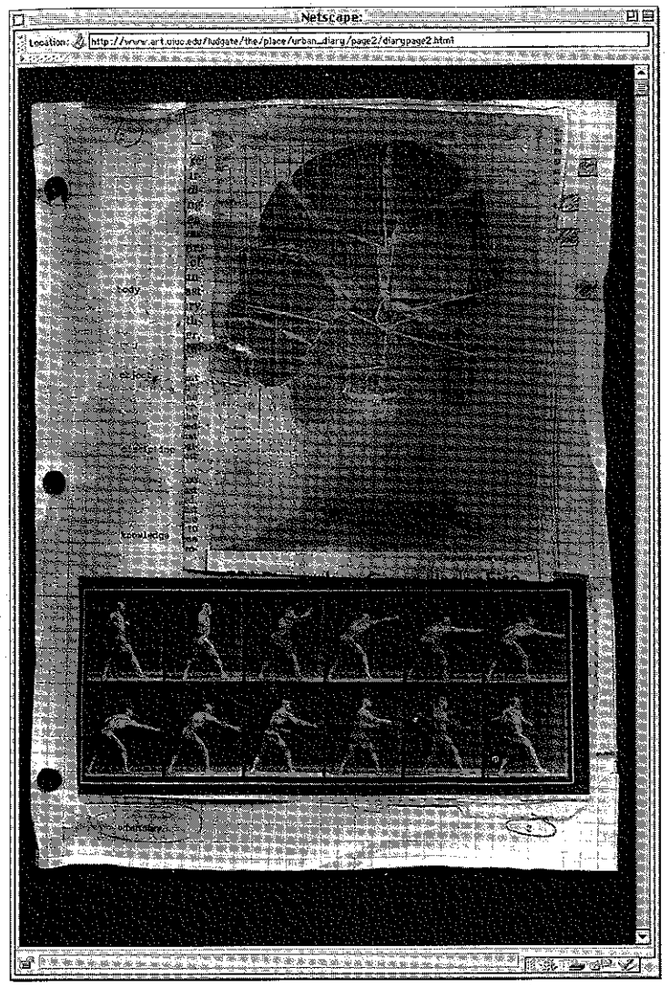

Figure I.4 A page from Joseph Squire's *Urban Diary*. http://gertrude.art.uiuc.edu/ludgate/the/place/urban_diary/intro.html January 24, 1998. © 1995 Urban Desires. Used by permission.

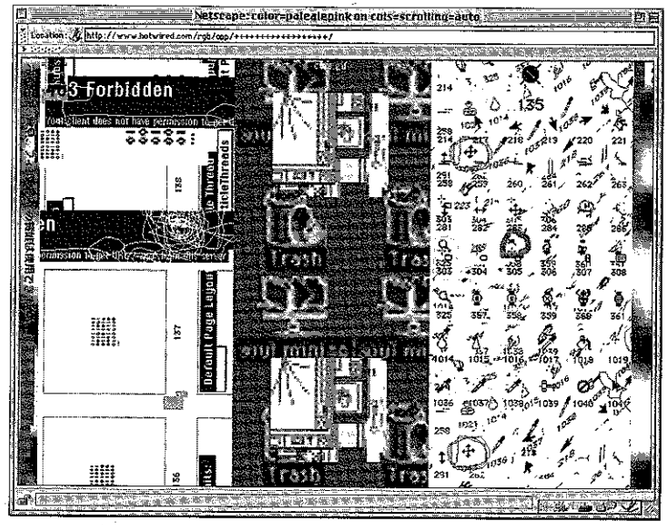

Figure I.5 An image from the RGB Gallery at the Hotwired web site: a collection of digital art. http://www.hotwired.com/rgb/opp/++++++++++++++++++ January 24, 1998. © 1994–1998 Wired Digital, Inc. All rights reserved.

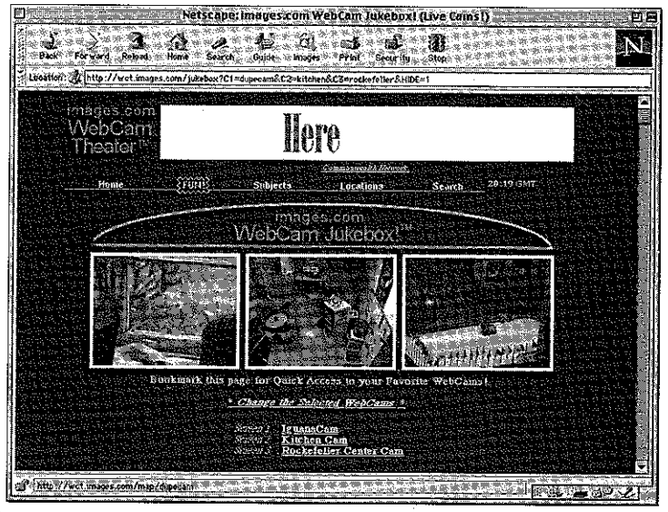

Figure I.6 This webcam jukebox allows the user to combine three individual webcams of her choosing. http://wct.images.com/jukebox January 29, 1998. © 1998, Kamal A. Mostafa. All rights reserved. Used by permission.

Figure I.7 The CNN Interactive web site. © 1998 Cable News Network, Inc. All rights reserved. Used by permission of CNN.

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 their own brand of immediacy. Directors of music videos rely on multiple media and elaborate editing to create an immediate and apparently spontaneous style; they take great pains to achieve the sense of "liveness" that characterizes rock music. The desire for immediacy leads digital media to borrow avidly from each other as well as from their analog predecessors such as film, television, and photography. Whenever one medium seems to have convinced viewers of its immediacy, other media try to appropriate that conviction. The CNN site is hypermediated—arranging text, graphics, and video in multiple panes and windows and joining them with numerous hyperlinks; yet the web site borrows its sense of immediacy from the televised CNN newscasts. At the same time televised newcasts are coming to resemble web pages in their hypermediacy (fig. I.7 and I.8). The team of web editors and designers, working in the same building in Atlanta from which the television news networks are also administered, clearly want their technology to be "television only better." Similarly,

Figure I.8 CNN Headline News. © 1997 Cable News Network, Inc. All rights reserved.

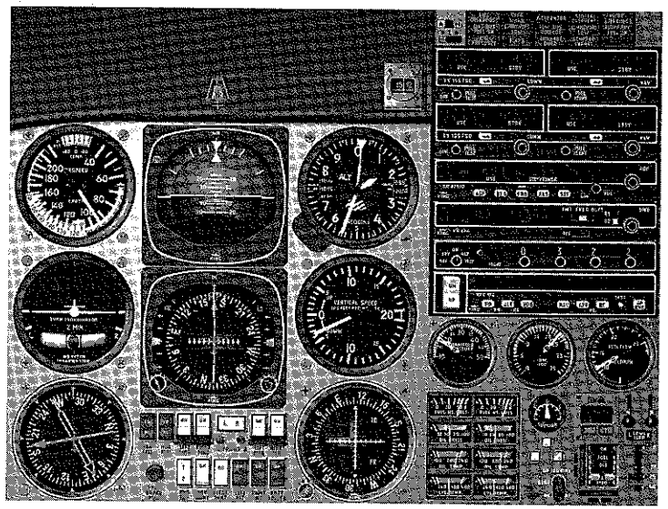

Figure I.9 Photorealistic Piper Seneca III Module: the interface for a flight simulator. © 1998 Initiative Computing AG, Switzerland. Reprinted with permission.

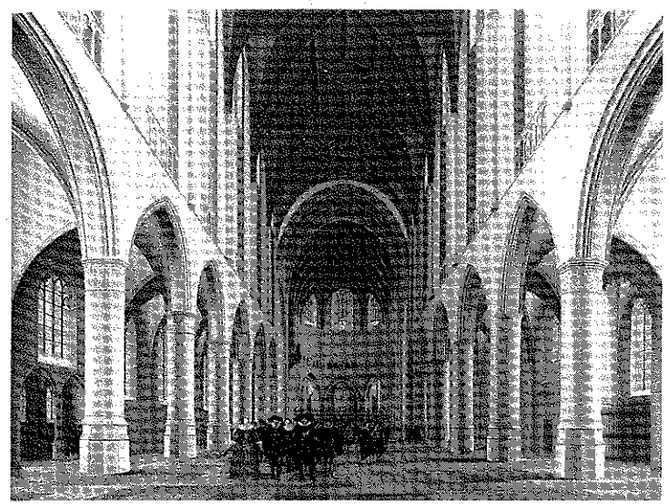

Figure I.10 Saenredam, Pieter Jansz. "S. Bavo in Haarlem" 1631. The John G. Johnson Collection, Philadelphia Museum of Art. Used by permission.

one of the most popular genres of computer games is the flight simulator (fig. I.9). The action unfolds in real time, as the player is required to monitor the instruments and fly the plane. The game promises to show the player "what it is like to be" a pilot, and yet in what does the immediacy of the experience consist? As in a real plane, the simulated cockpit is full of dials to read and switches to flip. As in a real plane, the experience of the game is that of working an interface, so that the immediacy of this experience is pure hypermediacy.

Remediation did not begin with the introduction of digital media. We can identify the same process throughout the last several hundred years of Western visual representation. A painting by the seventeenth-century artist Pieter Saenredam, a photograph by Edward Weston, and a computer system for virtual reality are different in many important ways, but they are all attempts to achieve immediacy by ignoring or denying the presence of the medium and the act of mediation. All of them seek to put the viewer in the same space as the objects viewed. The illusionistic painter employs linear perspective and "realistic" lighting (fig. I.10), while the computer graphics specialist mathematizes linear perspective and creates "models" of shading and illumination (fig. I.11; plate 1). Furthermore, the goal of the computer graphics specialists is to do as well as, and eventually better than, the painter or even the photographer.

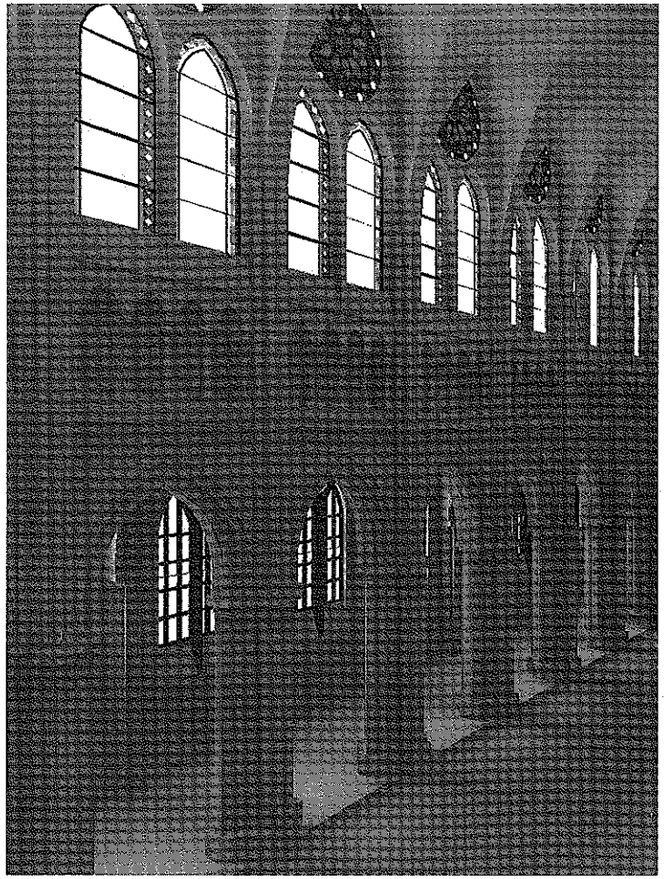

Figure I.11 A photorealistic computer graphic: the nave of Chartres Cathedral, by John Wallace and John Lin. © 1989, Hewlett-Packard Co. Used by permission.

Like immediacy, hypermediacy also has its history. A medieval illuminated manuscript, a seventeenth-century painting by David Bailly, and a buttoned and windowed multimedia application are all expressions of a fascination with media. In medieval manuscripts, the large initial capital letters may be elaborately decorated, but they still constitute part of the text itself, and we are challenged to appreciate the integration of text and image (fig. I.12; plate 2). In many multimedia applications, icons and graphics perform the same dual role (as in figure I.13; plate 3), in which the images peek out at us through the word ARKANSAS. This dual role has a history in popular graphic design, as a

Figure I.12 A page from a Book of Hours, circa 1450. © Robert W. Woodruff Library, Emory University. Used by permission.

Figure I.13 Arkansas: the splash (opening) screen for a multimedia celebration of the state.

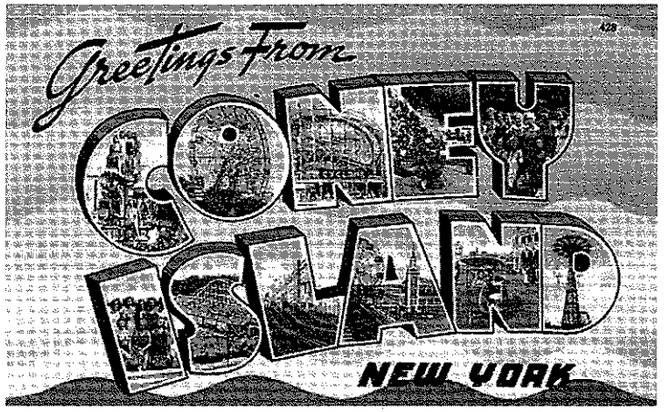

Figure I.14 A Coney Island postcard from the 1910s. http://naid.sppsr.ucla.edu/coneyisland/histart.htm January 24, 1998.

postcard of Coney Island from the early twentieth-century shows (fig. I.14). Today as in the past, designers of hypermediated forms ask us to take pleasure in the act of mediation, and even our popular culture does take pleasure. Some hypermediated art has been and remains an elite taste, but the elaborate stage productions of many rock stars are among many examples of hypermediated events that appeal to millions.

In the chapters that follow, we examine the process of remediation in contemporary media. In part I, we place the concept of remediation within the traditions of recent literary and cultural theory. Readers who are less interested in theory may want to turn directly to part II, which illustrates the work of remediation in such media as computer graphics, film, television, the World Wide Web, and virtual reality. These illustrative chapters should make sense even without the fuller explanations of transparent immediacy, hypermediacy, and remediation provided in part I. In part III, which is again more theoretical, we consider how new digital media are participating in our culture's redefinition of self. Because readers may choose not to read the book in linear order, we have provided references—the printed equivalent of hyperlinks—to connect points made in the theoretical chapters with examples in the illustrative chapters, as well as some references from each illustrative chapter to others. This link directs the reader to part II. ▷ **p. 85**

Our primary concern will be with visual technologies, such as computer graphics and the World Wide Web. We will argue that these new media are doing exactly what their predecessors have done: presenting themselves as refashioned and improved versions of other media. Digital visual media can best be understood through the ways in which they honor, rival, and revise linear-perspective painting, photography, film, television, and print. No medium today, and certainly no single media event, seems to do its cultural work in isolation from other media, any more than it works in isolation from other social and economic forces. What is new about new media comes from the particular ways in which they refashion older media and the ways in which older media refashion themselves to answer the challenges of new media.

In part I we explain in greater detail the theory and history of remediation. Like other media since the Renaissance—in particular, perspective painting, photography, film, and television—new digital media oscillate between immediacy and hypermediacy, between transparency and opacity. This oscillation is the key to understanding how a medium refashions its predecessors and other contemporary media. Although each medium promises to reform its predecessors by offering a more immediate or authentic experience, the promise of reform inevitably leads us to become aware of the new medium as a medium. Thus, immediacy leads to hypermediacy. The process of remediation makes us aware that all media are at one level a "play of signs," which is a lesson that we take from poststructuralist literary theory. At the same time, this process insists on the real, effective presence of media in our culture. Media have the same claim to reality as more tangible cultural artifacts; photographs, films, and computer applications are as real as airplanes and buildings.

Futhermore, media technologies constitute networks or hybrids that can be expressed in physical, social, aesthetic, and economic terms. Introducing a new media technology does not mean simply inventing new hardware and software, but rather fashioning (or refashioning) such a network. The World Wide Web is not merely a software protocol and text and data files. It is also the sum of the uses to which this protocol is now being put: for marketing and advertising, scholarship, personal expression, and so on. These uses are as much a part of the technology as the software itself. For this reason, we can say that media technologies are agents in our culture without falling into the trap of technological determinism. New digital media are not external agents that come to disrupt an unsuspecting culture. They emerge from within cultural contexts, and they refashion other media, which are embedded in the same or similar contexts.

Immediacy, Hypermediacy, and Remediation

1

The two logics of remediation have a long history, for their interplay defines a genealogy that dates back at least to the Renaissance and the invention of linear perspective. We do not claim that immediacy, hypermediacy, and remediation are universal aesthetic truths; rather, we regard them as practices of specific groups in specific times.[1] Although the logic of immediacy has manifested itself from the Renaissance to the present day, each manifestation in each age may be significantly different, and immediacy may mean one thing to theorists, another to practicing artists or designers, and a third to viewers. The diversity is even greater for hypermediacy, which seems always to offer a number of different reactions to the contemporary logic of immediacy. Remediation always operates under the current cultural assumptions about immediacy and hypermediacy.

We cannot hope to explore the genealogy of remediation in detail. What concerns us is remediation in our current media in North America, and here we can analyze specific images, texts, and uses. The historical resonances (to Renaissance painting, nineteenth-century photography, twentieth-century film, and so on) will be offered to help explain the contemporary situation. At the same time, the practices of contemporary media constitute a lens through which we can view the history of remediation. What we wish to highlight from the past is what resonates with the twin preoccupations of contemporary media: the transparent presentation of the real and the enjoyment of the opacity of media themselves.

The Logic of Transparent Immediacy

Virtual reality is immersive, which means that it is a medium whose purpose is to disappear. This disappearing act, however, is made diffi-

1. Our notion of genealogy is indebted to Foucault's, for we too are looking for historical affiliations or resonances and not for origins. Foucault (1977) 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" (146). Our genealogical traits will be immediacy, hypermediacy, and remediation; however, 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.

cult by the apparatus that virtual reality requires. In *Strange Days*, users of the wire had only to put on a slender skullcap, but in today's virtual reality systems, the viewer must wear a bulky head-mounted display, a helmet with eyepieces for each eye (fig. I.1). In other systems known as "caves," the walls (and sometimes the floor and ceiling) are themselves giant computer screens. Although less subtle than the wire, current virtual reality systems also surround 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 a station point that is always the visual center of that world. As computer scientists themselves put it, the goal of virtual reality is to foster in the viewer a sense of presence: 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 (Hodges et al. 1994).

In order to create a sense of presence, virtual reality should come as close as possible to our daily visual experience. 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: slow frame rates, jagged graphics, bright colors, bland lighting, and system crashes. Some of these ruptures are apparent even in the single static images that we see, for example, in figures 9.1, 9.2, and 9.3. 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. In his book on virtual reality, Howard Rheingold (1991) claims that "at the heart of VR [virtual reality] is an experience—the experience of being in a virtual world or remote location" (46). 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" (quoted in Ditlea 1989, 97). Meredith Bricken (1991), 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 rhythm of a song. You can be a tiny droplet in the rain or in the river" (372). All of these enthusiasts promise us transparent, perceptual immediacy, experience without mediation, for they expect virtual reality to diminish and ultimately to deny the mediating presence of the computer and its interface. Bricken's work is, in fact, entitled "Virtual Worlds: No Interface to Design."

The logic of transparent immediacy is also at work in nonimmersive digital graphics—that is, in two- and three-dimensional images projected on to 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 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. With these new applications, the desire for immediacy is apparent in claims 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 (GUI) 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 to the 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. Immediacy is supposed to make this computer interface "natural" rather than arbitrary. And 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 (Card, Robertson, and Macinlay 1991). 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 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," as she does in the physical world. Virtual reality, three-dimensional graphics, and graphical interface design are all seeking to make digital technology "transparent." In this sense, a transparent in-

terface would be one that erases itself, so that the user is no longer aware of confronting a medium, but instead stands in an immediate relationship to the contents of that medium.

The transparent interface is one more manifestation of the need 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 *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 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. To understand immediacy in computer graphics, it is important 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 linear perspective, erasure, and automaticity, all of which are strategies also at work in digital technology.

As Albrecht Dürer noted, and as Panofsky (1991) reminded us in *Perspective as Symbolic Form* (27), *perspective* means a "seeing through," and, like the interface designers of today, students of linear perspective promised immediacy through transparency. They trusted in linear perspective to achieve transparency because by mathematizing space, it used the "right" technique to measure the world. Martin Jay and others have argued for a close connection between Albertian perspective and Descartes's spatial mathematics. For Jay (1988), "Cartesian perspectivalism" constituted a peculiar way of seeing that dominated Western culture from the seventeenth century to the early twentieth by allowing the Cartesian subject to control space from a single vantage point.[2] By using projective geometry to represent the space beyond the canvas, linear perspective could be regarded as the technique that effaced itself as technique. As Alberti (1972) expressed it in his treatise *On Painting,* "On 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"(55). If executed properly, the surface of the painting dissolved and presented to the viewer the scene beyond. To achieve transparency, however, linear perspective was regarded as necessary but not sufficient, for the artist must also work the surface to erase his brush strokes. Norman Bryson (1983) 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" (92). Erasing the surface in this way concealed and denied the process of painting in favor of the perfected product. Although effacement is by 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 (Kemp 1990). 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 automaticity 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. (For a revisionist view, see Crary 1990.) A photograph could be regarded as a perfect Albertian window. André Bazin (1980) 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 Niepce. 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" (239). 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. 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, this question was extensively debated. Was photography an art? Did it make painting and painters unnecessary? And so on (Trachtenberg 1980, vii–xiii). In examining automatic reproduction

2. See also Martin Jay (1993, 69–82). Unlike Jay, Samuel Edgerton (1975) not only documents a connection between the mathematization of space and linear perspective, but seems to accept it as true. Bruno Latour (1990) also remarks on the significance of perspectivalism. Building on William Ivins's study, *On the Rationalization of Sight* (1973), 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 manipulate the world itself, because the mathematization of space makes the context or medium transparent and provides immediate access to the world. See Latour (1987, chap. 6, 1990).

and the artist as a creative agent, Stanley Cavell (1979) expanded on and revised Bazin: "Photography overcame subjectivity in a way undreamed of by painting, a way that could not satisfy painting, 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" (23). 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 an agent who stood between the viewer and the reality of the image.[3]

Bazin (1980) concluded that "photography and the cinema . . . are discoveries that satisfy, once and for all and in its very essence, our obsession with realism," yet he was certainly wrong. These two visual technologies did not satisfy our culture's desire for immediacy (240). 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 (1994) 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" (161). But even if we cannot always tell synthesized images from photographs, we can distinguish the 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:

Digital graphics extends the tradition of the Albertian window. It creates images in perspective, but it applies to perspective the rigor of contemporary linear algebra and projective geometry (Foley et al. 1996, 229–283). 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 (Elkins 1994; Kemp 1990, 20, 47–49; Hagen 1986). (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 (Foley et al. 1996, 563–604, 721–814), although so far less successfully than perspective. 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 others describe the erasure of human agency from the production of photographs.[4] 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 of 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 an affinity to photography. In both cases, the human agent is erased, although the techniques 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, with no clearly defined parts or steps. For this reason, many in the nineteenth century could regard light or nature itself as the painter. Talbot did so in his book *The Pencil of Nature* (1969), and Niepce did as well, when he wrote that "the Daguerrotype is not merely an instrument which serves to draw Nature; on the contrary it is a chemical and physical process which gives her the power to reproduce herself" (Trachtenberg 1980, 13; see also Jussim 1983, 50). 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 and virtual reality, where the computer is draw-

3. A similar argument could be made for television, especially for the "live" coverage of news and sporting events, which promise immediacy through their real-time presentation. In "The Fact of Television," Stanley Cavell has described what he calls the "monitoring" function of television. 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 (1977).

4. Computer graphics, representational painting, and traditional photography efface the visible signs of agency; an American abstract artist like Rauschenberg, however, seeks to efface the act of erasure itself. (See Fisher 1991, 98–99.)

ing 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. ▷ **p. 119** 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 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), precisely because these distorted photographs, which make the viewer conscious of the photographic process, are themselves not regarded as realistic or immediate. Thus, 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. So-called digital photography is a hybrid that combines and reconfigures these two kinds of automaticity. ▷ **p. 104**

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. However, the very fact that the images are in motion (in computer animation and virtual reality) suggests new strategies for achieving immediacy. If immediacy is promoted by removing the programmer/creator from the image, it can also be promoted by involving the viewer more intimately in the image. The production of computer animation seems to be automatic, yet the viewing can 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

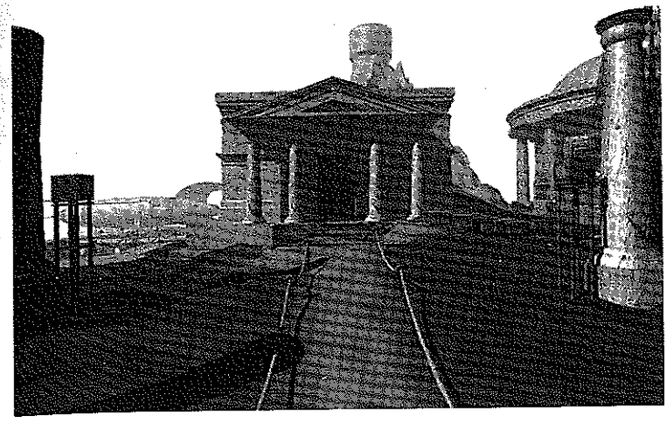

Figure 1.1 A view of Myst island. © 1993 Cyan Inc. Myst ® Cyan Inc. All rights reserved.

the movement. Now, computer animation can function like film in this respect, for it too can present a sequence of predetermined camera 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 virtual reality enthusiasts, the plane defined by the video screen on the outmoded desktop computer is like Alberti's window, and it is this plane that virtual reality now shatters. Rheingold (1991) claims that "in the 1990s, VR technology is taking people beyond and through the display screen into virtual worlds" (75). 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. Yet 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, Riven,* or *Doom,* despite the relatively low resolution and limited field of view afforded by the screen (fig. 1.1). ▷ **p. 94** 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 deny that linear-perspective painting, photography, film, television, or computer graphics could ever achieve unmediated presentation.[5] For such theorists, the desire for immediacy through visual representation has become a somewhat embarrassing (because undertheorized) tradition.[6] Outside the circles of theory, however, the discourse of the immediate has been and remains culturally compelling. Even within the academic community, among art historians and perceptual psychologists, linear perspective is still regarded as having some claim to being natural. (See, for example, Gombrich 1982; Hagen 1980, 1986.) Meanwhile, computer graphics experts, computer users, and the vast audiences for popular film and television continue to assume that unmediated presentation is the ultimate goal of 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.

It is important to note that the logic of transparent immediacy does not necessarily commit the viewer to an utterly naive or magical conviction that the representation is the same thing as what it represents. *Immediacy* is our name for a family of beliefs and practices that express themselves differently at various times among various groups, and our quick survey cannot do justice to this variety. The common feature of all these forms is the belief in some necessary contact point between the medium and what it represents. For those who believe in the immediacy of photography, from Talbot to Bazin to Barthes, the contact point is the light that is reflected from the objects on to the film. This light establishes an immediate relationship between the photograph and the object. For theorists of linear-perspective painting and perhaps for some painters, the contact point is the mathematical relationship established between the supposed objects and their projection on the canvas. However, probably at no time or place has the logic of immediacy required that the viewer be completely fooled by the painting or photograph. Trompe l'oeil, which does completely fool the viewer for a moment, has always been an exceptional practice. The film theorist Tom Gunning (1995) has argued that what we are calling the logic of transparent immediacy worked in a subtle way for filmgoers of the earliest films. The audience members knew at one level that the film of a train was not really a train, and yet they marveled at the discrepancy between what they knew and what their eyes told them (114–133). On the other hand, the marveling could not have happened unless the logic of immediacy had had a hold on the viewers. There was a sense in which they believed in the reality of the image, and theorists since the Renaissance have underwritten that belief. This "naive" view of immediacy is the expression of a historical desire, and it is one necessary half of the double logic of remediation.

5. 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 Derrida's *Of Grammatology* (1976) and Nelson Goodman's *Languages of Art* (1968). W. J. T. Mitchell (1994) 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 (1993) 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.

6. In some theorists the embarrassment becomes acute. The "punctum" in Barthes's *Camera Lucida* is precisely that element in photography that threatens to become immediate, to pull the viewer into the photograph itself. Meanwhile, in his analysis of the pernicious reality effect of cinema, Christian Metz (1977) seems appalled at the thought that the "apparatus" of the cinema can lull the viewer into a hypnotic state of apparently unmediated experience.

The Logic of Hypermediacy

Like the desire for transparent immediacy, the fascination with media also has a history as a representational practice and a cultural logic. In digital media today, the practice of hypermediacy is most evident in the heterogeneous "windowed style" of World Wide Web pages, the desktop interface, multimedia programs, and video games. It is a visual style that, in the words of William J. Mitchell (1994), "privileges fragmentation, indeterminacy, and heterogeneity and . . . emphasizes process or performance rather than the finished art object" (8). Interactive applications are often grouped under the rubric of "hypermedia," and hypermedia's "combination of random access with multiple media" has been described with typical hyperbole by Bob Cotten and Richard Oliver (1993) 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" (8). This definition suggests that the logic of hypermediacy had to wait for the invention of the cathode ray tube and the transistor. However, 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 on to a world of information made visible and almost tangible to the user, and their goal was to make the surface of these windows, the interface itself, transparent. As the windowed style has evolved in the 1980s and 1990s, however, 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 more 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.

The graphical interface replaced the command-line interface, which was wholly textual. By introducing graphical objects into the representation scheme, designers believed that they were making the interfaces "transparent" and therefore more "natural." Media theorist Simon Penny (1995) points out that for interface designers: "*transparent* means that the computer interface fades into the experiential background and the analogy on which the software is based (typewriter, drawing table, paintbox, etc.) is foregrounded. If the paintbox software is 'intuitive,' it is only intuitive because the paintbox is a culturally familiar object" (55). In fact, the graphical interface referred not only to culturally familiar objects, but specifically to prior media, such as painting, typewriting, and handwriting. In making such references, computer designers were in fact creating a more complex system in which iconic and arbitrary forms of representation interact. We have only to place figure 1.2 beside the virtual environment in figure 9.1 to see that a wholly different visual logic is operating.

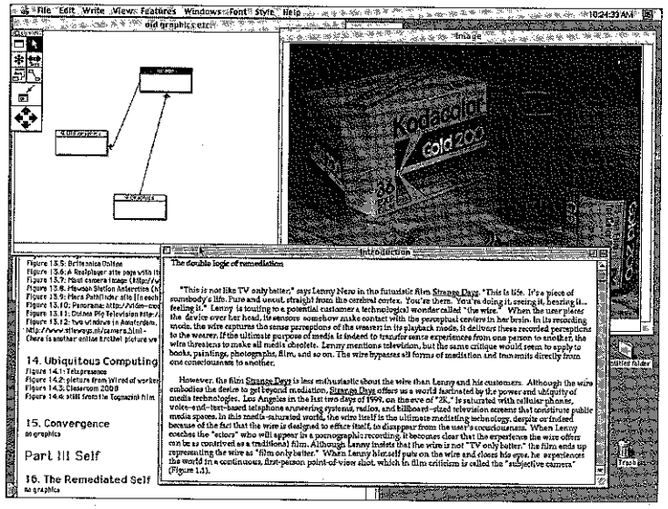

Figure 1.2 The windowed style of the desktop interface.

Unlike a perspective painting or three-dimensional computer graphic, this windowed interface does not attempt to unify the space around any one point of view. Instead, each text window defines its 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 hererogeneity of their contents mean that the user is repeatedly brought back into contact with the interface, which she learns to read just as she would read 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 simultaneously automatic and interactive. We have argued that the automatic character of photography contributes to the photograph's feeling of immediacy, but with the windowed computer, the situation is more complicated. Its interface is automatic in the sense that it consists of layers of programming that are executed with each click of the mouse. Its 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. While the apparent autonomy of the machine can contribute to the transparency of the technology, the buttons and menus that provide user interaction can be seen as getting in the way of the transparency. If 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. Nevertheless, 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 in digital technology. As a counterbalance hypermediacy is more complicated and various. In digital technology, as often in the earlier history of Western representation, hypermediacy expresses itself as multiplicity. If the logic of immediacy leads one either to erase or to render automatic the act of representation, the logic of hypermediacy acknowledges multiple

acts of representation and makes them visible. Where immediacy suggests a unified visual space, contemporary hypermediacy offers a heterogeneous space, in which representation is conceived of not as a window on to the world, but rather as "windowed" itself—with windows that open on to other representations or other media. The logic of hypermediacy multiplies the signs of mediation and in this way tries to reproduce the rich sensorium of human experience. On the other hand, hypermediacy can operate even in a single and apparently unified medium, particularly when the illusion of realistic representation is somehow stretched or altogether ruptured. For example, perspective paintings or computer graphics are often hypermediated, particularly when they offer fantastic scenes that the viewer is not expected to accept as real or even possible. Hypermediacy can also manifest itself in the creation of multimedia spaces in the physical world, such as theme parks or video arcades. ▷ **p. 173** In every manifestation, hypermediacy makes us aware of the medium or media and (in sometimes subtle and sometimes obvious ways) reminds us of our desire for immediacy.

As a historical counterpart to the desire for transparent immediacy, the fascination with media or mediation can be found in such diverse forms as medieval illuminated manuscripts, Renaissance 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, if 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 are particularly resonant with digital hypermediacy today. Some resonances seem obvious. For example, the European cathedral with its stained glass, relief statuary, and inscriptions was a collection of hypermediated spaces, both physical and representational. And within the grand space of the cathedral, altarpieces provided a 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 in 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 the outside of the cabinet doors. The closed doors depict depth in the represented space; when they are opened, they reveal a bas-relief 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 fifty drawers, doors, and panels, each painted with a perspectival landscape or genre scene. The pictures on the doors and drawers of these cabinets ironically duplicated the three-dimensional space that they concealed. Thus, the two-dimensional pictures on the doors opened on to a fictional space, while the painted doors themselves opened on to a physical one. (For an example, see figure 1.3.) Something similar is happening in digital design 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 space of the computer and the Internet.

We are not alone in noting this resemblance. In *Good Looking,* art historian Barbara Stafford has remarked on the parallels between digital media and baroque cabinets—in particular when she describes the so-called *Wunderkammer:*

Turning . . . to the disjunctive jumble stored in an eighteenth-century cabinet or chamber of curiosities, the modern viewer is struck by the intensely interactive demands it places on the visitor. . . . Looking back from the perspective of the computer era, the artifacts in a Wunderkammer seem less physical phenomena and more material links permitting the beholder to retrieve complicated personal and cultural associations. Looking forward from the Enlightenment world of apparently miscellaneous pleasures, we discern that scraps of wood, stone, or metal,

Figure 1.3 An Italian cabinet, circa 1660, made of rosewood, ebony, and tortoise shell with painted glass plaques. Photography courtesy of Victoria and Albert Museum.

religious relics, ancient shards, exotic fetishes, animal remains, miniature portraits, small engravings, pages torn from a sketchbook, are the distant ancestors of today's sophisticated software [*e.g., multimedia encyclopedias*]. (74–75)

With its multiplicity of forms and its associative links, the Wunderkammer is a fine example of the hypermediacy of the baroque.

We can also identify hypermediacy in oil painting—for example, in the Dutch "art of describing" explored by Svetlana Alpers (1983). 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 made up of a multiplicity of representations. Their paintings were not multimedia; rather, they absorbed and captured multiple media and multiple forms in oil. This Dutch art has often been contrasted with the paradigm of Renaissance Italian painting with its representation of a more unified visual space, in which the signs of mediation were meticulously erased. We can in fact find hypermediacy in individual works and individual painters throughout the period in which linear perspective and erasure were ascendant: for example, in Velasquez's *Las Meninas,* discussed by Alpers, Foucault, and, because of Foucault, many others (Alpers 1982, 69–70; Foucault 1971, 3–16) 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 almost guaranteed its repeated return.

Hypermediacy can be found even in the mechanical technologies of reproduction of the nineteenth century. Jonathan Crary (1990) has challenged the traditional view that photography is the continuation and perfection of the technique of linear-perspective painting. For Crary, there was a rupture early in the nineteenth century, when the stable observation captured by the old camera obscura and by perspective painting was replaced by a new goal of mobility of observation. Reflecting this goal was a new set of (now archaic) devices: the diorama, the phenakistoscope, and the stereoscope. These devices, characterized by multiple images, moving images, or sometimes moving observers, seem to have operated under both these logics at the same time, as they incorporated transparent immediacy *within* hypermediacy. The phenakistoscope employed a spinning wheel and multiple images to give the impression of movement. The appeal to immediacy here was that a moving picture, say, of a horse, is more realistic than a static image. On the other hand, it was not easy for the user to ignore or forget the contraption of the phenakistoscope itself, when even its name was so contrived. The phenakistoscope made the user aware of the desire for immediacy that it attempted to satisfy. The same was true of the stereoscope, which offered users a three-dimensional image that seemed to float in space. The image was eerie, and the device unwieldy so that the stereoscope (fig. 1.4) too seemed to be a more or less ironic comment on the desire for immediacy. Crary shows us that hypermediacy manifested itself in the nineteenth century alongside and around the transparent

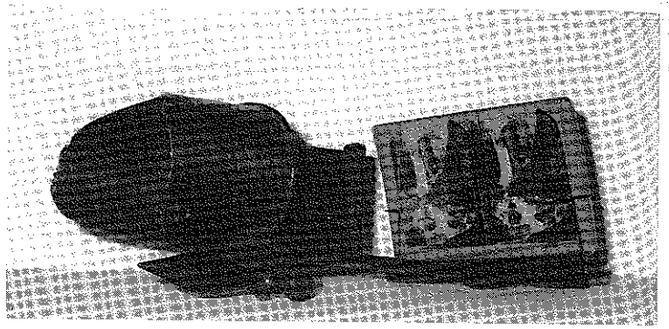

Figure 1.4 A nineteenth-century stereoscope. © 1998 Richard Grusin.

technology of photography. Nevertheless, the logic of transparent immediacy remained dominant. The obvious fact is that the conventional camera survived and flourished, while these other technologies did not.

According to Clement Greenberg's influential formulation, it was not until modernism that the cultural dominance of the paradigm of transparency was effectively challenged.[7] In modernist art, the logic of hypermediacy could express itself both as a fracturing of the space of the picture and as a hyperconscious recognition or acknowledgment of the medium. Collage and photomontage in particular provide evidence of the modernist fascination with the reality of media.[8] Just as collage challenges the immediacy of perspective painting, photomontage challenges the immediacy of the photograph. When photomonteurs cut up and recombine conventional photographs, they discredit the notion that the photograph is drawn by the "pencil of nature," as Talbot (1969) had suggested. 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. As we look at Richard Hamilton's *Just What Is It That Makes Today's Homes So Different, So Appealing?* (fig. 1.5), its cluttered space makes us aware of the process of construction. We become hyperconscious of the medium in photomontage, precisely because conventional photography is a medium with such loud historical claims to transparency.[9]

Richard Lanham (1993) 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'?" (40). In collage and photomontage as in hypermedia, to create is to rearrange existing forms. In photomontage the preexisting forms are photographs; in 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"; Lanham wants to include digital design in the twentieth-century mainstream, which has often created heterogeneous spaces and made viewers conscious of the act of representation (40–41).

In the twentieth century, as indeed earlier, it is not only high art that seeks to combine heterogeneous spaces. Graphic design for print, particularly for magazines and newspapers, is becoming increasingly hypermediated as well. Magazines like *Wired* or *Mondo 2000* owe their conception of hypermediacy less to the World Wide Web than to the

Figure 1.5 Richard Hamilton, *Just What Is It That Makes Today's Homes So Different, So Appealing?* © 1998 Artists Rights Society (ARS), New York/DACS, London.

7. As Clement Greenberg (1973) puts it, "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." (68–69).

8. Greenberg (1965, 70–74) 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. When Braque and Picasso took to pasting scraps of newspaper and wallpaper on 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.

9. In making us conscious of the medium, photomontage can be seen both to accept and to challenge the received understanding of photography as transparent. From one point of view, photomontage can be interpreted as a deviation from the essentially transparent and unified nature of photography. On the other hand, photomontage can be seen not as deviating from photography's true nature as a transparent medium but as exemplifying its irreducible hypermediacy. This latter interpretation of the photographic medium has been advanced by W. J. T. Mitchell (1994) in the idea of the "imagetext."

Figure 1.6 The front page of *USA TODAY*, January 23, 1998. © 1998 USA TODAY. Reprinted with permission.

tradition of graphic design that grows out of pop art and ultimately lettrisme, photomontage, and dada. The affiliations of a newspaper like the *USA Today* are more contemporary. Although the paper has been criticized for lowering print journalism to the level of television news, visually the *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 (fig. 1.6) the graphical user interface of a web site (fig. 1.7). For that matter, television news programs also show the influence of the graphical user interface when they divide the screen into two or more frames and place text and numbers over and around the framed video images. ▷ **p. 189**

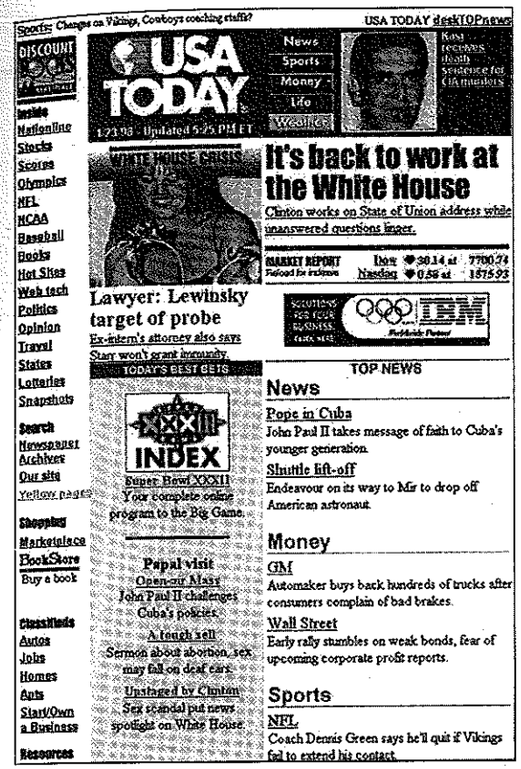

Figure 1.7 The *USA TODAY* web site, January 23, 1998. © 1998 USA TODAY. Reprinted with permission.

In all its various forms, the logic of hypermediacy expresses the tension between regarding a visual space as mediated and as a "real" space that lies beyond mediation. Lanham (1993) 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 (3–28, 31–52). A viewer confronting a collage, for example, 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. In the logic of hypermediacy, the artist (or multimedia programmer or web designer) strives to make the viewer acknowledge the medium as

a medium and to delight in that acknowledgment. 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.

For digital artist David Rokeby, the dichotomy between transparency and opacity is precisely what distinguishes the attitude of engineers from that of artists in the new technologies. Rokeby (1995) is clearly adopting a modernist aesthetic when he writes that "while engineers strive to maintain the illusion of transparency in the design and refinement of media technologies, artists explore the meaning of the interface itself, using various transformations of the media as their palette" (133). In fact, since Matisse and Picasso, or perhaps since the impressionists, artists have been "exploring the interface." However, Rokeby may not be doing justice to "modern" engineering. Media theorist Erkki Huhtamo (1995) points out that acknowledgment is characteristic of our culture's attitude to digital technology in general: "Technology is gradually becoming a second nature, a territory both external and internalized, and an object of desire. There is no need to make it transparent any longer, simply because it is not felt to be in contradiction to the 'authenticity' of the experience" (171). And Huhtamo is right to insist that hypermediacy can also provide an "authentic" experience, at least for our current culture; otherwise, we could not account for the tremendous influence of, for example, rock music.

Above, we identified the logic of transparent 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 clearest examples of digital hypermediacy (such as the Residents' *Freak Show,* Peter Gabriel's *Xplora 1,* and the Emergency Broadcast Network's *Telecommunications Breakdown*) come directly or indirectly from the world of rock music production and presentation. Initially, when "liveness" was the signifying mark of the rock sound, early recordings adhered to the logic of transparency and aimed to sound "live." As live performance became hypermediated, so did the recordings—as electric and then digital sampling, rave, ambient music, and other techniques became increasingly popular (cf. Auslander, forthcoming). The evolution of recording techniques also changed the nature of live performance. As early as the late 1960s and 1970s, performers such as Alice Cooper, David Bowie, and Kiss began to create elaborate, consciously artificial productions. The traditional "musical" qualities of these productions,

Figure 1.8 A screen capture from the *Telecommunications Breakdown* CD-ROM by the Emergency Broadcast Network. © 1995 TVT Records. Reprinted with permission.

never very complicated, became progressively less important than the volume and variety of sound and the visual spectacle. Today, the stage presentations of rock bands like U2 are celebrations of media and 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 on 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. 1.8). This visual multiplicity is synchronized to an insistent "techno-rock" soundtrack. At times one or other 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.

Except for rock music, the World Wide Web is perhaps our culture's most influential expression of hypermediacy. As Michael Joyce (1995) reminds us, replacement is the essence of hypertext, and in a

sense the whole World Wide Web is an exercise in replacement: "Print stays itself; electronic text replaces itself" (232). When the user clicks on an underlined phrase or an 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. And beyond the Web, replacement is the operative strategy of the whole windowed style. In using the standard computer desktop, we pull down 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 on 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 offer a more appropriate representation than another. In doing so, they are performing what we characterize as acts of remediation.

Remediation

In the early and mid-1990s, perhaps to a greater extent than at any other time since the 1930s, Hollywood produced numerous filmed versions of classic novels, including Hawthorne, Wharton, and even Henry James. There has been a particular vogue for the novels of Jane Austen (*Sense and Sensibility, Pride and Prejudice,* 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 they do not contain any overt reference to the novels on which they are based; they certainly 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 or quoted. This kind of borrowing, extremely common in popular culture today, is also very old. One example with a long pedigree are paintings illustrating stories from the Bible or 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 reuse 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.

On the opening page of *Understanding Media* (1964), 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" (23–24). 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. In fact, all of 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 (1994) defines as "the verbal representation of visual representation" (151–152). 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 on the degree of perceived competition or rivalry between the new media and the old.

At one extreme, an older medium is highlighted and represented in digital form without apparent irony or critique. Examples include CD-ROM (or DVD) picture galleries (digitized paintings or photographs) and collections of literary texts. There are also numerous 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 these older materials, as if the content of the older media could simply be poured into the new one. Since the electronic version justifies itself by granting 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 never so. The computer always inter-

venes 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, although the new is still justified in terms of the old and seeks to remain faithful to the older medium's character. There are various degrees of fidelity. Encyclopedias on CD-ROM, such as Microsoft's *Encarta* and Grolier's *Electronic Encyclopedia,* seek to improve on printed encyclopedias by providing not only text and graphics, but also sound and video, and they 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 eighteenth-century *Encyclopédie* and *Encyclopaedia Britannica.* In the early 1990s, the Voyager Company published 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 remediated the printed book without doing much to challenge print's assumptions about linearity and closure. Even the name, "Expanded Books," indicated 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 character of a text or the 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. The borrowing might be said to be translucent rather than transparent.

The digital medium can 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 hypermediacy. This is particularly clear in the rock CD-ROMs, such as the Emergency Broadcast Network's *Telecommunications Breakdown,* in which the principal refashioned media are music recorded 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 "Electronic Behavior Control System," old television and movie clips are taken out of context (and therefore out of scale) and inserted absurdly into the techno-music chant (fig. 1.8). 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 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, that 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 graphical user interface acknowledges and controls the discontinuities as the user moves among 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 on the older one in acknowledged or unacknowledged ways. For example, the genre of computer games like *Myst* or *Doom* remediates cinema, and such games are sometimes called "interactive films." ▷ **p. 94** 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. ▷ **p. 204** Numerous web sites borrow 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 point-of-view sites monitor the world for the Web, they do not always acknowledge television as the medium that they are refashioning. In fact, television and the World Wide Web 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 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 was already complete in Disney's *Toy Story.* ▷ **p. 147** And here too the goal is to make the computer disappear: to make the settings, toys, and 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 can refashion film and television.

Unlike our other examples of hypermediacy, this form of aggressive remediation does create an apparently seamless space. It conceals its relationship to earlier media in the name of transparency; it promises the user an unmediated experience, whose paradigm again is virtual reality. 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 on the conventions and associations of the first-person point of view or subjective camera. ▷ **p. 163** Science-fiction writer Arthur C. Clarke has claimed that "Virtual Reality won't merely replace TV. It will eat it alive" (cited by Rheingold, 1991, back cover). 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 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 transparency as it is for hypermediacy.

Another category of refashioning must be mentioned here: the refashioning that occurs within a single medium—for example, when a film borrows from an earlier film, as *Strange Days* borrows from *Vertigo* or when a painting incorporates another painting, as in Courbet's *Interior of My Studio.* This kind of borrowing is perhaps the most common, because artists both know and depend most immediately on predecessors in their own medium. This borrowing is fundamental not only to film and painting, but also to literature, where the play within a play (from *Hamlet* to *Rosencrantz and Guildenstern Are Dead*) or the poem within a poem or novel (from the *Odyssey* to *Portrait of the Artist*) is a very familiar strategy. In fact, this is the one kind of refashioning that literary critics, film critics, and art historians have acknowledged and studied with enthusiasm, for it does not violate the presumed sanctity of the medium, a sanctity that was important to critics earlier in this century, although it is less so now. Refashioning within the medium is a special case of remediation, and it proceeds from the same ambiguous motives of homage and rivalry—what Harold Bloom has called the "anxiety of influence"—as do other remediations. Much of what critics have learned about this special kind of refashioning can also help us explore remediation in general. At the very least, their work reminds us that refashioning one's predecessors is key to understanding representation in earlier media. It becomes less surprising that remediation should also be the key to digital media.

Media theorist Steven Holtzman (1997) argues that repurposing has played a role in the early development of new media but will be left behind when new media find their authentic aesthetic:

> *In the end, no matter how interesting, enjoyable, comfortable, or well accepted they are, these approaches [repurposing] borrow from existing paradigms. They weren't conceived with digital media in mind, and as a result they don't exploit the special qualities that are unique to digital worlds. Yet it's those unique qualities that will ultimately define entirely new languages of expression. And it's those languages that will tap the potential of digital media as* new [original italics] *vehicles of expression. Repurposing is a transitional step that allows us to get a secure footing on unfamiliar terrain. But it isn't where we'll find the entirely new dimensions of digital worlds. We need to transcend the old to discover completely new worlds of expression. Like a road sign, repurposing is a marker indicating that profound change is around the bend.* (15)

From the perspective of remediation, Holtzman misses the point. He himself appeals to a comfortable, modernist rhetoric, in

which digital media cannot be significant until they make a radical break with the past. However, like their precursors, digital media can never reach this state of transcendence, but will instead function in a constant dialectic with earlier media, precisely as each earlier medium functioned when it was introduced. Once again, what is new about digital media lies in their particular strategies for remediating television, film, photography, and painting. Repurposing as remediation is both what is "unique to digital worlds" and what denies the possibility of that uniqueness.