series of mirror reflections of a work's most significant concerns and structures. The *mise-en-abyme* is a mini narrative that encapsulates or somehow reflects the larger structures within which it is held: it is a mirroring of the text by the subtext. As Gregory Ulmer puts it, the *mise-en-abyme* "is a reflexive structuration, by means of which a text shows what it is telling, does what it says, displays its own making, reflects its own action."[21]

The relevance of this term to hypertextual environments is that the *mise-en-abyme* allows the unfolding of meaning; it makes feasible a Romantic conceit: click on the acorn, and the tree majestically unfolds. One of the central questions for the design of the Web is how to make information accessible, attractive and meaningful. By developing introductory or covering structures that contain within themselves in miniature the concerns of the work as a whole, and offering direct access to that whole or to those other relevant parts, the hypertextual, networked *mise-en-abyme* can help to stem the gush of unconnected nano-thoughts.

Michael Heim notes, "Thought must now learn to live in a new element if it is to live at all."[22] Hypertext systems must offer users the ability to craft or follow linkages among the nodes of information that build arguments, construct plots, even search for epiphanies. Only by planning for and incorporating ongoing synthetic processes can hypertextual systems overcome the tendency to let the screen's size determine the length of discourse. In a networked environment, the scope of the database is almost limitless, and this is one of the most exciting qualities of our era. But we must not forget that so much of that data must display itself in the concrete blocks of text determined by the limited real estate of the single screen. If we are justifiably wary of our culture's overflow of nano-thoughts, info-bits, unsustained characterization, plotless narratives, and sound bites, we need to determine how to use the short forms dictated by the medium to craft longer forms of argumentation and narrative.

| 5 |

DIGITAL PHOTOGRAPHY: THE DUBITATIVE IMAGE

The Alexandrine Dream

In the third century B.C.E., Ptolemy I of Egypt called on "all the sovereigns and governors on earth" to send him volumes of every kind, by "poets and soothsayers, historians, and all the others too."[1] Thus the Ptolemaic dynasty set itself the task of housing all "the books of all the people of the world" under one roof in the Library of Alexandria. The word, once written down, has always been subject to reproduction, and the fact that there could be more than one copy of a book has long encouraged such totalizing fantasies in the realm of language.[2] A few short centuries after Ptolemy I, the fabled Library of Alexandria burned to ashes. Yet the desire to spatialize and totalize knowledge within a repository has thrived through the millennia.

The technologies change but the dream remains. Michel Foucault mentions that in 1538, after the advent of printing, La Croix du Main proposed a space "that would be at once an Encyclopaedia and a Library, and which would permit the arrangement of written texts according to the forms of adjacency, kinship, analogy, and subordination prescribed by the world itself."[3] As the word has been digitized, the Alexandrine dreams have shifted from architectural space to hyperspace. For decades, Ted Nelson (who, as discussed in chapter 4, coined the word "hypertext" in the 1960s) has been pursuing Project Xanadu, a computer-based system to digitize and link the totality of text, making possible "a common publishing repository for the writings of humankind," a clarifying system of order.[4] The computer here serves to meld Hellenistic structure and Renaissance method.

What, then, of the image? Through most of human history, reproducing the image has been vastly more problematic than replicating the word. Not even the most megalomaniacal of tyrants ever proposed bringing all of humankind's art works together in one place—the

Media

Compositing a photochemical shot of a live model, a digital photo of a 12" physical model of the monster, and electronic manipulation of chromatics, lighting and shadows, this piece is typical of the next generation of fine art digital photography, which takes as a given the dubitative qualities and potential of the medium.

Charlie White, *The Inland Empire* (1999), from the series *In a Matter of Days.* Courtesy of Muse X Editions, Los Angeles, and Andrea Rosen Gallery, New York.

prospect of uniting so many unique objects has always been too daunting. The advent of photography held out the possibility that what the tyrant could not assemble as booty, the scholar could gather as representation. In 1859, Oliver Wendell Holmes prophesied:

The time will come when any man who wishes to view any object, natural or artificial, will go to the Imperial, National, or City Stereographic Library and call for its skin or form, as he would for a book at any common library. We do now distinctly propose the creation of a comprehensive and systematic stereographic library, where all men can find the special forms they particularly desire to see as artists, or as scholars, or as mechanics, or in any other capacity.[5]

Photography, Art History, Semiotics

Analyzing the methods and assumptions of art history in the modern era, Donald Preziosi notes that in addition to making comprehensiveness possible in the realm of the image, photography—specifically the projected transparency so important to nineteenth-century archival practices—reduced "all analysands to a common scale and frame for comparison and contrast."[6] It is thus no exaggeration to say that the invention of photography made the discipline of academic art history possible. The slide format homogenizes size, style and era, naturalizing art history's teleologies: allowing seamless transitions from massive, ancient Parthenon to miniature, medieval icon in Art History 101; letting scholars segue without breaking stride from Pablo Picasso's *Les Demoiselles d'Avignon* (1907), Cubism's signature canvas, to Robert Smithson's *Spiral Jetty* (1969–1970), the pivotal earthwork constructed on the bed of Utah's Great Salt Lake. Moreover, photography's mechanistic regime of representation is a linchpin of the development of a semiotic of the image. Photography is both the apotheosis and challenge to painterly notions of realism. The very idea of a science of signs, of semiotic discourse, relies on the "photography effect."

Yet today, photography as both medium and object of discourse is undergoing a most radical confrontation with electronic imaging technologies. The computer's capacity to electronically represent any image as simply another graphic is a serious challenge to photography's previously secure position within the archive as the *primus inter pares* of representational media. That is, the photograph was formerly the representational medium under which all others could be subsumed, distributed, and analyzed. Today, that role must be allotted to the computer graphic. Under its domain, the photograph is transformed into simply one among many representational forms. A critique of digital photography, therefore, must take into account this subsumption of the "photo" to the computer "graphic."[7] With this subsumption comes a shift in the very way we conceptualize the photographic image: both in terms of the way we read it as a sign, that is to say its position within a semiotic, and the way that we consider it within contexts, that is to say in terms of its place within art history.[8]

The development of electronic imaging technologies, of which digital photography is but one part, has posed a challenge to both the conception of semiotics and the discipline of art history. We are only just now getting around to understanding the impact the computer has had on the discourses developed around the photographic object, discourses not just technological but epistemological.[9] Writing in 1961, at the height of his structuralist phase and under the influence of the science of signs, or semiology, developed by Ferdinand de Saussure,[10]

Roland Barthes observed that "the photograph is not simply a product or a channel but also an object endowed with a structural autonomy."[11] Moving on from there, he identified the crucial specificity of the medium: while there may be a reduction of visual information from the object to its image (proportion, perspective, color), there is no "*transformation* (in the mathematical sense of the word) . . . the image is not the reality but at least it is its perfect *analogon* and it is exactly this analogical perfection which, to common sense, defines the photograph."[12] But as film scholar Rick Altman notes, "conventional wisdom is always about yesterday's technology; that's how it became commonplace."[13]

Digital Photography?

We know there has been a rupture between photochemical photography and electronic imaging technologies. In *The Reconfigured Eye: Visual Truth in the Post-Photographic Era*, William J. Mitchell offers a clear delineation between these two technologies of image production. "A photograph is an analog representation of the differentiation of space in a scene: it varies continuously, both spatially and tonally."[14] This differs from any computer image, whether originally photographic or not.

Images encoded digitally by uniformly subdividing the picture plane into a finite Cartesian grid of cells (known as *pixels*) and specifying the intensity or color of each cell by means of an integer drawn from some limited range. The resulting two-dimensional array of integers (the *raster* grid) can be stored in computer memory, transmitted electronically, and interpreted by various devices to produce displays and printed images."[15]

Digital imaging can take input from a vast variety of sources, among them analog cameras, digital still cameras, video, scanners, and camcorders, and can be displayed on monitors or in hardcopy outputs including thermal wax, dye transfer, inkjet, laser printing, filmcameras, imagesetters, and—for large-scale applications—computer-to-press and computer-to-plate systems. But those who, like Mitchell, insist that there has been a revolutionary, systemic shift between chemical and digital imagery on a formal level are overstating their case. As digital imaging improves, the human eye finds it harder and harder to dis-

tinguish between the fine details and flowing curves we associate with chemical processes and the pixellated images of electronic systems.

Even the much touted differences between the composition of each type of image can be overemphasized. Following Barthes and a host of others, the "revolutionary camp" concentrates on the analog nature of conventional photography—positing a one-to-one relationship between object and photograph. This concentration leads them to key in on the physical differences between the mechanical photograph and the electronic image. But while they note that with every copy of an analog picture, detail is lost (a process best thought of as a re-presentation) while presumably nothing is lost with digital transfers (a re-production), the realities of digital practice prove otherwise. For example, in most commercial systems, image compression is a vital component of digital imaging, in order to keep file sizes, transfer rates, and archiving manageable. With each compression and expansion, the digital image suffers at least its own mutation and degradation, just as does its analog predecessor. Uncompressing digital images does not reproduce them, it rewrites them. Networked environments promise to worsen, not lessen, this situation, due to the need to compress images before sending them out, only to unstuff—and thereby rewrite—them at the other end.

Thus the truly radical transformation is not from chemical to digital systems of production—as Mitchell and the others would have it—but rather in the composition of the output, which has shifted from the discrete photograph to the essentially unbounded graphic. It is here that the "revolutionary" shift can be located. The "unique" photograph is now forced to merge, even submerge, into the overall graphic environment. There formerly discrete photographic elements blend even further into the computer's digital soup of letters, numbers, motion graphics and sound files: what is crucial is that all of these and more are simply *different manifestations of the data maintained in binary form*.

Whereas this quality of digital imaging seems to be an extension of the mechanical reproduction of photography, the nature of computer imaging—of which digital photography is only a subset—engenders a radical shift. Because the digital image is composed of discrete pixels that have mathematical values assigned to them, the whole of the

digital image can be shifted by modifying the definitions given to those pixels. The computer allows the artist to morph, clone, composite, filter, blur, sharpen, flip, invert, rotate, scale, squash, stretch, colorize, posterize, even swirl an image around a single point, making the photographic look like it is being sucked into a black hole.

While photography has always had an inherent mutability, the digital photograph is so inextricably linked to the other elements of computer graphics that the formerly unique qualities of photography as photography disintegrate. Within the realm of the digital, all images are subject to the visual alchemy of the paint program, which offers the user a set of tools to modify every quality of the pixel. This linkage of electronic imagery and digital paint programs is at the heart of the subsumption of the "photo" to the "graphic." When all images are created or modified by the computer, the photographic is no longer a privileged realm of visual communication, segregated by its machined qualities.

The Semiotics of Dubitative Images

The inherent mutability of the digital image poses a challenge to those who have striven to create a semiotic of the photographic. Having already mentioned Saussure's model, we can also look to the influence of his American contemporary, Charles Sanders Peirce. Film theorist Peter Wollen maintains that Peirce offers an even more precise semiotic for the analysis of the visual image than Saussure.[16] Peirce created three classifications of signs: icon, symbol, and index. The icon is a "sign determined by its dynamic object by virtue of its own internal nature." This is akin to the painted or sculpted image, a relationship of likeness. A symbol is a linkage based on convention, as in language, an arbitrary relationship between a dog and the word "dog." A third type is the index, "a sign determined by its Dynamic object by virtue of being in a real relation to it." With the index, there is a causal link between the object and the sign, like wisps of smoke curling in the distance that indicate the presence of fire. In regards to photography, Peirce was quite explicit: "Photographs, especially instantaneous photographs, are very instructive, because we know that in certain respects they are exactly like the objects that they represent. But this resemblance is due to the photographs having been produced under such cir-

cumstances that they were physically forced to correspond point by point with nature. In that respect then, they belong to the . . . class of signs" known as the index.[17]

It is hard to imagine a science of signs, especially Peircian semiotics, developing in a pre-photographic age. The classical aesthetic dichotomy divides poetry and painting. A science of signs develops only after technology adds a new dimension to the signscape of the symbolic representations of literature and the iconic representations of painting. Peirce was born in 1839, the same year in which photography was invented. Both he and Saussure developed their ideas contemporaneously with the development of the cinema.[18] Only after the mechanical photographic apparatus ruptures the dichotomy developed between writing and painting—between the symbolic and the iconic—is semiotics developed. The mechanical apparatus of photography vastly expands the realm and power of the indexical sign. What has happened to this class of signs, and to the semiotics of the image in general, with the advent of *digital* photography?

With electronic imaging, the digital photographic apparatus approaches what avant-garde filmmaker and photographer Hollis Frampton refers to as painting's "dubitative" processes: like the painter, the digital photographer "fiddles around with the picture till it looks right."[19] The dubitative—defined as "inclined or given to doubt"—has long been present in photography, but now it is located at center stage. While critics and theorists have long rejected the idea that the photograph is somehow "true," the very fury of the debate over digital imaging proves that the public sphere still holds the evidentiary nature of photography in high regard. Yet, as Mitchell and others point out, in the era of the dubitative digital photograph, the public is forced to trust in the source of the image, or in the veracity of the image's context.

In this, the digital photograph must now be treated as having the same truth value (or lack thereof) as a written text. We have thus returned, in some sense, to the aesthetic of the pre-photographic era, to a signscape that is once again reduced to the dichotomy between the word and the image, though now both are merely different outputs from the same binary code. This insistence on context and interpreta-

tion is, of course, not unique to electronic imaging, but the digitizing of the photographic has made it ubiquitous.

Gisèle Freund recounts a story about photographer Robert Doisneau that illustrates the importance of context. Doisneau was famous for his shots of Parisians in cafés and on the street.

One day, in a small café on the rue de la Seine where he was accustomed to meeting his friends, he noticed a delightful young woman at the bar drinking a glass of wine. She was seated next to a man who was looking at her with a smile that was both amused and greedy. Doisneau asked and received permission to photograph them. The photographs appeared in the magazine *Le Point*, in an issue devoted to cafés illustrated with Doisneau's photographs. He handed this photograph, among others, to his agency.[20]

All this was well and good, of course, until his agency started to sell the picture without Doisneau's involvement. The man in the picture objected strenuously when the photograph was used by an obscure regional magazine to illustrate a piece on drunkenness and temperance. Doisneau offered his profuse apologies, and the man, a drawing instructor, though incensed that he should "be taken for a boozer," accepted them. The agency then turned around and sold the photo to one of France's leading scandal rags. As is the wont of a scandal rag, it did a story about vice and captioned the picture: "Prostitution in the Champs-Elysées." At this point, all bets were off, the drawing teacher sued the magazine, the agency, and Doisneau. The court fined the magazine and the agency but found the photographer an "innocent artist."[21]

As already noted, the ways in which digital technologies break down whatever remains of our inherited faith in the indexical relationship between the photograph and its object are of obvious importance to the epistemology and politics of an image-saturated culture. This overwhelming attention to the dubitative, to questions of fraud and forgery, though, tends to obscure the developments in another area of discourse around photography. The breakdown of the indexical relationship between the photograph and its referent, and the concurrent obliteration of photography's assumed truth value, have had the same

impact as the destruction of the aura occasioned by the advent of photography itself.

Electronic Auras and the Aesthetics of Mutable Form

Walter Benjamin's essay "The Work of Art in the Age of Mechanical Reproduction" has become a central text for those trying to understand image environments in an age of mass media. Benjamin observed the transformation of culture under the pressure of mechanical technologies of reproduction, examining the impact of reproductive techniques like printing, woodcuts, lithography, and especially the mechanical arts of photography and film on the reception and appreciation of art. Prior to the advent of these technologies, there was a singular importance to an artwork's "presence in time and space, its unique existence at the place where it happened to be." This anchoring in place and in moment is a prerequisite of the art work's "authenticity," which in turn adds to its "aura"—its specialness, its roots in myth and ritual, its fetish characteristic. "That which withers in the age of mechanical reproduction is the aura of the work of art."[22]

In "The Photographic Activity of Postmodernism," Douglas Crimp takes a fresh look at what had happened to the concept of the aura by the 1980s, the decade that not coincidentally saw the wide deployment of electronic imaging technologies. In the photographic work of postmodern appropriationists Cindy Sherman, Sherrie Levine, and Richard Prince, Crimp finds an acquired aura lifted from the "original" work from which the artists appropriate. Cindy Sherman is best known for her "Untitled Film Stills" (1977–1980) in which she photographed herself adopting the poses, attitudes, and styles of anonymous B-movie denizens. In one image she is the librarian, in another the gun moll, and in a third the office girl in the big city. Sherman's film stills are reverberations rather than instances of origin and narrative. Sherrie Levine came to fame when she rephotographed famous images from the canon of photography, exhibiting them as her work, albeit with new titles. Her "After Walker Evans" (1981) challenges both the idea of authorship and the sexual politics of the art world in which men are masters and women are models. When Richard Prince worked as a layout artist in the New York magazine world in the late
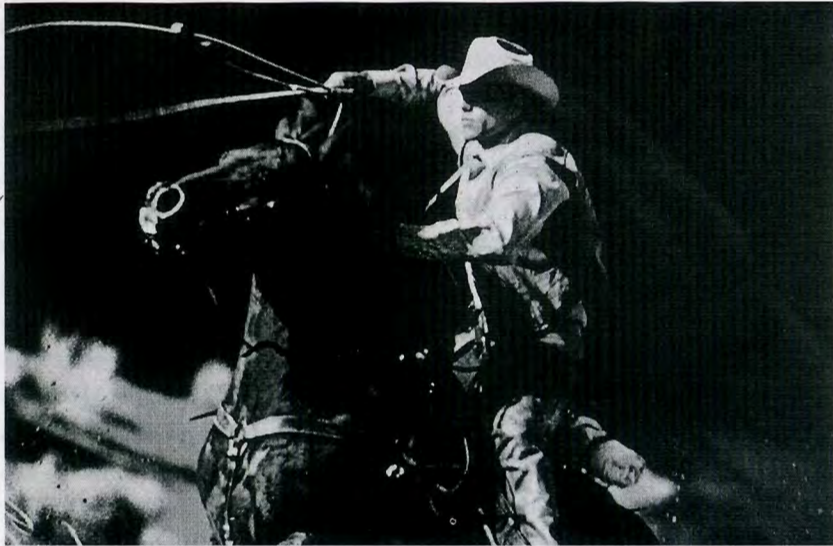
Richard Prince's appropriation of the imagery, but not the trademark and pitch text, from Marlboro cigarette ads lends his photograph an acquired aura. Although not produced electronically, the photograph presages the ways in which digital images can seem utterly familiar, yet remain ultimately estranged.

Richard Prince, *Untitled (cowboys)* (1987). Courtesy of Barbara Gladstone Gallery, New York.

1970s on early digital imaging systems, he looked at advertising, pondering the relationship between the images and their identificatory texts. His appropriation of the imagery, but not the trademark and pitch text, from Marlboro cigarette ads left him with images that seemed utterly familiar, but ultimately estranged.

Crimp sees Sherman, Levine, and Prince as developing work in which the acquired aura is now a "function not of presence but of absence, severed from an originator, from authenticity. In our time the aura has become only a presence, which is to say a ghost."[23] The aura as ghost is a stimulating idea. This emphasis on absence and severing from the origin points to a way to characterize the rupture between the photographic and the post-photographic eras.

There has long been a bifurcation in photography—between the photograph as documentary evidence and the photograph as "art" ob-

ject. This opposition between realistic/documentary/journalistic photography and art photography is one that has generated some of the most impassioned critical writings on the medium. As we enter the digital era, the age of the dubitative, this bifurcation will no longer function, for all digital photographs—no matter what their makers' intents—are analogous to the art photograph.

As noted above, the reigning fiction about photographic practice is that it relies upon mechanical and chemical means, relatively unaided by human intervention, to re-present the outside world. It is thus taken to be an ideally suitable medium for an "objective" presentation of that exterior world. But what of those who would employ photography to render inner states? These are the artists who have chosen to use the camera to concentrate on those qualities that Abigail Solomon-Godeau describes as "the issues and intentions . . . associated with the aestheticizing use of forms of the medium: the primacy of formal organization of and values, the autonomy of the photographic image, [and] the subjectivization of vision."[24] "Fine art photography" has always been less reliant on truth value than have documentary and news photography. Much of art photography has been happy to mime the developments of other art forms, looking to painting as an exemplar of the "serious" art—from Edward Steichen's "Self-Portrait with Brush and Palette" (1902) to Joel Peter Witkin's monstrous *memento mori* of cadavers, sexual freaks, and the deformed from the 1990s. The *tableaux vivants* and still lifes, the concentration on formal questions of light and shadow, the quest for the limits of photographic practice—all these are the hallmarks of the modern work, no matter what the medium.

In another essay, Solomon-Godeau points out that regarding art photography as "the expression of the photographer's interior, rather than or in addition to the world's exterior, has been almost from the medium's inception *the* doxa of art photography and a staple of photographic criticism since the mid-nineteenth century."[25] This is the obverse of the truth-value question; it is the question of the aesthetics of form. Yet, as we move into the digital, the aesthetics of form become more and more involved in the aesthetics of mutable form.

Techniques of Observation

The man beholdeth himself in the glass and goeth his way, and straight-way both the mirror and the mirrored forget what manner of man he was.

Oliver Wendell Holmes[26]

A mutable hyperaesthetic acknowledges that as imaging technologies change, so must analyses of the art object evolve. As we enter an era of digital photography on demand, image re-production via electronic spigot, we are challenged to create a context that does not completely devalue other forms of production and presentation. In essence, it forces us to re-invent art history, which was born with the advent of photography. Of what will the new art history, perhaps better formulated as a hybrid approach to both new and old media, consist?

Additionally, we must question how great a revolution these new media will bring on. As Jonathan Crary points out in *Techniques of the Observer*,

Photographs may have some apparent similarities with older types of images, such as perspective painting or drawings made with the aid of the camera obscura; but the vast systemic rupture of which photography is a part renders such similarities insignificant. Photography is an element of a new and homogeneous terrain of consumption and circulation in which an observer becomes lodged. To understand the 'photography effect' in the nineteenth century, one must see it as a crucial component of the a new cultural economy of value and exchange, not as part of a continuous history of visual representations."[27]

We know we are involved in a similar era of change with regard to our techniques of image production; we must now determine whether we are in the formative stages of a similar transformation of our techniques of observation.[28]

One reason that Ridley Scott's 1982 film, *Blade Runner*, retains its hold on the contemporary imagination is that it offers a compelling interrogation of the relationship among photography, memory, and truth. *Blade Runner* continues to offer insight into our emerging and imagined techniques of observation.[29] This science-fiction film concerns Rick Deckard (Harrison Ford), a bounty hunter, known here as a

blade runner, who tracks down androids who have escaped from slavery in off-world colonies. These androids, called replicants and sold with the tag line "more human than human," are extremely difficult to detect, and the possibility of "retiring" a human by mistake makes Deckard's job even more distasteful. As the narrative develops, Deckard encounters Rachel (Sean Young), a replicant who has been so fully implanted with false memories that she thinks she is human. When he confronts her with this news, she insists that this could not possibly be true, because not only does she remember growing up, she has photographs to prove it. She tries to show him a print of herself as a child in her mother's arms. Deckard refuses to even look at it, and badgers her into accepting her status as a replicant by forcing her to acknowledge that he knows things about her innermost and unvoiced thoughts—things about her past that he could know only if he had been provided access to the memory files with which she was programmed. She then drops the photograph and flees the apartment. Deckard picks up the photograph, and the image fills the entire frame—the photo becomes the totality of the film image. At this point the extraordinary occurs: the "still" image of the photograph begins to move—a ray of light wavers, as if obscured by a cloud, and the girl and her mother seem to shift just slightly.[30] This short flickering can be taken as a sign of a new era of the image—the mutable aesthetic of the electronic era made visible.

In *Slippery Traces* (1995), artist George Legrady has reified this mutable aesthetic, drawing from *Blade Runner* while making his own comment on the informatics of the electronic image. As with so much contemporary computer-inflected work, *Slippery Traces* blurs genres and technologies. Legrady creates an arranged universe of three hundred postcards that have been scanned and "linked according to literal and metaphoric properties."[31] These photo-graphic images are projected on a screen, with a cordless infrared mouse resting on a podium in front of the image on screen. The user/spectator uses the mouse to search out up to five hot spots on the images which then lead to one of the other cards, which in turn has its own hotspots. *Slippery Traces*'s interface replicates the look and sound of a memorable piece of imaginary technology from *Blade Runner*. In the film, Deckard inserts a photograph of a replicant's apartment into a machine that allows him
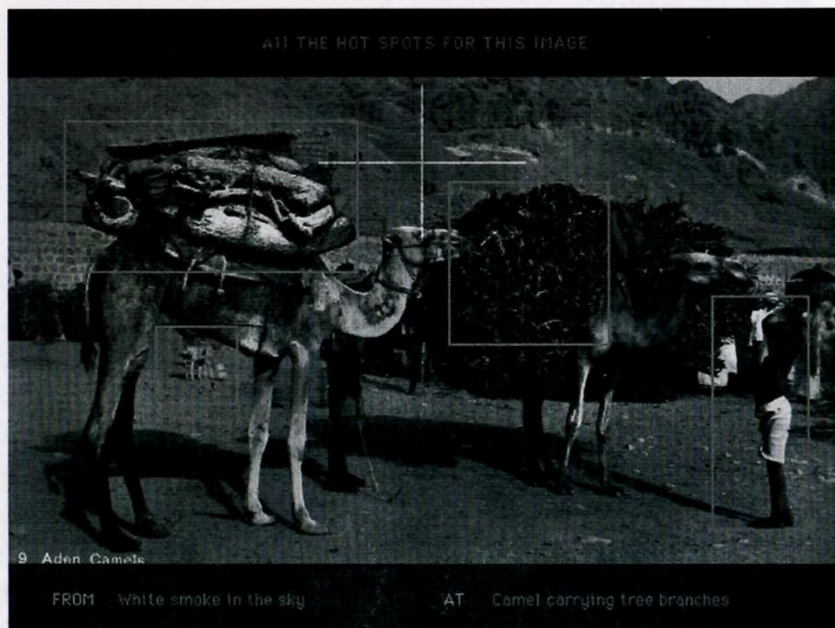
George Legrady makes visible the mutable aesthetic and informatics of digital images, linking a series of appropriated postcards according to their literal and metaphoric properties. The interface draws inspiration from the Esper, *Blade Runner*'s fictional photo-analyzer.

George Legrady, *Slippery Traces* (1995). © George Legrady/ZKM, Karlsruhe.

to search, scan, enlarge and navigate through the represented space of the image. He calls out instructions to the machine: "Move in, stop . . . pull out, track right . . . pull back, stop . . . track 45 right, stop . . . center and stop . . . enhance 34 to 36 . . . " and eventually, when he has found the precise detail he was looking for, "Give me a hard copy right there." The photo-analyzer, known as the Esper, responds on cue, clicking distinctively with a mechanical precision, creating a fantasy of photographic omniscience, if not omnipotence. The Esper's user can extract an almost limitless amount of information from a single still.[32]

Slippery Traces appropriates the Esper's sound and interface to play off the link between the realm of high art, emergent digital practice, and the mental geographies colonized by the forces of popular culture. Like replicants, we have a vestigial memory of a photo analyzer that

never existed, except as a flickering few moments in a movie now decades old. As a culture, we are starting to understand that the truth value of the photo-graphic is gone. What is still up for grabs is the effect this will have on the narratives we tell with these dubitative images—our electronic arts, enhanced televisions, and digital cinemas—and the analyses we craft about the new techniques of observation that will emerge from them—the emergent semiotics of the mutable imagescape.