



Fig. 1. Etch-A-Sketch digital illustration.

Artisanal Prefigurations of the Digital: Animating Realities, Collage Effects, and Theories of Image Manipulation

by Maureen Turim

For centuries artists have been forming and transforming the image point by point. At its most basic, a pencil traces the points, while an eraser adjusts, rectifies. A layering of washes may create a more fluid distillation of points. Textures of paint, impasto may create a thicker surface, building points on top of points into an actual third dimension of tactile space in front of the image plane. All these formations and transformations might be called artisanal: techniques of craft, skill, and hard work. We usually think of this artisanal process not as a setting of points, but as a continuum. I draw a line, descriptive, expressive, gestural, fluid. If I am drawing from nature, then the line may be somewhat analogous to the referent.

Yet we know each line I draw potentially has been plotted. "Plotting" is a word we associate more with design and architectural drawing than with free drawing; it resonates suggestively with narrativity, and with all constructivist art. Potentially at least, any line I draw is nothing more than a series of darker points inscribing its difference from the field of lighter points surrounding it (or if the paper is black and the implement, light, the reverse). These lines

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are plotted against the invisible but implied grid of a geometrical division of the rectangle (or square, circle or other shaped surface). In addition, these lines are plotted against the void, against an infinity of space that is not this line.

Every time we draw we etch just such a progression or mass of points. We mark a surface differential. In a sense the theory that brought this home was not that formulated around computer generated imagery, but that which preceded and anticipated it, if only by a few decades; if MacDraw allows us to reconceptualize drawing as a presence and absence of pixels, this certainly finds its precedent in any point on any drawing surface conceived of as merely such an actualization of its potentiality. Consider such wonderful theoretical works as Kandinsky's *Point and Line to Plane: Contribution to the Analysis of the Pictorial Elements* and Paul Klee's *Pedagogical Sketchbook*.¹

First though, let's consider a children's toy "Etch-a-Sketch": I remember this toy periodically when working with programs such as MacDraw, MacPaint, Painter, Ofoto, and PhotoShop. A red plastic frame, two white knobs surrounding a screen that looked like a television screen, Etch-a-Sketch is a primitive machine for drawing with knobs that control a line. It is a machine with a bias towards straight lines, for to draw a curve, one had to combine the rotation of both knobs, coordinating the movement of both hands. Further, the line was always continuous within the entire drawing surface. One could not end the line and begin again elsewhere. This constraint, etched into the design of this toy drawing apparatus, prepares us in a sense for the computer as a drawing apparatus; all programs, all apparatuses that tie the body, hand, and eye to the machine have their constraints, though less obvious ones. The Etch-a-Sketch can teach us, *in extremis*, something about the more subtle limitations of image-making and image-modifying computer programs.

Such computer programs simulate drawing, painting, and the art and techniques of the darkroom. The "knobs" that we conceptually turn in these programs with our index finger on the button of a "mouse" are amazing, yet awkward. Our virtual "toolboxes" produce simulacra of a large repertoire of gestures and processes known to the image making arts. They work as analogues to real processes, processes which digitalization allows us to simulate. The codes of

analogy have migrated here. No longer do we simply have only codes of analogy to the visual referent (and let's remember, please, that we still have those rampant in video and digitalization), we now have codes of analogy to both a set of processes and to an entire history of styles. Digital artmaking has magnified, multiplied, and intensified the codes of analogy.

For decades some artists and many technicians have dreamt of the power to transform the image point by point a bit more automatically, to short-cut artisanal processes or the interaction between the artist and certain factories, such as printing labs, to speed up artists' labor. This automatism of process we might call, mundanely, "digital image manipulation possibilities." Conversely the mundane engineering phrase "mechanical drawing" gains new poetic resonance.

Yet we should remember that other artists steeped in the craft of image making know that cumbersome manual techniques were part of what evoked their ingenuity and provided their inspiration. Material art making has a sensuality and physicality that varies from medium to medium. In light of this, we should pay more attention theoretically to the art that is happening simultaneously to digital art making. Some artists work in opposition to the automatic and the virtual. Installations using "real objects" rather than representations, or works that involve minute and elaborate handwork such as intricate pencil marks or obsessive wrappings of tiny objects speak of this resistance. Chris Burden's cardboard, wood, and wire installation, "All the Submarines in the United States of America," (1987) might be seen as an example of an artist who displays real objects (model submarines) to present, amusingly and conceptually, that which one would expect to see as a chart, perhaps using a computer generated graphic configuration. Some artists will relentlessly mix computer generated and digitally processed imagery with the older techniques of artisanal image production.

It is in recognition that we are at a juncture of such possibilities that I propose juxtaposing the digital and the artisanal as a way of addressing the history of image manipulation and its semiotics. I will not assume here that the artisanal is intrinsically better than the digital because slower, more tactile, more responsive; nor conversely, will I assume that the digital is anything entirely or even particularly new. Instead I wish to use this juxtaposition to help us theorize both.

I do mean to suggest first that the principles of image construction are only in part determined by a technology, since all the techniques associated with that new technology existed before, in a form of prefiguration. In cinema history we call a similar prefiguration “precinematic,” a term which refers to both toys and apparatuses (the Zoetrope, the Mutescope). With digital video, the artisanal approximations that performed similar processes include the ways art, photography, film, and video prefigure the work of digital imagery through compositional devices, mise-en-scene, constructivism, and collage/superimposition techniques.

For all this rich heritage, however, when we speak of a theory of the visual digital image, the question that dominates is the most controversial aspect of digitally registered photography and videography: how will the digital image affect the recording of physical and historical realities? We know that photography and cinema have born the burden of recording an unadulterated reality and therefore testifying to history; we know that despite theoretical disclaimers of all sorts, as media they have been linked to a greater simulation of the real even when they pursue fiction and fantasy. Digitalization affords even greater possibilities of a capricious play with the record of the visually real, stemming from its seamless wedding of disparate material and its potential to manipulate photos as changeable drawings, without leaving a trace of its processes. Note my language here; “no trace of a process,” which means no photographic plate, no negative. This lack of a solid substratum that collects the traces of images means that there we lack a trace of the manipulations wrought. Digitalization disturbs the capturing of an image on a photographic plate as an elemental gathering of visual proof.

Now it is not hard to imagine the possibility of inscribing a trace through data encoding of some sort that would signify that the following information was gathered at a given instant at a given place and never rearranged after that instance. No sooner do we posit such a code of digital image encryptment through verifying codes than we imagine how easy it would be to counterfeit them. An historian’s nightmare develops so soon after the visual archives became photographic and filmic instead of painted or etched. So soon after a world began to rely on images to tell its histories, so soon after the photographs of Robert Capa (“Death of a Loyalist Soldier,” 1936), Dorothea Lange (“Ex-Slave with a

Long Memory” 1937) and Margaret Bourke White (“Buchenwald, Germany April 1946”) went from photo to journalism to historical record, we have the specter of all images being digital, implying that none can be verified. First, let me note that historians such as Sybil Milton, in “Photography of the Holocaust,” emphasizes the necessity for supplementary documentation of any photograph before taking it as evidentiary.² She recognizes the potential for the subtlest staging. Some evidence of reliability may be found in the photo itself, some more in the negative, but ultimately written documentation affects judgments good historians make on the facticity of representation, and presumably the digital photo or video journalist will supplement her images by necessity.

However, digital collages such as Jeff Murphy’s “Combatanta,” 1993 and Esther Parada’s “2-3-4-D Digital Revisions in Time and Space 1991-1992 at the Margin” evocatively retrace a post-digital history. Murphy cites Capa’s “Death of a Loyalist Soldier” in juxtaposition to Delacroix’s “Liberty Storming the Barricades,” asking us to compare not only the composition of these two heroic works, but the historical truth values presented by both images. Likewise, Parada’s digital collage comments on no longer being able to wrest an image from a linear historical instance as an unadulterated trace. Instead these artists posit the plurality of history and insist on the comparative creative commentary of the artist photographer. Many would argue that nothing has been lost by digital techniques’ transformation of photography, except an unfortunate naive belief in photographic recording of reality, and a world has been gained in which we have to support our visual statements as arguments with supplementary arguments, including ones that would document history beyond the photograph. Martha Rosler takes just such a position. However, I think the case cannot be closed so quickly, and I would like to examine the theoretical issues at stake here.

So while in numerous categories the design capacities we now associate with digital imagery were already developed through other more artisanal processes, they were far less frightening, for we usually could discern a fake. Remember that Roland Barthes cites as counter-example to his argument of photographic testimony a famous example of photographic trickery, the 1951 photograph “widely circulated in the American press... said to have cost Senator Milliard Tiddings his seat; this photograph represented the Senator in conversation with

the communist leader Earl Browder.”³ He resolves the theoretical problem such trickery might pose to his faith in photographic representation by implying that such fakes can be detected. Anyway, in this instance, they testified to the naive anti-Communist phobias of an early fifties U.S. context.

Even the new photography textbooks attempt to speak to the theoretical implications of difference between photographic plate and the pixel register. In *Photography: an Introduction*, Martin Lister’s chapter, “Photography in the Age of Electronic Imaging” proposes a chart contrasting the analogue image to the digital, all four points of which have to do with numerical encoding: in contrast to the analogue image that transfers properties of a referent, operates in a continuous field, involves material inscription, and is medium specific, the digital image converts properties to an arbitrary numerical code, creates units out of all elements, forms an abstract, detachable signal, and uses one binary code for all media, allowing for convergence.⁴ Obvious differences, but the chart proposes a misleading symmetry to the oppositions, and too great a simplicity to the notion of a fundamental difference. On all levels, the difference exists only in so far as the analogue image resists scanning and has properties that are unavailable to reproduction through digital and electronic display. Otherwise, the analogue image meets the digital image when it becomes transferable and open to convergence.

Convergence shows us how similar the two sorts of images are. That convergence also reveals a lack in the digital image should not be forgotten here; the digital reproduction of a Van Gogh is not a Van Gogh, despite an Italian CD-Rom devoted to his work. The “Automatic Van Gogh” function of Macpaint and the cloning Van Gogh (or impressionism, etc.) function in Painter only approximate through fractal mathematics what it would mean to submit any image whatever to the hand and the brush stroke pattern of the distinctive and distinguished historical painter, Van Gogh. One of the repercussions of much digitally-inspired art theory is that it has forgotten that, despite Walter Benjamin’s famous essay, reproduction did not substitute for the tactilely based art work; if anything it helped us to discern and appreciate its difference. However this difference holds more strongly for the difference of painting and photo, painting and digital image, than it does from analogue video image to digital video image, and it is on this far more narrow distinction that I wish to focus.

First let's return briefly to the way semiotic theory addresses this question, which can be traced to a debate implied by positions Roland Barthes took in contrast to those of Umberto Eco. Barthes, drawing heavily on a phenomenology of the image as viewed by a spectator, first spoke of how the photographic image "seems to be a message without a code."⁵ He saw all photos as first and foremost indexical signs in which the denotative level masks the connotative level. For all its echoing of the André Bazin's notion of the photo and the cinema as an imprint,⁶ the language and method are quite different in Barthes. Later, Barthes will himself leave out the "seems to be" when he reiterates his formulation in the guise of a confession in *Camera Lucida*, seemingly rejoining a more Bazinian notion of the imprint.⁷

Barthes' positions were seen critically by Eco in his *A Theory of Semiotics* where he works through a series of images of horses to define the semiotics of the image.⁸ He considers a drawing of a horse, emphasizing how the outline of the drawing constitutes the object by an element that doesn't exist in reality; he considers how a drawn zebra, which could contain unlimited differences from the drawing a horse, in fact is recognized in any drawing of a horse with stripes. His point is that drawings that work on the codes of analogy do so quite selectively. This leads him to posit very strong codes of analogy that operate in our definition of the representation of reality.

Given this premise, he might then have posited minimal distinctions between a drawing or painting of a horse and photos of a horse, for depending on the density of the codes of analogy in each medium they might take on the characteristics of the other. On one extreme pictorial photography, on the other hyper-realist painting; media converge as they borrow each other's codes of analogy, each others' principles of representation. Both media represent the horse through lines and shadings, traces of tints; both can increase or decrease the density and form of this coding at the will of the person controlling the artistic process.

If I have spent this time developing the semiotic recognition or misrecognition of codes of analogy, it is for a purpose, for there is a semantic sliding that goes on in current debates on the digital image. The analogue video image is equated

with the video image's retaining a sharply coded trace of visual analogy to real objects. We reach here the point at which semiotics in its sense of coding gets borrowed or should I say misappropriated by cybernetics. The digital image is seen as encoded, the analogue as not. Several slippery usages follow from this including calling certain digital images reproductions, when we should say call these images transcriptions.

Another terminological problem arises when we realize that an "analogue video image" constitutes a term that refers to the way in which an image is both encoded and transferred as a signal. Analogue visual images may in fact be highly processed, a point that is clarified by much work that was made at the Experimental Television Center in Upstate New York, which was devoted for years to a variation of the Paik-Abe synthesizer, the Rutt/Etra scan processor, and the David Jones colorizer, devoted to machines that modified the analogue signal whether or not that signal originated as a camera image, and whether or not that image was coded with any degree of recognizable codes of analogy. Similarly, in such tapes as *Soundgated Images* (1974) and *Time/Energy Objects* (1975), the Vasulkas have seemed to insist on an analytic understanding of the electronic signal or waveform as a model for visual representation. *Soundgated Images* uses the signal from the soundtrack to control the image, so that we are invited to imagine the electronic waveform that unites both. *Time/Energy Objects* displays abstract forms in which the viewer can visually identify oscillator-generated sine, triangle, and square waves as constructive elements. As such the signal becomes both the substance that enables writing and the evidence that such writing has occurred.

Despite experimentation with computer generated imagery by the Vasulkas as early as *Digital Images* (1979), a bias of sorts against digital processing lingered for many video artists. Analogue processing was considered less alienating, more creative, more fluid, more subject to chance and the sparks of inspiration that grow out of such inexactitude. Partially due to the manner in which analogue processing addressed the signal more as a whole, it retained a focus on the electronic aspect of the video image; in other words, there was a mythos generated out of the fear that digital video would lose touch with the signal and the artisanal, rejoining the film image by aping its special effects. Digital

would become commercial, precise, and ultimately more concerned with stroking the codes of analogical representation than in tracing the dynamics of an avant-garde abstraction. Its users would not necessarily need to know the technology, not need to wire and rewire, not truly be experimental in their attitude toward television; once wired in the metaphorical sense they could treat their machines with a nonchalant obliviousness, leaving the programming to technical drones in Silicone Valley laboratories devoted to mass profits, far removed from the site of experimentation.

It is for this reason that I find the collaboration of Steina and Woody Vasulka so fascinating, for they were able to move between analogue and digital image making in a manner that elsewhere I have written about with Scott Nygren;⁹ they saw both processes as artmaking that allowed one to write the image so that it encouraged reading the tools of processing. Thus in a certain sense the least analogically-rendered image still provided traces of its formation, and these remaining traces of representation allow one to understand image production and reception as process. The codes of analogy orient the viewer without dominating the works.

In the history of digital image making beyond such pioneers as the Whitneys and the Vasulkas, in the field of digital photography, scanner transfer dominates much early work. The representational image is an imported artifact; layering and collage construct this work, much of which could have been accomplished with photographic printing processes of superimposition. However the digital scanner and computer rearrangement of scanned material invited thinner layers and more intricately rewoven imagery; yet even this play of traces of archival images with additional drawings again was prefigured in silk-screen and lithography, such as works by Robert Rauschenberg. Yet there is still good reason to see this stage of subtle layered traces that borrowed from the archives of image making as establishing digital imagery's important contribution to theory. Always historical and recombinatory, such work speaks well to a postmodern zeitgeist of reinvigorating all past traces with new placements. Spatial rearrangement here makes the citation an emphatic reinscription; the artist cites and rewrites in a highly conceptual mode. Once temporally active film or video image and audio tracks are added to the mix, the largely spatial representation gains complex

temporal dimensions. Images and sounds may weave in and out, with the temporal image changes occurring at different rates in separate interior sectors of the image. Temporality here can be largely divorced from a relationship to the “real” that all but the most experimental cinemas of the past sustained.

Here I mean more than slow or rapid motion, more than montage that transforms temporality, and something different than the time-image as explored by Deleuze.¹⁰ Digital imagery has the potential to pose temporality differently than most earlier approximations in cinematic editing ever could, for temporal change is no longer limited to a frame by frame beat; the digital image can change its pixels at a rate far beneath the threshold of human perception. The theory I wish to evoke here is one which plays with the notion of animation beyond perceptual reality; if each pixel is a transformational point, then the digital image can animate its surface to conceptualize the shimmer of the image plane rather than its fixity and flicker. Of course time-base correction and frame buffering provide the means by which the video image succeeds in simulating cinema, permitting video to manifest the discrete temporal frame, even to the point of erasing its shimmering differences. We need to recognize how digital video has tended to render the electronic as if it were a still photography and cinematic temporality. The unique temporality of the digital electronic image has been adjusted and “corrected.” It has become a machine for simulation of the earlier image forms more economically. Retrospectively the drifting frames, the electromagnetically oscillated frames, the fluid frames of analogue processed video ask us to remember what the frame buffering and even the multiple embedded frames of digital video permit us to forget: video does not need to look anything like film. Its spatial and temporal pulsations can be quite different, and it is the challenge to digital video work to articulate occasionally this difference, instead of bypassing it.

A separate theoretical debate heats up with the early seventies introduction of solid-state sensors; digital imagery takes over scientific photography especially at the microcosmic and macrocosmic scales producing images such as “Hair on a Fly’s Tongue” and “Moon Surface.” When the pixel sensor registers light in manner analogous to a photographic plate, the new medium simulates that aspect of photography and cinema as well. Yet that simulation soon extends through



Fig. 2. Video frame enlargements from Bill Viola's *I Do Not Know What it is that I am Like*, (1986).

the computer to a simulation of the darkroom as metonymic site for all creative manipulation of the image—hence the phrase “digital darkroom,” a virtual site if ever there was one. Further, the computer can simulate photographic representation by building the image by mathematical equations. There follows the widespread recognition that image artmaking has undergone a dematerialization, valid only if one posits information is not material, an increasingly less convincing hypothesis in an information age.

So let me close what has been a rather wide-ranging theoretical discussion of the artisanal, the analogue, the codes of analogy, and the digital by focusing on how the work of Bill Viola illustrates through contradictions many of the points I have made. Until most recently, Viola's work has been representative of how many video artists, like many artists in other media resisted not only the digital construction of the image, but also the technophilia of certain earlier avant-gardes. By embracing the physical, the earth, the body, and other manifestations of the natural, Viola resisted not only the virtual, but also the machine. Like artists who have installed roughly hewn trees as sculptural elements, or piled soil, or grown grass or moss, Viola has captured the organic in video, arranging analogical and organic imagery to create metaphors that at once float and burn. Even as he used digital editing, he resisted digital manipulations by embracing a highly analogical image in both the semiotic and video senses of that term, borrowing on the history of photography and artmaking. Yet just before Viola's magnificent retrospective of fifteen installation pieces and numerous tapes opened in Los Angeles, garnering critical and popular attention

to images we have seen over the past thirty years, he opened an exhibit in Karlsruhe, Germany at the ZKM (Zentrum für Kunst und Mediatechnologie) called “Tree of Knowledge.” Of this work Viola says:

I didn’t want any specific kind of tree. I did a lot of research at the Huntington Gardens, photographing many species, in order to arrive at this ideal tree, I told Bernd Lintermann, the programmer to look at the paintings of the Northern European masters, especially Van Eyck and Hans Memling. Ironically we started with software that gave us as biologically accurate a model of growth as possible, but soon made various deviations that actually enhanced the image’s realism—we made the trunk gnarl rather more rapidly than would happen in nature, for example. As we all know, conventions of realism are often more powerful than reality itself.¹¹

What I love about this quote is that Viola is describing a process of painting, one intertextually aware of the history of painting as well as the virtues of scientific study of real trees. It seeks its own ideal and abstracted painterly representation, using some specifically generated programming to achieve its effect. Couple this with the knowledge that Viola already produced a work entitled “Tree of Knowledge” in 1977 in which he lit a real tree with a high powered searchlight for several hours as night fell, and we see that more is at stake here than a defining shift to digital technology.

What is at stake is perhaps best illustrated by Viola’s *I Do Not Know What it is that I am Like*, (1986) a work which defines the montage of images of nature as a contradiction that produces a riddle. Viola plays with random and natural shifts internal to the image, exemplified by the way flies land on a piece of carrion, then fly off. Motivated, but random, this cycle of movement is linked in the work to cycles of life and death and movements of the elemental as manifest by such substances as air, water, and fire. These images run throughout the installations, dreamily repeated from work to work, varied in scale and inscription. Yet they are presented under language in its negativity: I do not know what it is that I am like. This statement which perhaps borrows its minimalist aesthetic from writer Raymond Carver (*What We Talk about When We Speak About Love*) reminds us that the self, the artist, and video itself is still somewhat less than self-evidently knowable.¹² We are far from the scientific image here, even though we might compare the fly’s tongue to Viola’s framed observation of the life of

flies. We know these video signs escape us even as they escape from us, even as the psyche and the philosophical are deeply embedded images. The truly embedded image, the image within the image is not simply the internally enclosed and encased frame of digital video, it is a far more fundamental enfold- ing of visual signifiers within the poetics of language in its broadest sense. What we know is that digital video extends this tension between signifiers, this in- vestigation of meanings, extends it without fixing its movement. No theory of the digital should arrest this poetics by pretending to know what it is that the digital is like. It is like all art and language that has preceded it, like it but dif- ferent in that it draws new relations into its mathematical equations. Only through combining what we know of its processes with what we know of the processes of art and language will we know anything at all about the digital.

Notes

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1. Wassily Kandinsky, *Point and Line to Plane: Contribution to the Analysis of the Pictorial Elements*, trans. Howard Dearstyne and Hilla Rebay (New York: Solomon R. Guggenheim Foundation for the Museum of Non-Objective Painting, 1947). Paul Klee, *Pedagogical Sketchbook* (New York: Praeger, 1953).
2. Sybil Milton, “Photography of the Holocaust,” Lecture at the University of Florida, April, 1998.
3. Roland Barthes, “The Photographic Message,” in *Image Music Text*, trans. Stephen Heath (New York : Hill and Wang, 1977), 21.
4. Martin Lister, “Photography in the Age of Electronic Imaging” in *Photography: an Introduction*. See also Mikkel Aaland and Rudolph Burger, *Digital Photography* (New York: Random House, 1992); Hubertus v. Amelunxen, Stefan Iglhaut, Florian Rotzer in collaboration with Alexis Cassel and Nikolaus G. Schneider, ed, *Photography After Photography: Memory and Representation in the Digital Age* (Amsterdam: G+B Arts, 1996); Norman Breslow, *Basic Digital Photography* (Boston: Focal Press, 1991); R. J. Clarke, *Transform Coding of Images* (London and Orlando: Academic Press, 1985); R. J. Clarke, *Digital Compression of Still Images and Video* (London and New York: Academic Press, 1995); Adrian Davies, Phil Fennessy, *An Introduction to Electronic Imaging for Photographers* (Oxford and Boston: Focal Press, 1994); Mark Haworth-Booth, *Metamorphoses: Photography in the Electronic Age* (New York: Aperture Foundation, 1994); and Manijeh Majlessi, *Digital photography* (Washington, D.C.: Library of Congress, 1995).
5. Barthes, “Rhetoric of the Image,” in *Image Music Text*, 43.
6. André Bazin, “The Ontology of the Photographic Image,” in *What is Cinema?* trans. Hugh Grey (Berkely and Los Angeles, University of California Press, 1967), 9-16.

7. Barthes, *Camera Lucida: Reflections on Photography* (New York: Hill and Wang, 1980), 88-9. “The realists, of whom I am one and of whom I was already one when I asserted that the Photograph was an image without code—even if, obviously, certain codes do inflect our reading of it—the realists do not take the photograph for a ‘copy’ of reality, but for an emanation of past reality: a magic, not an art.” (my italics) Barthes’s investment in things before the camera having-been-there is extended in his later *Camera Lucida* theory, in which he wants to see the photo as reality in a past state; at once past and real. This will lead him to differentiate film from photography, claiming that film rarely has this past tense implication, as movement escapes being ensconced in the past to render the filmic image understood as an ongoing present. Obviously much is debatable here and has been widely debated, and I have always understood this late book as far more a personal confession than a theoretically sound argument, for the only resonance seeing a film’s temporality as present due to motion has to do with a fictional conditioning of the spectator; for those of us who have always seen film as testimonies to past moments, to their moment of filming, for those of us who see even fictional films obliquely as documents, this theory said more about a suspension the fictional film demands, and demands only of a certain type of spectator.
8. Umberto Eco, *A Theory of Semiotics* (Bloomington: Indiana University Press, 1976), 206.
9. Maureen Turim and Scott Nygren, “Reading the Tools, Writing the Image” in *Steina and Woody Vasulka and Machine Video*, (San Francisco: Museum of Modern Art, 1996), 49-64.
10. Deleuze.
11. Bill Viola, “Art at the End of the Optical Age: Interview with Virginia Rutledge,” *Art in America*, March 1998, 75.
12. Raymond Carver, *What We Talk About When We Talk About Love* (New York: Knopf, 1981).