9/00
Article Number 00019

DRIFT!
THE VASULKAS

Two cameras are driven by an identical vertical drive, which places all images in locked vertical position on the monitors. The horizontal drive frequencies originate from different timing sources, setting the images adrift horizontally (on the monitors). The keyers, by prioritizing (main/key) layers of both camera images, drift them opposite to the reference (main). Both images appear in "the normal" on the preview monitors (mode I and III). In mode V and VII we see a left to right drift, inversely right to left. The raster-reversion custom switches provide left/right flip (mode II, IV, VI and VIII). The horizontal blanking expander assures a wider transparent "bar," squaring the format of the video images.

Eight variations are seen including parallel as well as reverse horizontal drift:
Mode I: direct preview of Camera A
Mode II: reverse scan of Camera A
Mode III: direct preview of Camera B
Mode IV: reverse scan of Camera B
Mode V: Camera A over B drifting left to right
Mode VI: Camera A over B drifting left to right (reversed scan)
Mode VII: Camera B over A drifting right to left
Mode VIII: Camera B over A drifting right to left (reversed scan)

Camera A, on a tripod is pointed at camera B, which is mounted on a turntable. Every one turn, camera B also "sees" camera A. Anybody entering this environment becomes the third observer/observed. Although the viewer should walk around freely, his/her most ideal position is on a line when both cameras' views coincide, where a passing blinking "bar" reveals the viewer on both image planes.

While the Vasulkas initially focused on two basic areas - horizontal drift and the audio-visual relationship - they began to expand their repertoire of effects by commissioning various people to build specialized video equipment. As Steina recalls,

In the spring of 1970, which was the first year we were working, we met Eric Siegel, and we immediately fell in with him very well. And he made use of equipment we had gotten, and we got to use his colorizer, and he helped Woody to build one. He made the boards, and then Woody wired everything together, which was the first wiring experience that Woody got into with video. As soon as we got the first money from the State Arts Council [NYSCA], we set a little aside for tool development, and our tool person became George Brown.

In addition to the Horizontal Drift Variable Clock, Brown constructed a switcher in 1971. He also made a cascading or multi-keyer in 1973. Unlike most keyers, which key two images - one over another -the multi-keyer could key up to six images. This allowed images to be manipulated to create foreground-background relationships. In 1974, Brown also made a programmer, a digital device which could store and replay a sequence of operations such as a switching or keying order.

Between 1971 and 1974 the Vasulkas made numerous tapes utilizing these tools in increasingly complex combinations. *Black Sunrise* (1971), described by the Vasulkas as a "performance of energies organized into electronic images and sounds," is a continuum of constantly permutating abstract images, which variously resemble a landscape or an aurora. *Elements* (1971) consists of variations on video feedback that are processed through a keyer and colorizer. The Vasulkas called these tapes, as well as *Key Snow* (1971), Electronic Image and Sound Compositions. And in many of these works the video was a function of the audio. In the program notes to the 1971 Whitney show, they said of these tapes, "They resemble something you remember from dreams or pieces of organic nature, but they never were real objects, they have all been made artificially from various frequencies,

from sounds, from inaudible pitches and their beats." These were the kinds of tapes that - with their colorful swirls of abstract imagery - were dismissed by many critics because they looked like a moving version of modern abstract painting, which was then becoming unfashionable. For the Vasulkas, however, their work was based on various manifestations of electromagnetic energy rather than abstract art.

Other tapes from this period can be correlated with modern art, though. *Home* and *Golden Voyage* (1973) are based on bizarre juxtapositions found in Rene Magritte's paintings, which, the Vasulkas felt, were similar to the effects they were producing. Using the colorizer, multi-keyer, and switcher, as well as horizontal drift, *Home* consists of three sequences in which still lifes are set in motion - e.g., an apple drifting past a teapot on a kitchen stove. *Golden Voyage* refers directly to Magritte. It is a sort of animation of his painting *The Golden Legend.* "We were looking at this picture and we were joking about how many cameras we'd need to reproduce it," Steina explained. "Of course, three. One camera would be on." These images were combined using the multi-keyer and set in motion via horizontal drift. Loaves of French bread embark on a journey. They travel across various backgrounds - a mesa, a beach, a building as well as a reclining nude woman. Initially mere loaves, the breads take on phallic connotations as they encircle the woman - an attempt at absurdist humor.

Many of their other tapes made during this time are less symbolic. For instance, in *Vocabulary* (1973), images of a hand and a sphere are manipulated with a keyer, colorizer, and the Rutt/Etra Scan Processor in order to "convey in a didactic form the basic energy laws of electronic imaging." The tapes *1-2-3-4* (1974) and *Solo for 3* (1974) are even more didactic in that images of numbers are permutated in various foreground-background relationships determined by the programmer. In *Solo for 3,* three cameras focus on three different sized images of the number three. The image planes are layered with the multi-keyer, and sequenced by a digital musical instrument. The numbers drift, controlled by the variable clock. The result in both cases is a *Sesame Street-style* interplay of numbers, but with a synthetic soundtrack.

In 1974 the Vasulkas acquired a Rutt/Etra Scan Processor, a device which allows the video raster - as well as the images displayed on it - to be reshaped through magnetic deflection. To Woody, the appeal of the Rutt/Etra was its capacity to visually display in a precise manner the most basic elements of the video signal - electronic waveforms. It was this device that catalyzed his preoccupation with an aesthetic that was fundamentally didactic. For the next few years, the Vasulkas collaborated less. Woody described how the scan processor influenced his work:

Compared to my previous work on videotape, the work with the scan processor indicates a whole different trend in my understanding of the electronic image. The rigidity and total confinement of time sequences have imprinted a didactic style on the product. Improvisational modes become less important than an exact mental script and a strong notion of the frame structure of the electronic image. Emphasis has shifted towards a recognition of a time/energy object and its programmable building block - the waveform. [30].

The idea that video images were nothing more than electromagnetic energy constructed in time was central for Woody, and he made numerous tapes and films from 1974 to 1977 depicting the process. Many of these used audio and video noise as the image source. One of the clearest illustrations of what he called "time/energy objects" is found in *The Maffer* (1974). In it a generated dot pattern is displayed on the raster. The three primary waveforms - sine, square, and triangle - are fed into the Rutt/Etra and used to shape the raster display so that the dot pattern assumes the shape of each waveform. Woody illustrated these kinds of changes more systematically in a set of grid-like displays consisting of still photographs that depict the various states of the raster when controlled by the primary waveforms in conjunction with alterations of the scanning process. While these pieces were designed as reductive exercises, other tapes and films apply some of these principles to camera-generated images. Because the Rutt/Etra processes the signal in such a way that light energy - or brightness - can be converted to magnetic energy, the illusion of three-dimensionality is created. This is accomplished by connecting the incoming video signal to the vertical deflection system - or the magnetic force that "pulls" the image vertically - so that the brightest portions of an image stand out. As Johanna Gill described the effect, "what one is seeing is a topographical map of the brightness of an image; where the image is bright, it lifts the lines [of the raster], where it is black, they fall." [31]

Woody's tapes *Reminiscence* (1974) and *C-Trend* (1974), the film *Grazing* (1975), and the tape *Telc* (1974) by Woody and Steina, all transform camera images - landscapes, street scenes, sheep grazing - into topographic renderings. These tapes and films all start with a referent that is "real," so that one can more easily see the process of magnetic deflection than with less specific imagery. These tapes possess eerie, web-like qualities. However, neither those qualities in themselves nor what they might symbolize interested Woody. Rather, this type of imaging challenged the dominance of the camera, and this challenge had implications that extended to fundamental perceptual issues.

The theory that Woody first articulated in the mid-'70s and has continually refined reevaluates not only cinematic form but what we generally call "reality." "Since we look at reality through our eyes, the reality has total dependence on perception, on how images are formed in the eye." [32] In other words, because the camera lens has come to represent an extension of human vision, it has been equated with a truthful rendering of reality.

According to Woody, electronically-generated, non-camera images - based on neither the lens nor the eye - indicate the potential for a new visual code that would supplant the traditional lens-bound mode of visual organization which has come to be accepted as most "real." He described his goal in 1978:

I can at least unleash some attack against the tradition of imaging, which I see mostly as camera-obscura bound, or as pinhole organizing - principle defined. This tradition has shaped our visual perception, not only through the camera obscura, but it's been reinforced, especially through the cinema and through television. It's a dictatorship of the pinhole effect, as ironic and stupid as it sounds to call it that. [33]

Woody's work with the Rutt/Etra, which he characterized as "the inevitable descent into the analysis of smaller and smaller time sequences," was a first step toward discovering a new code. The code was derived from nature, in that the devices he was using - in particular, the Rutt/Etra-were capable of revealing and displaying as waveforms the electromagnetic forces that occur in nature. These become perceivable as sounds and images only when artificially processed by oscillators, and displayed on oscilloscopes or video monitors, or processed through devices like the scan processor. Hence Woody's pursuit was not so much the investigation of video's inherent properties as a formalist end in itself; rather, it was more phenomenological, directed at challenging culturally determined notions of what constitutes reality.

Meanwhile, Steina took a different, though related, tack in *Machine Vision,* a series of tapes and installations begun in 1975. By utilizing a variety of mechanized modes of camera control - originally built by Woody for film work - Steina began to set up apparatuses designed to disassociate the camera from a human point of view.

Habitually, by looking, we keep selecting, subjectively "zooming," and "framing" the space around us. I wanted to create a vision that can see the whole space all the time.... And it too derived from my watching so many videotapes, watching an individual "delivering" you space.... It was a challenge to me to create a space that would not deal with the idiosyncrasies of human vision. [34]

Signifying Nothing (1975), *Sound and Fury* (1975) and *Switch! Monitor! Drift!* (1976) are all documentations of Steina interacting with studio set-ups in which two motorized cameras monitor not only the surrounding space but the movement of the other camera. The most complex of these is *Switch! Monitor! Drift!,* which consists of 13 scenes that variously combine the two cameras' automated movements with assorted effects achieved by keying, switching, horizontal drift and scan processing. The result is not merely technologically impressive, but cerebral: the dislocation of the picture plane forces the viewer to make sense of the surrounding fragmented space. In these tapes Steina is observing the system observing her and repositioning herself in the space in response.

In the installations *Allvision No. 1* (1978) and *No. 2* (1978-79), set up respectively at the Albright-Knox Gallery in Buffalo and at The Kitchen, these contraptions become at once kinetic sculptures and activators of the seeing process.

Two cameras are mounted on the ends of a slowly revolving axis with a perfectly spherical mirror at the center of the axis. On the monitors, viewers ' see an artificially created 360-degree image. While the viewers are part of the "real" space, they can at the same time see themselves in the "imaginary" dimension created on the screens. [35]

Allvision fragments and reconstructs reality and, in so doing, challenges us to participate in the deciphering process. Robert Haller aptly summed up this series: "[These pieces] sunder the sense of the 'true' in favor of the act of perception, demanding active seeing rather than the passive look." [35]

At this time Steina also began to use her violin to control the video image. *Violin Power* (1970-78) begins with Steina playing a classical piece and proceeds from that to electronic music. The violin - patched through an audio synthesizer to a video switcher - then activates switching between two different camera views of Steina playing. This scene constitutes one segment of *Switch! Monitor! Drift!* Similarly, in other segments the violin generates other image and sound distortions. *Violin Power* is another demonstration of the Vasulkas' use of sound to create video. For Steina, both sound and imaging devices are instruments. In this case, starting with a traditional musical instrument, the relationship is eloquently made obvious.

Much of her subsequent work reiterates these themes, but her methods vary, as do the results. For example, for *Urban Episodes* (1980) Steina constructed yet another motorized contraption in downtown Minneapolis which could perform automatically the four basic camera movements - pan, zoom, tilt, and rotation. Various mirrors were mounted in front of the lens and, combined with the camera's movement, confound our sense of what's reflected and what's real. More recently, in a group of tapes called *Summer Salt,* she utilizes the various mirrors and mechanical devices as well as preprogrammed switching to present images of the southwestern U.S. that once again pose questions about vision. However, these tapes seem to be less programmatic, less cerebral than some of her *Machine Vision* pieces. For instance, in *Somersault* (1982), a mirrored sphere is fastened a short distance from the lens, creating a fish-eye effect. Steina becomes a contortionist, jumping, bending, and twisting her body in a humorous mock-gymnastic performance.

Until 1977, all of the machines the Vasulkas employed with the exception of the programmer - operated according to the parameters of analog electronics, in which changes in the signal-audio volume, video brightness - are interpolated as voltage changes that vary continuously. An image or sound is produced through amplitude and frequency variations that are subject to distortion. By contrast, in the digital mode the parameters of a signal are sampled at discrete time intervals, and these samples are translated - through an analog-to-digital converter - into a binary code. When displayed, this code is transformed into discrete picture elements, or pixels, each one controlled individually or systematically by a computer. Pixel size varies according to the amount of memory available: more memory capacity allows a smaller pixel size, thus providing the greatest resolution.

In the mid-'70s, the implications of digital computers were considerable: not only was digital imaging more precise, but for Woody it offered a third model for imaging based not on electromagnetic energy but on mathematical systems. But in the mid-'70s computers were so complex and expensive that an extensive programming background was essential for anyone who wanted to employ them. Moreover, getting an image on the screen was not too difficult but manipulating it in real time was. Producing a recordable output was yet another stumbling block - a problem exacerbated by the fact that computer designers and video designers hardly communicated.

The Vasulkas began work on a digital system in 1976. Don MacArthur fabricated a prototype and Walter Wright wrote its first programs; both men had experience with computers. [37] But it was Jeffrey Schier, then a student at the State University of New York at Buffalo, who designed and built, with Woody, a more complex system called the Digital Image Articulator or Imager. Because of the enormous time and energy required-by Steina's count, Woody soldered over 20,000 connections - all of the Vasulkas efforts in the late'70s were directed toward building the Imager. (The tape *Cantaloupe,* completed in 1981, is Steina's documentation of the process.) In 1977 and 1978 the Vasulkas made several tapes titled *Update,* which are visual summaries of their work with the Digital Image Articulator.

This system can take two video inputs, digitize these, and then perform a series of operations on those two images based on logic functions derived from the Arithmetic Logic Unit (a standard computer component). Depending on which logic function is operating, the numerical codes - and hence the images - are combined in different, but absolutely predictable ways. Such combinations revealed the system's inner structure to the Vasulkas, and also constituted what Woody has called a syntax.

What was surprising to me was to find that the table of logic functions can be interpreted as a table of syntaxes-syntactical relationships which are not normally thought of as being related to abstract logic functions. Because the logic functions are abstract, they can be applied to anything. That means they become a unified language, outside of any one discipline. [38]

To illustrate his ideas, Woody organized a set of grids - just as he had in 1975 with analog images - which represent the precise visual manifestations of this syntactic structure.

In video terms, however, an important property of the Imager was its capacity to perform these and other operations in real time. This was substantial, since a video signal could now be digitally processed as it passed through the Imager practically instantaneously - contrasted to the kind of computer imaging in which a program is entered and one must wait minutes or hours, depending on the program's complexity, for the computer to perform the operation.

Artifacts (1980) is a sort of demonstration tape that uses the logic of the computer to combine real-time, digitized, camera-generated images and texture so that effects like keying, zooming, and multiplication of the image are achieved. Woody described the tape as a "collection of images initiated by basic algorithmical procedures, to verify the functional operation of a newly-created tool." *Artifacts* reiterates the Vasulkas analogy of their work as dialogue with a tool. In the tape, Woody explains, "By artifacts, I mean that I have to share the creative process with the machine. It is responsible for too many elements in this work. These images come to you as they came to me-in a spirit of exploration."

Steina also utilized the digital system, but within much less theoretical constraints. In several tapes, among them *Selected Treecuts* (1980), she juxtaposes variations of trees through programmed switching - digitized and non-digitized. This "rhythmic collage," as she describes it, is paradoxical in that it not only mesmerizes, but directs the viewer's attention to two different representations - analog and digital - of the same reality.

Woody's project of using a linguistic model for imaging is hardly novel; rather, much of his thinking proceeds from his film background. A number of film semioticians have examined, in Christian Metz's words, "the ordering and functioning of the main signifying units used in the film message." [39] Similarly, Woody has attempted to discover what some of the signifying units might be for electronically-generated and manipulated images. Some important qualifications should be interjected, however. He did not want to remain limited to images generated by the camera, nor did he want to rely on traditional narrative structures. But, as Metz has pointed out, "The cinema was not a specific 'language' from its inception, but only became so in the wake of the narrative endeavor.'" He continues: "The pioneers of' cinematographic language - Melies, Porter, Griffith - could care less about 'formal' research conducted for its own sake ... men of denotation rather than connotation, they wanted above all to tell a story." [40]

In 1978, after the Vasulkas made some of the first of their digital experiments, Woody expressed an interest in applying electronic imaging codes to a narrative: "The process of understanding these structure became aesthetic to me. But I also suspect that I feel again some kind of need to express literature.... Beyond dealing with these minimal image structures, I can foresee a larger structure of syntactic or narrative conclusions coming out of this work." [41] Woody's most recent tape, *The Commission* (1983), sets out to do just that. The 45-minute tape is narrative; Woody calls it an opera, but it is more akin to modern fiction, relying heavily on the spoken word. This apparent irony, however, is countered by his strategic use of both audio and video effects as narrative devices. Initially, the extreme slow pace of some sections of *The Commission* is completely mystifying and frustrating. At the same time, the work is so carefully structured and the texts so compelling that upon repeated viewing the viewer can discern various themes unfolding, building, and resonating.

The Commission is a metaphor for art-making as realized in the story of two eccentrics - the violinist Niccolo Paganini and the composer Hector Berlioz. Both are self-indulgent, theatrical, and ultimately tragic. As such, they represent archetypal artist-characters. Paganini, played by video artist Ernest Gusella, is a sickly, agonized, romantic figure, near death, who describes his grotesque, fantastic visions. Berlioz, played by composer and performer Robert Ashley, is a cerebral and rather fussy character who speaks in abstractions. A male narrator is never seen, but his tale of Paganini's life - interspersed between scenes - provides continuity as well as a context for the otherwise opaque texts.

The script was written by the respective players, who seem physically and temperamentally well-suited to their roles. In Ashley's case, his Berlioz is much like his other performances; he adopts the same elliptical ruminating with the same sing-song delivery. However, in *The Commission* Ashley's opacity is appropriate to the depiction of a self-absorbed and self-interested man. Similarly, Gusella's Christ-like appearance suggests a tortured artist, who is abused even in death. If it's Paganini who actually dies in the end, it's clear that Berlioz - lost in his own world of tea and toast - is not much more lively.

Without embarking on a textual analysis of *The Commission,* I would like to suggest a few of the ways that Woody and Steina, who did the camerawork for the tape - have applied some of the techniques developed in their previous work. In each of the 11 segments, a different effect is employed and then exercised through a series of variations. This enables correlation's to be made between that particular device and the scripted text. And since action is minimal, the text is thus underscored rather than diffused.

Perhaps most important, though, is the almost obsessive repetition in every segment: interweaving of nuances and variations of sound, image, and, in the process, meaning. At the opening of the tape, we are told that toward the end of his life, Paganini lost his voice and had to speak through his "beloved illegitimate son." The exactment of this relationship becomes a metaphor for interpretation but is also a device which aids the audience in apprehending the story. In the next scene, a gaunt Paganini whispers - through the use of a sound processor - into the ear of his son. The son repeats, not always accurately, what his father has just said. In subsequent scenes, sections of the texts are also repeated, and the voices are all processed in a variety of ways that reinforce the actors' speeches. For instance, in one segment, the narrator describes the intense feeling of expectation that a follower of Paganini experienced when he thought he would get an opportunity to hear the virtuoso play. The pitch of the processed voice rises and falls as he tells of his anticipation and eventual disappointment.

The video, too, is carefully conceived. In one scene Paganini hands Berlioz an envelope containing a commission for a musical score, acting as an intermediary for an anonymous patron. Here images of the two men are rapidly switched. This device - first used in Steina's *Sound and Fury* - emphasizes the gesture of giving; however, the stiff, jerky movement which results also provides a visual counterpart to Paganini's false pretenses. Woody also uses the potential of the Rutt/Etra very effectively in the scene of Paganini's embalming: the web-like effect used earlier in Woody's "time/energy objects" is used here in conjunction with Bradford Smith's set to vividly create a death chamber space.

Such instances demonstrate how the Vasulkas electronic devices may be used as narrative devices in the future. Woody has made a difficult tape that attempts to rethink complex problems of characterization, plot, and even representation.

In trying to distinguish between various videomakers' work with imaging devices, my first impulse was to invoke an old dichotomy within modernist art discourse - that is, to make a distinction between two basic approaches that can be identified as formalist and expressionist. According to this framework, the first approach would be represented in the "first generation" of video artists by the Vasulkas, while the latter would descend from Nam June Paik. Having established these two points, one could chart an axis along which other artists could be placed. However, as closer scrutiny of the Vasulkas work clearly demonstrates, such a dichotomy does not hold. In spite of the formalist implications of what they have done, they have also suggested how some of the imaging practices might be used to challenge representational conventions. In the next article, I will discuss other artists' work in relation to the flip side of the modernist coin - expressionism.

NOTES

1. David Bienstock, program notes for "A Special Videotape Show," Whitney Museum of American Art, 1971.
2. Sherry Miller, "Electronic Video"
3. "Image Processing Notes toward a Definition," *Exposure,* Vol. 21, No. 1 (1983), p. 22.
   Maureen Turim, "Process Video," in *The Electronic Gallery,* exhibition catalogue (Binghamton, N.Y.: University Art Gallery, State University of New York, 1983).
4. *Ibid.,* n.p.
5. Interview with the author, June 22, 1983.
6. Johanna Gill, *Video: State of the Art* (New York: Rockefeller Foundation, 1976), p. 46.
7. Except where otherwise noted, all quotes from Woody Vasulka are from interviews with the author, March 18, 1983.
8. Jonas Makes, "On New Directions, On Anti-Art, On the Old and the New in Art," *The Village Voice,* Nov. 11, 1965; reprinted in *Movie Journal* (New York: Macmillan Co., 1972), p. 208.
9. Jonas Mekas, "On the Plastic Inevitables and the Strobe Light," *Ibid.,* p. 242.
10. Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: Signet Books, 1964), p. 36.
11. *Ibid.,* p. 19.
12. Jonathan Miller, *Marshall McLuhan* (New York: Viking Press, 1971), p. 6.
13. Raymond Williams, *Television: Technology and Cultural Form* (New York: Schocken Books, 1974), p. 127.
14. See, for example, Mekas's description of a piece by Gerd Stern with Jud Yalkut and Brian Peterson at the Filmmakers Cinemathque, *Movie Journal,* p. 215; also his description of a multi-monitor display at Global Village, *Movie Journal,* p. 360.
15. Charles Hagen, "A Syntax of Binary Images: An Interview with Woody Vasulka,"*Afterimage, Vol. 6, No. 1 & 2* (Summer 1978), p. 20.
16. Gill, p. 46.
17. Except where otherwise noted, all quotes from Steina Vasulka are from interviews with the author, February 1982; March 19, 1983; and Aug. 28,1983.
18. David L. Shirey, "Video Art Turns to Abstract Imagery," *New York Times,* July 4, 1972, p. 6.
19. Rent for the first year was covered by $8,000 the Vasulkas received from the New York State Council on the Arts. Because by law NYSCA cannot fund artists directly, all projects are funded through non-profit organizations. According to NYSCA records, the Vasulkas-as a part of the group Perception-were funded in 1971-72 through Howard Wise's Intermix (later called Electronic Arts Intermix). Besides the Vasulkas, Perception originally included Eric Siegel and Vince Novak. The following year, still under the Intermix umbrella, they formed Vasulka Video as a way of getting funding for their tool development. Perception expanded to include Juan Downey, Frank Gillette, Beryl Korot, Andy Mann, Ira Schneider, as well as Gillette and Siegal.
20. Shirey, *op. cit*
21. Among the new music composers and performers were Laurie Spiegel, Jacob Druckman, Emmanual and Ghent, Phill Niblock, Frederick Rzewski, Gordon Mumma, Alvin Lucier, Tom Johnson, Charles Madden, Charles Dodge.
22. In addition to the Vasulkas and Chatham, other "cooks in The Kitchen" - as they were initially called - were Dimitri Devyatkin, a video artist who, with George Chaiken, organized a computer video festival; Shridhar Bapat, a video artist who organized a video festival with Steina in July 1972; Michael Tschucdin, rock musician, composer, and founder of the Midnight Opera Company, a rock band that

played on weekends. Also involved in music programming were Jim Burton and Bob Steams, who became director of The Kitchen in the summer of 1973.

23. Gill, p. 48.
24- Hagen, p. 20.
25. "The Vasulkas," *Cantrills Filmnotes,* No. 13, (April 1973); quoted in the program notes for "Video Art Review," a series of 18 programs presented by Anthology Film Archives, March 1981.
26. Gill, p. 47.
27. *Ibid.*
28. An example of this influence is found in a NYSCA grant proposal by Perception after the Vasulkas formed Vasulka-Video. Describing the group's multi-channel projects, it said: "Through the application of cybernetic [sic] principles, multi-channel systems demonstrate in microcosm, the future posture of global communication."
29. From a talk given at the Museum of Modern Art in the "Video Viewpoints" series, 1978.
30. Woody Vasulka and Scott Nygren, "Didactic Video: Organizational Models of the Electronic lmage" *Afterimage,* Vol. 3, No. 4 (October 1975), p. 9.
31. Gill, p. 49.
32. *Ibid.,* p. 50.
33. Hagen, p. 23.
34. Quoted in program notes for "Video Art Review," Anthology Film Archives, March 1981.
35. From program notes for exhibition at The Kitchen, 1978-79.
36. Unpublished paper by Robert Haller.
37. At the Experimental Television Center, then in Binghamton, N.Y., Ralph Hocking and Sherry Miller began to discuss the possibility with MacArthur and Wright in 1975. The original plan was for the Center and the Vasulkas to get the same computer and develop compatible software. This proved to be less realistic than originally thought, and the Center opted for a less software dependent system
38. Hagen, p. 21.
39. Christian Metz, "Some Points on the Semiotics of the Cinema," from *Film Language* reprinted in *Film Theory and Criticism,* edited by Gerald Mast and Marshall Cohen (New York: Oxford University Press, 1974), p. 103.
40. *Ibid.,* p. 106.
41. Hagen, p. 21.

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