Woody Vasulka: Dialogue With the (Demons in the) Tool

Lenka Dolanova with Woody Vasulka

> So I think that what used to be the source of the poetic material in the past is now technological systems. They are increasingly populated by demons and they behave more and more like humans, and the more of what we call intelligence is assigned to them, the more demonological systems will arise, the more mystery and the more stories for the future imagination will be found there. This was predicted by science fiction, and if we believe in that we will have regained a poetic system in its glory. (Vasulka and Weibel 2008: 397)

> We are not here because we create the machines. We are here because the machines need us to live. (Kirby 1997)

Woody and Steina Vasulka have become legendary for devotion to their tools. They not only quote them in the surveys of their work, but literally share their living space(s) with them. The metamorphosing nature of these tools determines the character of the dialogue, their structure being directly related to the 'style' of their emergent work. While this essay is dedicated primarily to Woody's mind-set, it inevitably contains references to Steina's work, because although they claim that their work pathways split in the middle of the 1970s, both artists still share their living and working space as well as their tools. Also, an underlying theme of their work is the documentation of their coexistence with the tools; 'I would put it this way: the main key towards what appears to be a style or direction is usually embedded in the tools. It's the evolution of the tools which in our work we usually illustrate.' (W. and S. Vasulka n.d.: 15–16)

Introduction (out of frame)

Before they entered the United States in 1965, Woody and Steina met in Prague, where Woody studied documentary film at FAMU (Film and TV School of the Academy of Performing Arts), and Steina, who comes from Iceland, studied violin and music theory. Woody was introduced to technology in his native town of Brno, capital of Moravia; he often recalls the early collecting experiences during his boyhood wanderings through the local military airport – collecting which he has continued since then. After World War II, machines were perceived as suspicious a priori artifacts, inviting deconstruction. Peter

Rubin's video documentary *42 Miles from Big Brother* (1987) contains the unique takes of the Vasulkas and other allied collectors, searching in a cache in the Black Hole, a bazaar of discarded military and other equipment in the heart of Los Alamos, the town where the US government conducted research into the development of the first atomic bomb. In the commentary, Woody talks about the fact that he was almost born at a dump, because Europe after WWII was one big junkyard. You could find all sorts of things at the Brno military airport that would inspire the fantasy of a little boy, and thus Woody's passion for finding technological outlet components was born there. Woody considers it an almost subconscious process, presupposing a mutual kinship of the collector and the object, analogous to another of Woody's hobbies: mushrooming. Whereas picking up mushrooms – a typically Central and Eastern European pursuit – is related to a kind of natural survival instinct, collecting technology and its underlying codes is a process of collecting knowledge, necessary for survival in today's 'society of control' where codes dictate who gets access to information (Deleuze 1992: 3–7). Woody has participated in an effort to 'acculturate' technology; to convert the manipulation of codes into the craft of the individual.

Woody admits that only the process of working with video brought him the intense sensations that he experienced during his childhood dismantling of the residues of war machines (W. and S. Vasulka 1973). As with many others, Vasulka's interest in video was initially as a medium that suggested a greater amount of freedom concerning image processing and access to equipment, but also in the overall context of presentation and distribution. The Vasulkas' underlying aim is unfolding the potential, the 'intelligence', of their working material. At first in analog video, later in the digital sphere, their work always exhibited a strong desire to disclose the secret, to find the code, to 'grok' the medium. Belonging to the most important group of creators who formed an institutional as well as a theoretical 'frame' of video, the Vasulkas simultaneously try to challenge this frame, reaching an 'out of frame, or 'out of sync' condition. This article suggests how the dialogue with the medium is being transformed with each new experience of videomaking, and how the dialogue with the machine is necessary alongside the creators' dialogue with their own accumulating histories.

The desire to go 'out of frame' is also the desire to get rid of the supremacy of the human eye, the inherited modes of perception, and to reach an alternative (let's say 'non-camera' or 'non-human') point of view. Steina's 1978 work *Machine Vision* brings the possibility to see things 'differently', and suggests an alternative approach to image by disclosing new relationships between our perceptional models and outer reality. *Machine Vision* demonstrates the principle of a total point of view. It uses two cameras placed on opposite sides of a moving rod, panning and recording reflections from both sides of the mirrored sphere positioned in the middle of the rod, thus 'seeing' the surrounding environment – including the apparatus itself – in 360 degrees.

While in much of Woody's work his rebellion is aimed against the camera and its pinhole principle (and thus stresses the generating or constructing of the image without camera), Steina offers alternatives to the human eye (e.g., in her preference for cameras

on machine-controlled moving tripods); together they attempt to deny the limiting cinematographic principle called 'camera-eye', and offer a different organization of perceptual experience. While their early video works supported observational modes of creation (for example, disclosing the frame during a deflection process), their entry into a digital medium directed the creators more towards a constructivist approach of creating an independent machine reality (constructing an artificial frame). Woody's robotic installations of the 1990s take 'out of frame' even further by letting the semi-autonomous machines navigate in an 'omnidirectional' digital space.

Dialogue with the tool

> Our work is a dialogue between the tool and the image, so we would not preconceive an image, separately make a conscious model of it, and then try to match it, as other people do. We would rather make a tool and dialogue with it; that's how we belong with the family of people who would find images like found objects. But it is more complex, because we sometimes design the tools, and so do conceptual work as well. (Gill 1976: 48)

To have a dialogue with the tool suggests that there is no preconceived idea of what is to be made. Observation of the machine behavior is an inherent part of the working process. Video processing tools were closely connected with audio synthesizers, which stimulated the development of video tools towards real-time aesthetics and production methods similar to playing (as with a musical instrument). The tradition of constructing audiovisual tools leads to baroque color organs and further; it is possible that Woody takes inspiration from the rich history of 'color music' and also feels a certain kinship with two Czechoslovakian solitaires: Zdeněk Pešánek, who since the 1920s developed various color pianos interlacing sound with the play of the light; and Milan Grygar, a Slovak-born and Prague-based author of acoustical drawings and scores using found mechanical toys from the end of the 1960s. Woody knew about Grygar's work and appreciated the accidental aspect of his creation, its playfulness and the real-time feedback features in his creative process.[1]

Dialogue with the tools also presupposes participation in the process of constructing the equipment itself, which means that the artist needs to learn how to use and construct tools and/or cooperate closely with engineers. In the case of the Vasulkas, they felt closely related to the subculture of tool makers in the United States in the seventies and eighties who retained their independence from the commercial system and worked outside the television industry, having 'the same purposeless urge to develop images or tools, which we all then maybe call art' (W. Vasulka 1978: 20). This independence from the system of commercial production was a key factor: an artist entering a dialogue with the tools begin to create his or her own creative (and living) environment. This creativity includes not only reshaping the tools, but also operating outside the established institutions, and forming an independent critical circle and alternative distribution systems. An 'ideology'

of the tools (their production, distribution, accessibility, etc.) has become an important subject of study since the 1960s. What distinguished the 'art tools' from the commercial ones was usually a greater amount of flexibility, accessibility by those with limited financial means, and the possibility of free sharing and modifying of the tools. Tools invented since the beginning of the 1970s by various artists and engineers across the United States shared some common functions, and it was possible to combine them during use. In the construction of these tools, feedback played an important role: experience with one set of tools influenced construction of the ones that followed. In the case of the Vasulkas, the dialogue with the tools always contained certain personal consequences:

> But all the possibilities of dealing with the tool, or the technology, in fact evolving this self-learning process through the tools and in fact mastering that with our own environment and economical unit as two individuals, that is crucial to me. (W. and S. Vasulka n.d.: 16)

Organizing the matter

Like other artists, the Vasulkas saw video material as a sort of independent, plastic 'matter' from which certain structures could be detached, making them accessible to the visual and aural senses of the observers. We can talk about a double existence of electronic images: the primary (virtual) state as a latent existence of the image in a shape of signal (or code), existing independent from its visualization; and its secondary (actual) state as created by organizing forces, such as synchronization pulses. The content of the image is the visualization of its underlying code. Virtual signal or code can be actualized through the process of its 'formation', when it gets depicted on the monitor. Each image arises from a continuous spectrum, existing as one of the possibilities of its actualization. Such an understanding is evident, for example, from the following excerpt of an interview with Woody by Jon Burris:

> Woody: [The television frame] indicates that there is a relationship between a code and its physical manifestation in space. It's a system which provides us with actual interface.
>
> Jon: It also gives us a kind of stability within a range of possibilities that are immensely broad. It's a construct for our perceptions, it's a construct for our cognitions. (W. Vasulka 1997: 32)

One of the video art pioneers, Stephen Beck, described the synthesizer as 'a filtration device in which, due to the proper selection of numerous electronic conditions, a given image out of the infinity of possible images results as a picture' (Beck 1975: 162). The

creator working with flexible electronic material generates an impulse: his or her task is to set up a situation and induce certain parameters, but the processing is necessarily shared with the machine, which further develops these parameters. Not without a certain irony, it is thus, '"the ability to turn the right knobs –" (Woody), "with the right piece of equipment." (Shridhar Bapat), which makes it "a new definition of the concept of the decisive moment." (Jud Yalkut)' (W. and S. Vasulka 1973). One of the most important characteristics of early video art was the cyclical character of electronic image, enabling immediate feedback, and many early installations played with the technology of the closed circuit. Here, the parallel with human consciousness and its functioning in perception is evident. Mathematician and physicist James P. Crutchfield from the Santa Fe Institute, a science research and education center, returned to the subject of feedback in the 1980s in his article 'Space-Time Dynamics in Video Feedback' in which he called the video feedback system a 'spatio-temporal simulator'. According to Crutchfield, feedback is an ideal testing space for developing and expanding the perception of spatial complexity and dynamical behavior (Crutchfield 1984: 191). For Woody, the discovery of feedback was one of his key early experiences with signal processing, and it underscored his awareness of the 'organic' character of the video medium:

> I had not seen anything like it before, and I was able to watch and observe this particular fire in a cave, as I called it, for days, which was always different and always fascinating. There is something that you know has other meaning in its ability to self-generate and self-organize. Of course, you can control it like you can control fire, but you cannot predict all its phases, you have no linguistic defense against this relentless process except by saying, 'It is like being in a dream.' And a dream it was. It took a few nights for my mind to deal with until, finally, a catharsis took place: 'You have been processed!' (Vasulka and Weibel 2008: 415)

Many tool creators and researchers of the time considered the new electronic equipment as new instruments of communication, or even tools for expanding consciousness. The strongly rooted belief that the structure of electronic tools reflects and shapes our thinking – that these are the tools which will challenge our mode of receiving the audiovisual information – was perhaps most decisively expressed in *Expanded Cinema* (1970), the influential book by Gene Youngblood devoted to the pioneers of experimental and computer film, holographic cinema, audiovisual media installations, and other forms of 'cinema-expanding consciousness'. In many places in the book Youngblood asserted that artists should invent or adjust the new tools to mediate their inner experience, their consciousness being formed at the same time by the new technology and by the experiments with new drugs (Youngblood 1970).[2] Above all, he claimed that it was the immediacy of the medium of television that gave rise to a belief in its potential of disclosing new relationships between the self and outer reality. However

vague the definitions of the character of this expanded consciousness might have been, this philosophy nevertheless remains one of the strongest prevailing myths of the period.

The group of image creators who concentrated on the 'inner parameters' of the video medium were labeled with the term 'image processing', generally understood as a research of the basic parameters of the electronic signal. These artists formed a certain (only later defined) group or style of video making, experimenting with video synthesis and signal manipulation, and inventing new machines that could employ techniques like colorizing, keying, switching, or various combinations of 'invented' techniques.[3] The aim of these artists, including the Vasulkas, Nam June Paik, Dan Sandin, Phil Morton, Stephen Beck, Ralph Hocking, and others, wasn't to produce art 'objects' – for example, in the form of finished videotapes – but to examine the process of image formation and the relationship of the creator with her or his own tool. The Vasulkas began to examine electronic signal parameters by violating the rules of input and output, purposefully introducing errors into the system to disclose its structural qualities. The inner functioning of the technology appears through a 'broken cable' when the frames dissolve and disclose the concealing mechanism itself. Through the imperfections, which at first came up accidentally, the creators learned about the functioning of the television medium, gradually gaining a greater amount of control. The new machine reality becomes a kind of Utopia:

> Our reality should be the one that we can dream about, be utopian about. This is all a paradox, because I don't know why I serve these machines, and certainly don't want them to serve me. But I do willingly submit myself to this process of working with them, letting them speak, letting them live. (Vasulka and Weibel 2008: 396)

In his most abstract works, aspects of Woody's story about his relationship to his own tools gain a somewhat radical form, particularly in his concept of 'One Scan Journey', where a work is limited to the description of the evolution of an image frame:

> […] the story contained in just describing the construction of the electronic field/frame could become the story of the 'One Scan Journey' or the 'Spaces' or 'Parallelity' that brings quite different esthetic experiences, encoded into different kinetic scales, as separate layers of drifting images, different rates of Flicker. The extended narrative possibilities of those seem perhaps banal at first site, but could become a fantastic opportunity to elaborate on the subject of 'abstract narrative' in Sharits's terminology. (Vasulka and Weibel 2008: 416–17)

However, although the results of the Vasulkas' formalist research of electronic material are primarily abstract, they often carry references to a larger cultural and social context, and also contain important autobiographic aspects. Woody's endeavor to bridge the spheres of culture and technology presupposes a detailed understanding of the character of the electronic medium. It includes a desire to suppress inherited aesthetic concepts,

which means not only leaving his career in documentary filmmaking and editing, but also entering a different sphere from the one he felt was more 'natural' in his own development. Leaving behind the secure sphere of more traditional approaches forces one to transform his or her own thinking, and the reflection of this process became, in Woody's case, the theme of his work.[4]

1. Early experiments

The New York City period (from 1965 to 1973, when they moved to Buffalo, NY) was for the Vasulkas a time of acquainting themselves with American independent art. Soon they were introduced to the medium of video, which eventually meant the abandonment of their work in film editing and music. The Vasulkas began to experiment with video 'full-time' in 1969, when they received their first portapak. For a short period (1969–71) they belonged among the devoted 'portapies',[5] documenting the 'off off off Broadway' scene of experimental theaters, jazz concerts, gay cabarets and street musicians, using the first portable video equipment introduced to the US market. These recordings became material for further use, being reworked or made parts of new works. The Kitchen, a free curatorial experiment providing one of the first venues for exhibition of the work of electronic media experimenters from various disciplines, was cofounded by the Vasulkas with Andy Mannick in 1971, and was the beginning of their curatorial and collecting activities.

1.1. Vision machines

After he arrived in New York in 1965, Woody worked as editor on the technical design of multiscreens for international world expositions. The important impulse for his break-up with cinematography was meeting Alfons Schilling, the Swiss-born artist who came to New York City in 1962 to try and find his way distinct from traditional art disciplines, and influencing Woody in this direction. In particular, Woody began to research the various manifestations of 3D imagery, such as holography, stereo-photography and 3D virtual spaces. Like other artists experimenting with new technologies, he also spent some time in the Bell Telephone Laboratories in Murray Hill, New Jersey, where he became acquainted with the work of Béla Julesz, a neurologist and experimental psychologist of Hungarian origin and the author of the book *Foundations of Cyclopean Perception*; Julesz influenced Woody's swing to autostereogram.[6] The stereo experiments constitute a part of the Vasulkas' work which has so far received little attention. Woody continued his 3D vision experiments later in his video work: a special tool for stereo experimenting was made for the Vasulkas by George Brown, and 3D imagery emerged with Woody's use of Rutt/Etra Video Synthesizer (also called the Rutt/Etra Scan Processor), where the frame itself can gain a shape of an

Figure 1. Tomiyo Sasaki and Ernie Gusella during an editing process in The Kitchen (1971). (courtesy. Steina and Woody Vasulka).

object floating in space. In Woody's installation cycle *The Brotherhood* (1990-98), there are 3D computer models, interrelated with the movements of a machine in physical space.

In the summer of 1967, Alfons Schilling and Woody moved to a loft at 128 Front Street in Lower Manhattan, and began to experiment with 'vision machines'. One of the instruments created by Woody was called Spider, a tool for recording the changes of parallax, enabling him to create a series of shots of the same object and producing a sort of 3D photo. They experimented also with stereo slide projectors, or two projections simultaneously on the same screen, whereby the rotating disc in front of the projector alternately interrupted the light flow, creating various 3D effects. Woody used adjusted 16mm Pathé cameras for experiments with a slit aperture; he removed the mechanism that moved the film inside the projector and closed off the whole lens except for a tiny hole in the middle, creating an early example of a slit-scan technique.[7] The experiments resulted in short (about four-minutes long) multiscreen films, *Aimless People*, *Peril in Orbit*, and the 360-degree *Three Documentaries*. An unrealized project *A Meeting/ Greeting* (1967), mentioned in a catalog of a later exhibition of the Vasulkas' work in Buffalo, was supposed to be an installation with two cameras located on a fountain. Each one of the cameras was automatically recording a 180-degree space of two people walking around the fountain.[8] Also, Woody experimented with sequential recordings with the use of stroboscopic light and with moveable turntables and projectors, which during the projection imitated and doubled the movement of film objects. The utopian aim of these experiments was to create a 'frameless cinema' and examine various ways of

presenting the observer in the observed; this early 'endoscopic modus' (observing one's own observation) to a great extent influenced the later work of Steina and Woody.[9]

One of the main aims of practical work, as well as theoretical thinking of the time, became the difference between film and analog video and digital 'framing'. Artists were trying to discover how the enclosing of the field of visibility occurs in various media, and what conceptual and perceptual consequences it brings about. In his essay 'The Frame' Woody writes:

> The positioning of the frame is achieved differently in each medium. In film, physical 'sprocket holes' position the film horizontally while the gate positions the leading edge vertically. In video, the image/frame is constructed from timing pulses prescribing the position of the lines and the axis of the frame. The timing pulses are encoded into the video signal to emulate the 'sprocket holes' of film and to position each succeeding frame in the precise place of the preceding one. (W. Vasulka n.d.)

The nonexistence of a stable frame is what differentiates film from electronic image: here the frame (image or field) is a flexible and changeable entity, which becomes visible only when an unexpected event, an error, takes place. Unintentional errors, resulting from the instability of the television signal, become constituent parts of the creative process. The Vasulkas' entry into video was influenced by the legendary exhibition of 'television art' 'TV as a Creative Medium', which Howard Wise organized in his gallery in May 1969. Among the group of New York artists participating were Paul Ryan, Frank Gillette, Ira Schneider, Les Levine, Aldo Tambellini, Nam June Paik and Eric Siegel; Siegel was one of the tool designers the Vasulkas later cooperated with in tool development. For many, the exhibition was the impulse to realize that working with a television image can provide new perceptual experiences, and can allow a great variability of manipulations. Jud Yalkut summarized:

> TV art imagery engenders multitudinous means of presenting itself upon whatever chosen monitor the presentation of a complete closed circuit system loop as a gallery piece, the modulation and distortion of received transmissions, the inclusion of the spectator as a visual link in the cybernated chain, and the eventual broadcast, through the air via cable, of articulated and composed video imagery. (Yalkut 1969)

Beginning in 1970, the Vasulkas began to experiment more systematically with feedback, and discovered one of the key modalities of their work: the possibility of interrelating sound and image, at first using an audio input for generating or altering a video signal. Thanks to the grant gained through the nonprofit media arts group Electronic Arts Intermix (EAI), the Vasulkas were able to finance their first activities, which were connected with a newly founded 'electronic media theatre', The Kitchen. The money from EAI was spent on the programming and rent of The Kitchen, and on buying and constructing their first equipment.[10]

2. Image processing: wave, the signal is coming

But the signal is a signal, that's what it is about. It's the signal. (W. and S. Vasulka 1985)

2.1. Video synthesizers: images versus sound

'Synthesizer video' (Gill 1976: 67) emerged at the end of the 1960s in close connection with the musical avant-garde. The development of the first video synthesizers was inspired by sound synthesizers, which many artists used; the Vasulkas owned the then common type of audio synthesizer, the VCS3, also called The Putney.[11] For the Vasulkas, crossing the boundary between audio and video synthesis was natural because of Steina's earlier musical education, and also Woody's musical praxis before he came to the States. Experiments with an oscilloscope (an instrument making visible

Figure 2. Steina and Woody Vasulka's 'open studio'; the photo is labeled 'From East Coast to West Coast' (1972). (photo. Warner Jepson; courtesy. Steina and Woody Vasulka).

the signal voltages) disclosed the fact that an electronic signal can be directly visualized in a form of waveshape, and influenced their structural approach to the video image. As John Minkowsky explains, the video synthesizer is 'a general term for a system of electronic modules that can generate and/or alter video imagery in real time' (Minkowsky 1978: 3). Several kinds of synthesizers can be distinguished; that the basic classification is into 'image processors' which use the camera input or prerecorded images and alter the parameters of the signal (e.g., the type created by Nam June Paik and Shuya Abe), and which typically also contain functions of colorizers, keyers, mixers and sequencers; and 'direct video synthesizers' (e.g., the Direct Video Synthesizer by Stephen Beck), which work without camera input creating (color) video signals only through electronic generation.

After discovering that the 'art materials' of their work were video and audio signals, frequencies and voltages, the Vasulkas found that working with video could be regarded as a continuation of sound experiments (Gill 1976: 83). Although the sound was never totally derived from image or image from sound, an image-generating signal often became a vehicle for generating or modulating sound, and vice versa. From the beginning, the Vasulkas insisted that their work was interactive, created in real time in the process of observing image behavior, and in the majority of their works from the early period, the image emerges, in a way, as a 'by-product' of sound. The artists tried to prove that electronic image and sound are of the same nature, only differently organized (the main difference is in frequency range, which in sound is more variable), and live audiovisual performance became the art form of the day. Apart from the Vasulkas, the foremost experimenters in real-time audiovisual performance were the key figures of the 'Chicago Circle', Dan Sandin and Phil Morton, and in California, Stephen Beck, the author of one of the first video synthesizers. Beck also considered his synthesizer (the Direct Video Synthesizer or DVS) not an instrument for making videotapes, but rather as the tool whereby he could 'play images as music' (Beck 1975). Dan Sandin was directly inspired by Robert Moog's ideas and the Sandin Image Processor (constructed in 1971–1973) was made as an analogy of Moog, version 2 (Sandin n.d.). The real-time aesthetics of the 1960s and 1970s is evoked in the contemporary audiovisual scene using algorithmic programming environments like Max/MSP/Jitter, Pure Data or Image/ine, or in 'livecoding' branches of current experiments when an 'artwork' emerges in real time in the process of writing and rewriting the software code (Yuill 2008).

2.2. Artists versus engineers ('New Americans')

Eric Siegel: Dual Colorizer; EVS

Eric Siegel, born in 1944 in Brooklyn, was a child prodigy; a techno-maniac who at the age of 15 made a closed-circuit TV system using outlet material, and a year later, the technical invention 'Color Through Black-and-White TV'; both these innovations

received prizes at New York Science Fair (Siegel 1970). As an artist, he introduced a video synthesizer at the above-mentioned exhibition of TV art in the Howard Wise Gallery, where he also showed a work created on it, called *Psychedelevision in Color*.[12] What was originally called a 'video effects generator' or 'magic box' became known as the Electronic Video Synthesizer (EVS); Siegel had created a prototype of it in 1970 in San Francisco. The EVS processed at first only black-and-white images, but Howard Wise, who wished for a color version for the exhibition, gave him money to create a system which would add color. Siegel accented above all the color intensity ('the colors are the most intense ever seen on any television monitor before') and the live aspect of the tool, as it could be used for audiovisual performances. The idea to create a tool for live video processing in the tradition of music instruments had appeared already in an early phase of Siegel's development of what became the EVS. Siegel considered EVS not only an analogy of a music instrument in the visual sphere, but also a tool capable of inducing altered states of consciousness, for example, by using the tool to influence the flicker rate of a television image (Siegel 1992). He was also interested in biofeedback, and suggested using his synthesizer for observing the neurological reactions on 'self-activated' patterns.

Another tool which Eric Siegel created was the Dual Colorizer, a tool assigning 'artificial' color to black-and-white images according to differences in a gray scale. The user can, in real time, choose images with specific intensity and can determine into which image sections to place them. The Vasulkas were two of the artists who used Siegel's colorizer as part of their equipment for video image manipulation, and Siegel also helped Woody to set up his own colorizer (Furlong 1985). In works like *Black Sunrise* (1971), *Distant Activities* (1972) or *Home* (1973), the Vasulkas typically applied vivid and rich synthetic colors. Siegel further improved his colorizer later, adding additional circuits and improving its controls.[13] Siegel, one of the 'new Americans' (as Woody called the first tool makers and artists who naturally understood the sound and image synthesis), is also author of a notable video travelogue series made in India. When Woody asked him if he felt like he was an artist, he answered that he considers himself more of an inventor in the lineage of Nikola Tesla:

> Howard Wise wanted to label me as an artist and I was, you know, young and rebellious, and I didn't see the advantage of being labeled an artist. I was trying to tell at least Howard Wise that my work was more like a Nikola Tesla or some experimenter that's not just into art. (Siegel 1992)

'Tool person' George Brown

> George's instruments put us right into the middle of media experimentation. To us they felt very sophisticated and, just as with digital tools and the computer, we never reached the bottom of the trunk. To me a good tool generates its own secrets at a much greater rate than it discloses them. (Gill 1976: 130)

The tape called *Evolution* (1971) is a play with retiming of the image, in which the horizontal and vertical synchronization pulses get 'in conflict.' Woody mentions that the work was decisive for the early period. The first part of it is created using video feedback in which variable image signals control sound synthesizers; the second part – containing a 'film strip' with the evolution of a man drawn from biology textbooks – shows a horizontally and vertically deflected frame. In the third, light rays are generated with the use of a sound synthesizer (Vasulka and Weibel 2008: 411). The tool called a Horizontal Drift Variable Clock (1972), or so-called drift clock, is an oscillator circuit providing an external source of synchronization, which enabled control of the horizontal movement of image, thus 'drifting' the image from its frame. It was George Brown, another distinctive technical workmate of the Vasulkas, who constructed the drift clock. Horizontal drift is part of the original Vasulka repertoire. While in *Evolution* the drifting event was still a pure chance occurrence – the 'broken cable', which results here in the accidental horizontal frequency deflection with a variable clock – it was possible to control the drifting frame, change its velocity or direction, shift it up and down or to the sides or diagonally to illustrate the 'plasticity' of an unstable video image. Considering the images used in the second segment of the work, the story of human evolution is related with the story of going 'out of frame'. Woody described the work as such:

> A piece called later *Evolution* was our major aesthetic breakthrough. We found out, if you have two cameras, one locked into the ordinary sync, horizontal and vertical signal, and another which would be either superimposed or keyed, if you fed a different horizontal frequency into the camera keying over the other, the image would horizontally flow either left or right. (W. and S. Vasulka 1973: 10)

The Vasulkas approached video as a space phenomenon, and from the beginning tried to show their works on multiple monitors, using the same horizontally proliferating imagery. Their installation works from the beginning of the 1970s, such as *Calligrams* (1970), *Matrix I* and *II* (1970–72), or *Discs* (1970), where it was as though the image is stretched across a bunch of monitors, further disrupted the frame. In *Discs*, the visual motif of a semi-circle is used, into which smaller film roll circles enter in a continuously accelerating rhythm; the time delay of repeated signal inputs results in an almost abstract pattern.

George Brown, a Vietnam veteran of Hungarian origin, developed three decisive tools with the Vasulkas: in 1971, a switcher (sequencer); in 1973, a Multi-Level Keyer; and one year later, a Programmer. These new tools already suggested a less intuitive and more analytical approach to image making than with previous tools. Switchers and programmers are tools enabling an artist to program certain rhythms in connection with sound, and a keyer broadens the possibility of working with various image layers at one time. Returning to the early experiments with Alfons Schilling concerning binocular perception, the development of the Video Sequencer (George Brown's Video Sequencer

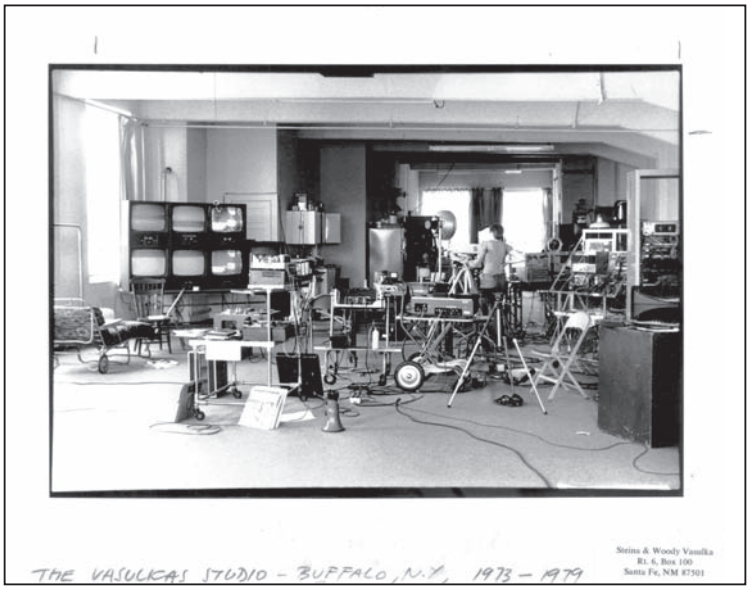

Figure 3. The Vasulkas' studio in Buffalo.
(courtesy. Steina and Woody Vasulka).

alias Field Flip/Flop Switcher) was inspired by the desire to further analyze the image-forming process as a subsequent depiction of individual frames. The tool enabled the two fields creating the image frame to be treated separately; the digitally controlled switching between two sources could be tied to various parameters such as rhythm or sound vibrations in various rates. The switching process could be triggered by vertical synchronization pulses of video or by outside audio or video signals generated by a different tool (Gill 1976: 130). For example, the Vasulkas used sequencers in the work *Home* (1973), where they switch between two camera inputs depicting home objects, completed with the interrelation of sound and video signals. In *Noisefields* (1974), the switching is between the background and the circle in the middle, which constitutues the only visual 'content' of the work. One of the fields always contains pure color, while the other contains only video noise.

The Multi-Level Keyer was made for manipulation of more image layers. While ordinary tools of the time provided a two-layer input, the analog Keyer made it possible to work with six inputs at the same time. The tool, consisting of a digital 'key priority encoder' combined with analog keyers/mixers, received and lined up single inputs and placed them in image layers with various space relationships. In real time, it was possible to 'cut out' parts of the images and replace them with new ones. The user chose the brightness level of the boundary between two sources, and parts of the image above or below this level were replaced by a different image input. The tool was used in *Vocabulary* (1973), where electronic textures permeate the depiction of a sphere and Woody's hand moving

above it. *Vocabulary* is an important work, which in its simplicity clearly demonstrates the early approach made possible by the Keyer, the echoes of which will appear in later works. Dialogue with the tool is described here with the shot of the artist's hand catching up to itself as electronic rays, as if tempted to leak further into the electronic spheres. In the somewhat didactic works *Solo for 3* (1974) and *1-2-3-4* (1974), the 'layering' of objects (numbers) of various sizes takes place, which causes illogical space relations. The illogicality of the space in video was commented on by Dan Sandin in his video demonstration, *Triangle in Front of Square in Front of Circle* (1973), where he explains that it is wrong to use concepts from common language to describe what happens on the screen:

> You cannot refer to image planes as in front of or behind, etc., that is just an illusory human perception. The Cathode Ray Tube knows nothing of this, I can prove it to you. Shortly thereafter we got a tape in the mail illustrating that what appeared as a

Figure 4. Steina's face processed in the work *Time/Energy Structure of the Electronic Image*. (courtesy. Steina and Woody Vasulka).

> circle in front of a square with a triangle behind the square, simultaneously showed the triangle in front of the circle. (Gill 1976: 132)

Both above-mentioned tools already contained some digital programming elements.[14] Because the automatization of the process of working with the keyer was needed, the Vasulkas asked George Brown to construct a programmable instrument, able to pursue a sequence of operations. The first wholly digital tool, Programmer, could control the functioning of the switcher or keyer, store operating sequences and activate them in any given moment. Rapid switching appears, for example, in *1-2-3-4* or *Golden Voyage*. In later works from the 1970s, as with *Switch! Monitor! Drift!* (1976), *Orbital Obsessions* (1975-77*)* or *Machine Vision* (1978), Steina experiments with switching between various camera viewpoints in real time.

2.3. Buffalo: 1973–79

In 1973, the Vasulkas moved to Buffalo, as Woody was invited to teach at 'the first department of media art ever to be established at a university' (Vasulka and Weibel 2008: 13), the Center for Media Study at the State University of New York at Buffalo (SUNY Buffalo), founded by Gerald O'Grady in 1972. It was certainly a unique environment in its attempt to create a sort of dream faculty consisting of some of the most original moving-image makers of the time; the Vasulkas worked there (Woody became faculty member in 1973, Steina in 1977) together with experimental filmmakers Hollis Frampton and Paul Sharits, documentarian James Blue, and musician and videomaker Tony Conrad.[15] Although these artists were strong individualists and mostly concentrated on their own work, some mutual interaction and cooperation occurred.

2.4. Rutt/Etra and its use by the Vasulkas

The effect of a vertical 'stretch out' of video's image lines, producing an illusion of 3D shapes, emerges from the use of a scan processor called the Rutt/Etra Video Synthesizer, named after its inventors (Minkowsky 1978: 5). The Vasulkas belonged to a group of key users; Woody partly constructed his model himself because he couldn't afford to buy the complete set.[16] Woody emphasized that working with the R/E pointed him towards a didactic approach:

> Improvisational modes have 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 element – the waveform. (Vasulka and Nygren 1975: 8)

The Rutt/Etra, which Steve Rutt created with Bill and Louis Etra in 1973, is an analog system controlled by electronic voltages, which enables the manipulation of distorted signals in real time.[17] The camera image is replayed on a small, built-in, black-and-white monitor adjusted for processing the television raster through 'deflection modulation'. The Rutt/Etra alters the regular scanning pattern, and this altered image is then recorded using an external camera to gain the right timing information again.[18] While the visual part of recorded reminiscences gets deformed (among them Woody's Moravian cottage with scanned chicks in *Reminiscence* [1974], shots from the city in *Telč* [1974], or street-view with cars in *C-Trend* [1974]), the real sound remains untouched. There is a different relationship between image and sound than in previous works; the elements do not influence each other but are in contrast – sound remains the connection with reality. The camera imagery is deformed in such a way that the image lines follow the contours of the depicted objects. Not only do lines deform the process, but also the shape of the frame itself gets violated: in *C-Trend*, the street-becoming-object turns over its axis in an empty space, receives shape from a left-to-right rotating surface, and finally gets slanted. The empty space among the objects is filled with video 'noise', in this case created by blackout intervals which normally fill the 'gap' between the scanning of singular fields.[19]

The video frame is also suspended in an electromagnetic field in *Grazing* (1976), where the recording of sheep on an Icelandic pasture gains a cylindrical, moon-like shape. *No.25* (1976) is not the result of camera imagery, but of an empty television frame: the image information (noise) is curved into a cylindrical shape of circles shifting up and down; the compressed lines become visible, accompanied with the internally generated synchronized sound. The Vasulkas used the Rutt/Etra as part of a larger tool set in other videos; for example, in *Soundsize* (1974), the pattern of points is modulated by the synthesizer-generated sound, and at the same time influenced by scan processing, which makes the point area lift, creating 3D shapes. The effect is similar in *The Matter* (1974), where the abstract shape is variously curved in relation to generated waveforms in sine, triangle and square shapes. Later, Woody uses the invented video effects in the service of narration in *The Commission* (1983), a story about the relationship of two artists, composer Hector Berlioz and violinist Niccola Paganini: the stretched-up lines appear in the final scene in a mortuary, where Paganini's body becomes a moving clutter of colored lines as if deprived of its physicality. Moving 3D objects in *Art of Memory* (1987) refer to the spatial metaphors of antique memory techniques as described by British historian Frances Yates (Yates 1966). It seems as if here for the first (and perhaps last) time the technology was used as a connection with narrative content.

Beginning in 1974, influenced by working with the Rutt/Etra, Woody became interested in a theoretical reflection of his work with the electronic image. The raster imagery photo recordings called *Time/Energy Structure of the Electronic Image* (1975–76), provide a simplified encyclopedia of effects enabled by a scan processor. Part of the cycle was published in 1975 in *Afterimage*, with the article Woody wrote together with Scott Nygren called 'Didactic Video: Organizational Models of the Electronic Image'

Figure 5. Woody Vasulka shooting *Art of Memory* (1985). (courtesy. Steina and Woody Vasulka).

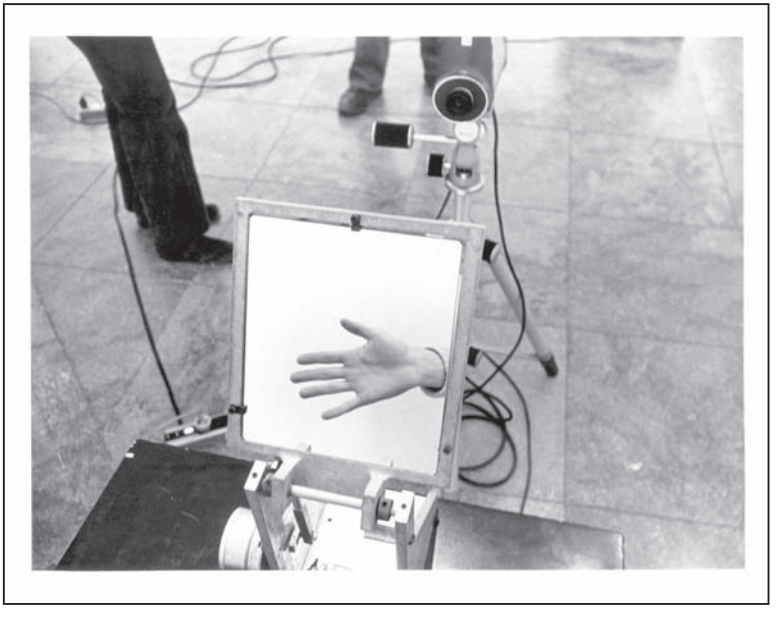

Figure 6. From the exhibition 'Vasulka. Steina – Machine Vision, Woody – Descriptions' organized by Linda L. Cathcart at Albright-Knox Art Gallery, Buffalo, NY (1978). (courtesy. Steina and Woody Vasulka).

(Vasulka and Nygren 1975: 9). To be able to fully grasp the process of image generation, Woody used a series of static images describing the electronic image step by step; he repeated the process later with digital imagery. His chosen basic elements, simple waveform shapes (sine, triangle, square) and camera inputs (Woody's hand and face), went through several stages of scanning deformation, creating a certain encyclopedia of effects at hand.

2.5. 'Color-Frames-Analysis Machine' (for Paul Sharits)

In Buffalo, Woody became more interested in a theoretical elaboration of the difference between film and electronic image. The effort to make a theoretical summary of experiences with electronic images to that point is documented in the transcript of lectures, which Woody presented in five May evenings of 1976 (Vasulka and Weibel 2008: 411–19), and in which he tried to suggest the necessity of inventing a new language to talk about electronic material. Woody also mentions the work of Paul Sharits, one of his faculty colleagues, and Sharits's desire to 'free the film frames' by way of rerecording a tilted filmstrip repeatedly put in the film gate. Woody shared Sharits' interest in defining the basic elements, the 'essence', of the medium. The main objects of Sharits's 'abstract narrativity' are elements usually hidden in cinematic presentation such as film perforations, the flatness of the screen or film frames. For Sharits, who is one of the key agents of 'flicker film', the fascination with the question of 'what happens between images' was as crucial as it has been for Woody.

Inspired by the dialogue with Sharits, Woody constructed a tool for manipulating colored frames. The grant application for 'Vasulka/Sharits Stroboscope Project'[20] describes the device for creating 'color-field motion picture films' by programmable color mixing. A time-setting machine was found at the dump in Horseheads, a city in upstate New York; the machine included a stroboscope, which was used for constructing the tool, which in turn enabled the creation of color sequences from an RGB filter (Dolanova 2008). A computer interface, using an algorithm created by another member of the Buffalo crew, Tony Conrad, was used to control lights and frame advances of the camera, and to reproduce the color scale onto 16mm film. However, Paul Sharits was not interested in the tool as much as Woody expected, preferring the handmade creation of the scores and their subsequent animation. Woody returned to the idea of the device later during the exhibition 'MindFrames' at the ZKM Center for Arts and Media in Karlsruhe, Germany, where, with the help of media artist and scientist David Link, he prepared a program for generating colors on the basis of Sharits's work. The visitors could repeat the creative process of making color flicker films using video analysis stations.[21] However, Woody's lasting sphere of interest in 'what happens between very fast frames' would require further research on the border of electronic arts and the science of perception.

3. From analog to digital

One of the subjects of the above-mentioned lectures is the transfer from analog to digital processes, which was dealt with on a practical level by both Steina and Woody in the process of constructing and testing their first digital tools. The transfer to digital systems brought the necessity of dealing with a new language of codes, and the 'syntax of binary images' changed the character of the dialogue with the tool. Woody mentioned that the necessity of translating the analog continuity into 'digital leather' was a 'little tragic moment', when the world of complete control and self-sufficiency was replaced by the world of computer programming which required a much larger amount of cooperation (Dolanova 2008). Woody dove into the world of optical fibers to find the worlds of new poetics, awaiting the exploration *and* explanation.

3.1. Digital Image Articulator

At the beginning of the tape *Cantaloup* (1980*)*, Steina, Jeffrey Schier and Woody sit behind the table. We hear Steina's voice, explaining the development and (planned) use of the tool called Digital Image Articulator:

> In the summer of 1978 we decided to build a digital image tool. In the tradition of video, our work with the computer had to result in an instantly moving image, which would involve a large amount of numbers in real time. (S. Vasulka 1980)

Figure 7. Steina with her *Machine Vision* installation at the Albright-Knox Art Gallery (1978). (courtesy. Steina and Woody Vasulka).

Following this is the shot of a working table, and Woody and Jeff discussing what is seen:

> Jeffy took the challenge to design such a tool which took 18 months from its inception to where it is now, which is by no means finished. Some 20,000 connections were wired by Woody and the device expanded from the planned four boards to eight. (S. Vasulka 1980)

A shot of Woody wiring and the description of the digitizing process follows the one described above; the image is 'sliced' into sixteen numerical values from the brightest to black. The proclaimed desire of the artists to 'look behind the image' was about to lead to the discovery of how the image is expressed by digital code. Woody's head appears in many colors, a hand is typing on the keyboard and the image gets transformed into a black-and-white version. Steina explains pixels and how you work with them: a shot of the street appears, at first not manipulated, later modified, 'briefly held in memory' and thus pixelated. 'Enter a character to grab the frame': Steina's face is being 'frozen' and pixelated by typing the commands on the keyboard. In the next sequence, the image of Woody is multiplied and his fourfold face is subjected to interruptions and pixilation in four time variants. Finally, everybody's image is subjected to multiplication: Woody engaged in 'absolutely senseless movement' of hand waving; Jeffrey playing with the sphere and blinking; and Steina prompting Woody to give her the close-up of her eyes. The work expresses a fascination with the fact that there is still real time, that you can 'see

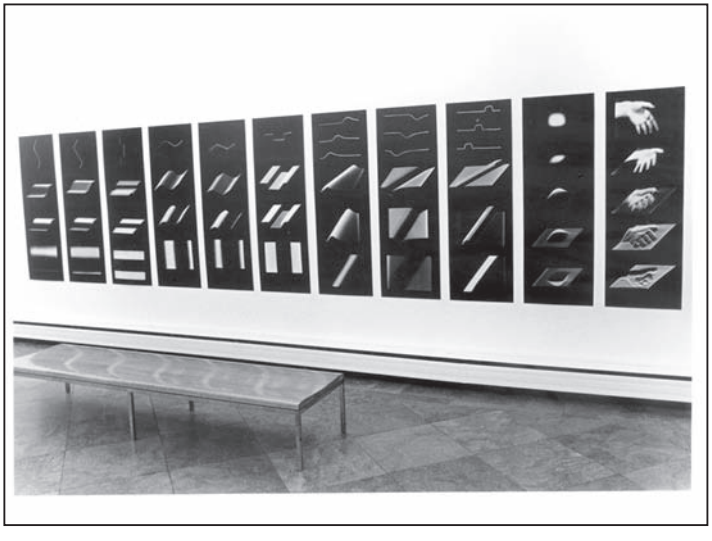

Figure 8. *Descriptions* by Woody Vasulka at the Albright-Knox Art Gallery (1978). (courtesy. Steina and Woody Vasulka).

the phenomenology of frame and field', and also do things that were not possible in video, like freeze the image in any moment or deal only with a specific part of the image.

Woody and Steina collaborated, beginning in 1975 with the physicist Don McArthur, computer scientist Jeffrey Schier and musician and programmer Walter Wright to build the tool, originally called Digital Image Processor, from which the Digital Image Articulator (DIA) later developed.[22] The main function of the Articulator was to process coded images in 'interactive real time' by transferring analog images into digital. The key was the requirement of real-time dynamic processing, even though at the beginning only low image resolution was possible, because the Vasulkas wanted to follow their modus of observing the system and working with images in real time (W. Vasulka 1978). The Vasulkas tested the DIA between 1979 and 1987, but it remained in a prototype stage. In a manual from 1979 written by Woody, Jeffrey Schier and Tom Moxton, they describes its functioning: it processed encoded images, transferred analog to digital, turning video signals to logical values of binary code. This numerical 'image' content was scanned and stored by a system of eight frame buffers in such a way that each light value was assigned a numerical value in a matrix of 128 x 128 pixels. Then various processes like image inversion, compression and frame expansion, outlining, changes of contrast, and pixelation were possible, including experimenting with feedback of programmed digital effects (Vasulka, Schier and Moxton c.1979).

As with processes of an analog world, Woody tried to explain the process of digital image development in a didactic way. In the text 'Syntax of Binary Images', published in *Afterimage* in 1978, Woody described his first encounter with digitally organized imagery, where the operations of binary code became a principle of image processing (Hagen 1978). Part of the article was an image tableau depicting the alterations emerging from the interaction of two structures in an arithmetic logical unit (ALU); the aim was again educational and by no means narrow in order to create a 'universal image score'. The ALU could carry out operations on two sets of 4-bit inputs at the same time, so the image groups A and B were used. The whole set consists of Tables 1–13, each including 16 images, resulting in 16 various arithmetic operations in different resolutions.

The work with the Articulator is documented in the tape *Artifacts* (1980). The transfer into the digital sphere is visualized in the shot of a sphere, which is subjected to pixilation, and we hear Woody's commentary, part of which is a famous declaration:

> 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 come to me, in a spirit of exploration. (W. Vasulka 1980)

Then he encourages the viewers to blink their eyes, move their head, freeze and unfreeze the tape a few times while watching it, and thus metaphorically participate in the process of image forming. A black-and-white image of Woody's hand appears, the outlines of which spread over the surface, covering more and more of it until it is completely

covered. While the first part of *Artifacts* reminds us of *Noisefields* in the relationship of the circular surface or hand to the 'background', the following colored section with the shot of Woody's hand in front of the sphere refers to *Vocabulary*. In another part, the shot is multiplied; a shot of Woody standing in the kitchen is zoomed in and out and shifted to the sides, then switched in synchronization with the sound. Finally the whole image is stretched vertically and horizontally until it reaches complete abstraction. In another multiplied image, a speeding zoom causes the images to look like a surface of vibrating spheres. In a following color shot, the sphere is filled with the black-and-white 'reflection' of the whole, and the movement of Woody's hand above the sphere is repeated inside it. This folding of the image into itself evidently refers to *Vocabulary*, where the hand was getting light beams out from the sphere; here Woody has the image as if in his hand and his movements influence the movement inside the sphere. *Artifacts* visualizes the possibilities of digital image manipulation and also the relationship to the analog sphere, especially by using the same initial imagery (sphere on background, hand, face), which makes this link evident. The elements descend into a detailed image analysis of the digital world as it discloses a larger amount of control. The working description for the DIA states:

> In computer imaging our attention to composition has almost all been consumed by a concentration on a single field formation. The density of events associated with this action, vocabulary, and a presence of a strong imaging myth, has fully satisfied our need for narrativities. We have directed all our attention toward that territory. (Schier 1978)

The minimal imagery put in the context of the digitizing process results in a typical, almost surreal magic in these first digital works. As in previous analog works, within the digital sphere a large part of the work consists of documenting the artists' relationship with the tool, and the process of 'testing' the tools remains the major concern of the artists. The bridges of analog and digital are visualized also in Steina's *Selected Treecuts* (1977) with its periodically stopped and pixelated shots of trees, or in *Bad* (1979) in which Steina works with the shot of a woman's face in correspondence with sound and image (audio signal decides when and how the images stored in computer memory appear on the screen). In the work *In Search of the Castle* (1981), created together with Woody, pixilation is used in 'narration' about the journey into the digital sphere, which becomes more and more overwhelming. Also in *The Commission* (1983) there are the sequences referring to the work with the Articulator: for example, the initial part with the image of multiplied hands and the dead body of Paganini; sequences of rapid switching between two video sources in which Berlioz, dressed in a white suit, mingles with pixelated landscape and clouds; or in the final scene of Berlioz alternately talking and playing harmonica.

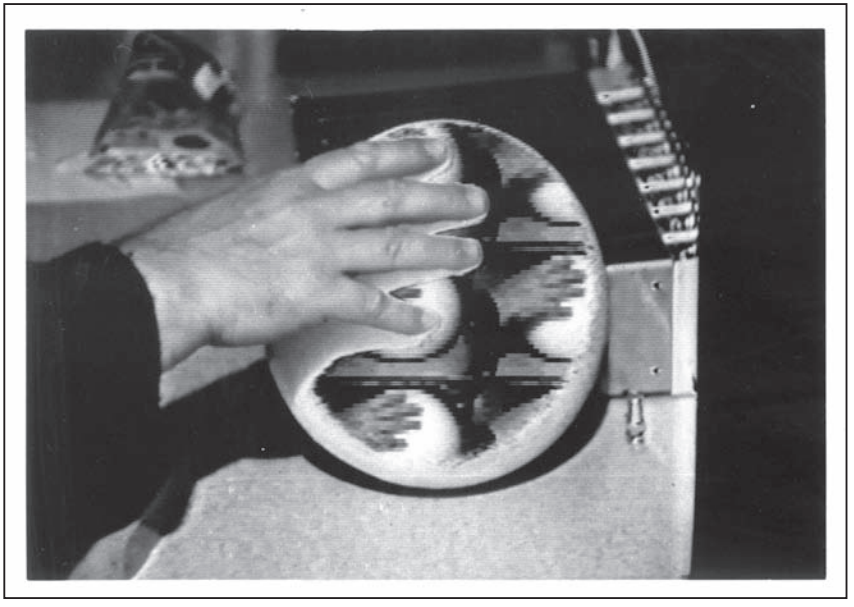

Figure 9. Screenshot from *Artifacts* by Woody Vasulka (1980).
(courtesy. Steina and Woody Vasulka).

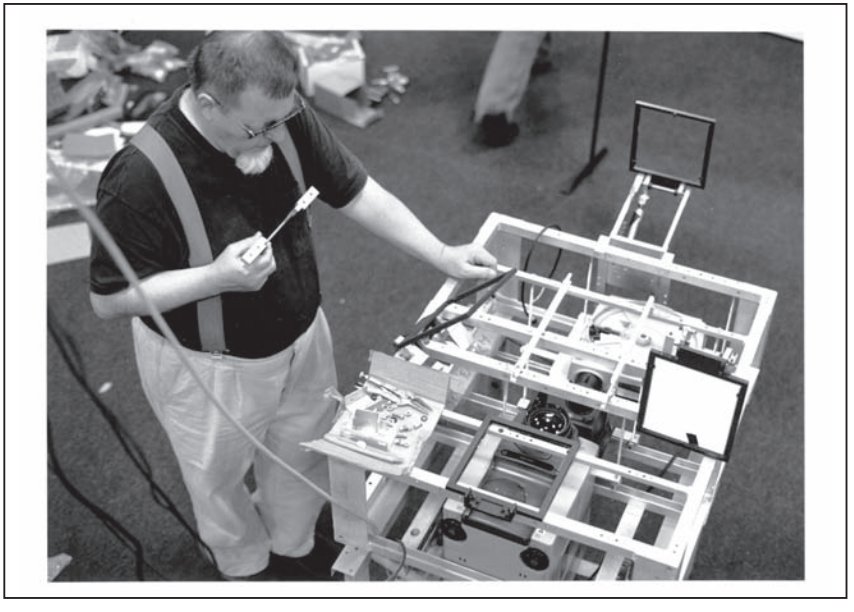

Figure 10. Woody Vasulka working on *The Brotherhood*.
(courtesy. Steina and Woody Vasulka).

4. Santa Fe

The Vasulkas have been living in Santa Fe, NM, since 1980. They discovered that the environment there is suitable for working and contemplation, with their custom-made adobe house-studio being constantly filled with cassettes, monitors, (parts of) installations, computers and found equipment that Woody had been collecting since the New York years. After the narrative opuses of the 1980s, such as *The Commission* (1983)

Figure 11. Woody Vasulka with *The Maiden* (Table 6 of *The Brotherhood* installation). (courtesy. Steina and Woody Vasulka).

Figure 12. Woody and Steina Vasulka and friend, Santa Fe, NM (c. 1992). (courtesy. Steina and Woody Vasulka).

and *Art of Memory* (1987), which in a way summarized the invented analog and digital effects, Woody began to construct his series of robotic installations, *The Brotherhood*, at the end of the 1980s. Conceptually *The Brotherhood* followed the experiments of the 1960s and the cycles of *Machine Vision* created by Steina in the 1970s. In this work he is also reflecting his childhood collecting of airplane gadgets and his previous experiments with physical engineering (W. Vasulka 1996: 65–72).

4.1. Demons in the tool: *The Brotherhood*

Woody's essay on male inclinations towards war, ironically titled *The Brotherhood* consists of six 'Tables'; the first was the piece called *Theatre of Hybrid Automata*, and another followed in 1990–96. The work engages the machine's leftovers, 'idling in the junk fields of the Southwest, their electronic nervous systems, their hydraulic and pneumatic networks, ripped apart and bleeding' (W. Vasulka 1996: 65). He decided to cannibalize them and their structural intentions so that their 'spirit' is reoriented for the cultural purposes of navigating in image space. Parts of the equipment were brought from Buffalo by Woody, others were gained in auctions, and some came from Black Hole in Los Alamos. The whole cycle was exhibited at NTT InterCommunication Center in Tokyo in 1998.[23] The installations use hybrid optical, mechanical, robotic, and pneumatic systems in connection with digital technology, and work with the discrepancy between traditional cinematographic space and the new digital space. Woody cooperated with software designers Russ Gritzo and Tim Odell, system administrator Bruce Hamilton and robotics technician Roderick Peyketewa.

Woody's underlying aim to touch the possibility of autonomous machine behavior refers to the literary works by Czech sci-fi predecessor Karel Čapek, who became famous

for using the word 'robot' for the first time in 1920 in his drama *R.U.R.*, which revived the subject of a machine-android revolting against its creators, then finally showing some naturally developed intelligence and feelings (Čapek 1990). Russ Gritzo wrote in his catalog essay about *The Brotherhood*'s 'soul in the machine' (Gritzo 1999: 113–15), that Woody decided to establish a means of communication among the various devices in space, 'ranging from sensors to musical instruments to robotics'. The software called Intercom translates output from system devices into commands that each of the other units understand. The next level was added in 1997, when the operating system UNIX added the level of 'authenticity' to the machine, and the 'Actor' architecture emerged:

> In essence, an Actor is a stand-alone, real-time software program that takes 'cues' from the real-world and delivers them as commands to real-world devices, according to its programming. The goal of Actor architecture is to provide a means in the software that, like a character in a drama, will perform a single, predictable role. Once activated by the stimulating device, the Actor communicates a specific response that results in a specific behavior. (Gritzo 1999: 113)

Actors can also communicate with other Actors, and while each Actor functions in a predictable manner, Actors show an 'organic' behavior. Russ Gritzo explains:

> I particularly enjoy the 'biological analog' invoked by Actor architecture. A network of loosely related, atomic processing units cooperating to bring about a high-level behavior, is very close to the structure of simple biological systems. The use of this 'connectionist' model as part of the art's implementation is one of many unique features of the Vasulka systems, which are, in fact, authentic down to the lowest software level. (Gritzo 1999: 115)

The fact that the operational procedures of these electromechanical devices are not 'psychologically dependent', as David Sears Mather stressed (Mather 1999: 105), is probably the key feature for Woody, who tries to 'disclose' a sort of intelligence in the machine, find 'demons' operating within it and dialogue with them. He mentioned the inspiration gained from Russian theater innovators from the beginning of the twentieth century (e.g. the biomechanics theory of V. E. Meyerhold), who advances the idea of a global theater system where actors should become closer to machines – their locomotive apparatus mechanized – while at the same time being able to observe and reflect their own position as actors (Dolanova 2008).

The military hardware of the first of *The Brotherhood* works, *Theater of Hybrid Automata*, orientates itself thanks to a rotating camera assembly (a robotic gyroscope used for missile navigation) in the middle, monitoring 360-degree space, and operating in the environment surrounded by four target screens. A synthetic voice states the position of the head, and a video camera sends the image of phased installation observation into the

projector; the real projected images are alternated with 3D computer-generated models. The whole piece is network-connected so that it can be operated and controlled from a distant place. Woody builds his installations in this way because he wants to see how they function as a part of his continuous life laboratory. His concept of interactivity is different from the common use of the term; he intends that the activity of the public consists more of sensing the inner working of the machines than any real interaction with them.[24] The visitors can only aimlessly wander in the space given to them; they are confronted with the inaccessibility of these machines and lost in their space. Few hints of interactivity are provided, such as in Table 3, *Friendly Fire*, where the drum pads enable choice between the scenes and different speed and direction, so that the viewers can play with the recordings of a friendly-fire accident from the Gulf War when the American troops were mistakenly attacked by their own army.[25] Also *The Maiden*, the most anthropomorphic of all the Tables, dedicated to women nursing the wounded soldiers, can be controlled by sounds and Woody often cooperates with Steina, who has 'played' Woody's work *The Maiden* with her digital violin. No more concessions for the untrustworthy public:

> But this is maximum I could give to my audience. Am I happy about it? Of course not, because in some strange way they get into their own spasmodic modes and then they simply destroy the work. But it recovers and comes back to its own good old cycle. (Kirby 1997)[26]

5. Re:frame

The story wouldn't be complete without mentioning the archiving projects by the Vasulkas, for which they have also been developing some new techniques and methods, becoming among the most important archivists of the early historical period of video art and electronic culture. Their almost obsessive desire to collect and contextualize these phenomena stems from the belief that they have participated in the key chapter of twentieth-century media art history. Their motivation also includes the desire to create a history (or mythology, sometimes) themselves. Collecting has been present in their activities since the 1970s, when they began to collect information documenting the emerging avant-garde of electronic arts: texts, photographs, interviews (preserved as audio recordings or at least as transcripts), videotapes, and so on. From their first efforts in the 1990s, they continue with projects that evaluate the achievements of makers from the early period of video art. For example, invited by Peter Weibel, they prepared the exhibition 'Eigenwelt der Apparatewelt: Pioneers of Electronic Art' devoted to sound and image processing tools for the 'Ars Electronica' festival in Linz, Austria.[27] Their last large activity was the exhibition project 'MindFrames', in cooperation with Peter Weibel, prepared for ZKM in Karlsruhe and devoted to a group of creators centered around the media arts organization Media Study/Buffalo and the Center for Media Study. Through this project, they tested the possibilities of curatorship from a distance.[28]

The dialogue with the (demons in the) tools has been morphing; often the leftovers, the suppressed motives, leak in some form into the Vasulkas' artworks, but the main themes remain the same throughout their art-making histories. These themes were especially: real-time audiovisual synthesis; 'home-made' development of tools; and observing their own interaction (*Machine Vision*). Vasulkas' early period of experiments with portapak video cameras and the first synthesizers was one of intensified spontaneity that was typical for encounters with new media, when discoveries often occurred by accident. They got out of this phase quickly. The first of George Brown's programming equipment signified the step towards gaining more control; the Vasulkas were no longer just observing, but trying to force the tools to do something that could be to a certain extent predicted, but still only to a certain extent controlled. In the middle of the 1970s, Woody had a growing desire to look back, to step out of the process and analyze his own dialogue with the machine; this desire manifests itself in Woody's writing from the period. In the 1980s, the techniques and tools that Woody examined perviously were suddenly used in narrative videos – *Art of Memory* and *The Commission* – for creating works with real actors. In these works, the question is asked if, after so many years of Woody's preference for 'machine vision', narration is still possible.[29] With the entry into a digital medium comes the realization that he cannot control the creative process completely, and that cooperation is required in every phase of the tool creation. It is perhaps significant that the human body gains even more prominence in the Vasulkas' first digital tapes: the testing material consists almost solely of the recordings of Woody's hand, his or Steina's body, or studio interiors. Later tapes are increasingly accompanied with spoken commentary explaining what is happening on the screen, and the role of the artists as interpreters is thus being continuously confirmed. Also, the Vasulkas increasingly refer to their own previous analog works, making the circularity of their working process obvious.

Toward the end of 1980s, the first of the 'Tables' from the robotic brotherhood emerged. Here, the 'machine vision' and its observing gained another level. The effort to induce a sort of independent behavior coincides with the desire to have a theater to play with in which the actors are mechanized – controllable but at the same time unpredictable. Woody's idea of a total laboratory of life includes the observation of himself interacting with machines (interacting sometimes with the real 'actors'), while he situates himself in a special territory, that of an observer-commentator or interpreter of this new digital space. He admits that there might come a day when his control will be lost – a time for which he waits with curiosity. In the introduction for this essay I quoted Woody's probably slightly ironic statement about machines becoming more and more demonic. His statement recalls, among others, the idea of Pandemonium by a herald of artificial intelligence, Oliver Gordon Selfridge, who imagined consciousness as virtual machine, in which various homunculi – demons[30] – argue to reach a consensus. How much of our life we will deposit into technological structures and how poetical and human-like these will become can be perhaps enunciated by the next generation of scientists from fields like DNA computing. The dialogue with 'spiritual machines'[31] will have its attractions and will perhaps also result in some form of art. Woody once declared:

Early

At first we looked at video as a singular discipline. We, as well as the others, used wide register of genres, from work with abstract electronic imagery to documentary forms in a tribal aesthetic unity, escaping serious division plaging other media, namely film. The portapack itself was a dominant and unifying tool for all.

We were introduced to the alteration of Video images through the basic equipment available. We could manipulate the scan lines by changing the deflection controls of the monitor, use the recorder to freeze frames, advance or backtrack tapes manually and look into processes within a frame (Decays I, II). We learned forced editing and asyn-chronous overlays on the first generation 1/2 inch video equipment (CV) and practised all methods of camera/monitor rescan, the only way for us to capture and preserve the violated state of a standard television signal. Progressively, through new tools, we learned the principles of generating and processing of images, having access to internal structuring of the video signal itself.

A decisive tool in our early collection was a sound synthesizer (Putney) which pointed us in the direction in sound and image generation and in a mutual inter-hangeability of both.

Most significantly, we used a matrix of video screens to relate movements of video frames, a function of time, from which the horizontal relationships lead us to a more environmental understanding of video.

In the Fall of 1970, we laid down a cable from our loft on 111 E. 14th St. in New York City, over the roof of S. Klein department store, to 101 E. 14th St., the studio of Alphons Schilling, to experiment for a short time with one-way video and two-way audio transmission.

By 1971, it became obvious, that we could not accommodate the traffic of interested people, visiting our studio. We decided then to establish a permanent place for video and other electronic arts elsewhere. On June 15th of that year, we opened The Kitchen at the Mercer Arts Center in New York.

Steina and Woody

> Our technological environment is a web of rituals – it's inevitable – once you start connecting systems together, they become autonomous and we become their guests. To the machine we are the dispensable ones, we will die, but the system lives; technology becomes the house in which we are guests for a short time. In the long view, technology will become very complex and challenging. Will it need us? I don't know. (Vasulka and Weibel 2008: 387)

References

Beck, Stephen (1975), 'Image Processing and Video Synthesis: Electronic Videographic Techniques', in Woody and Steina Vasulka (eds) (1992), *Eigenwelt der Apparatewelt: Pioneers of Electronic Art*, Linz, Austria: Ars Electronica.

Čapek, Karel (1990), *Toward the Radical Center: A Karel Capek Reader*, Peter Kussi (ed.), Connecticut: Cat Bird Press.

Crutchfield, James P. (1984), 'Space-Time Dynamics in Video Feedback', *Physica*.

Deleuze, Gilles (1992), 'Postcript on the Societies of Control', *October*, 59 (Winter).

Dolanova, Lenka (2008), 'Woody Vasulka: Dialogue s démony nástrojů', Ph.D. thesis, Film and TV School of the Academy of Performing Arts, Prague.

Furlong, Lucinda (1985), 'Tracking Video Art: Image Processing as a Genre', *Art Journal*, 45: 3 (Fall).

Gill, Johanna (1976), 'Video: State of the Art', in Woody and Steina Vasulka (eds) (1992), *Eigenwelt der Apparatewelt: Pioneers of Electronic Art*, Linz, Austria: Ars Electronica.

Gritzo, Russ (1999), 'The Evolution of the Soul of the Machine: Thoughts on the Software of the Vasulka Systems', in R. Christ (ed.), *The Brotherhood*, Sante Fe, NM: Lumen Books.

Hagen, Charles (1978), 'A Syntax of Binary Images: An Interview with Woody Vasulka', *Afterimage*, 6: 1–2.

Kirby, Peter (1997), *Binary Lives: Steina and Woody Vasulka* [video].

Mather, David Sears (1999), "Compositional Networks" in Ronald Christ (ed.), *The Brotherhood: Woody Vasulka: A Series of Six Interactive Media Constructions*, Japan: NTT Publishing Co., Ltd.

Minkowsky, John (1978), *Some Notes on Vasulka Video 1973–1974* [unpublished].

—— (2008), 'Framing the Mind in the Museum', in Woody Vasulka and Peter Weibel (eds) (2008), *Buffalo Heads: Media study, media practice, media pioneers, 1973–1990*, Cambridge, MA: MIT Press.

Renov, Michael and Suderburg, Erika (eds) (1997), *Resolutions: Contemporary Video Practices*, Minneapolis: University of Minnesota Press.

Sandin, Dan (n.d.), 'Dan Sandin interviewed by criticalartware', http://video.google.com/videoplay?docid=3100159088801019891#. Accessed June 29, 2012.

Schier, Jeffrey (1978), *The Vasulka Imaging System*, Buffalo, NY: Vasulka.org, http://vasulka.org/. Accessed June 29, 2012.

Siegel, Eric (1984), *Electronic Zen: The Alternative Video Generation: Jud Yalkut Interviews Eric Siegel: Television Is The Last Communication Link We Have To Change This Country*, http://experimentaltvcenter.org/electronic-zen-alternative-video-generation-jud-yalkut-interviews-eric-siegel-television-last-commun. Accessed June 29, 2012.

—— (1992), 'Interview with Eric Siegel', in Woody and Steina Vasulka (eds), *Eigenwelt der Apparatewelt: Pioneers of Electronic Art*, Linz, Austria: Ars Electronica.

Vasulka, Steina (1980), *Cantaloup* [video].

Vasulka, Woody (n.d.), 'The Frame' [unpublished essay].

—— (1976), 'Five Lectures', in Woody Vasulka and Peter Weibel (eds) (2008), *Buffalo Heads: Media study, media practice, media pioneers, 1973–1990*, Cambridge, MA: MIT Press.

—— (1980), *Artifacts* [video].

—— (1996), 'Notes on Installations: From Printed Matter to Noncentric Space', in Steina and Woody Vasulka, *Machine Media* [exhibition catalog], San Francisco Museum of Modern Art, pp. 65–72.

—— (1997), 'Interview with Woody Vasulka by Jon Burris', July 24, http://www.vasulka.org/archive/Interviews/10JonWoody.pdf. Accessed June 29, 2012.

—— (2008), 'Interview with Woody Vasulka by Lenka Dolanova', July. Collection of Lenka Dolanova.

Vasulka, Woody and Nygren, Scott (1975), 'Didactic Video: Organizational models of the electronic image', *Afterimage*, October.
Vasulka, Woody, Jeffrey Schier and Moxton, Tom (c.1979), *The Articulator Manual* [unpublished technical manual for the Digital Image Articulator], The Daniel Langlois Foundation, Montreal; Steina & Woody Vasulka Fonds, VAS B63-C1.
Vasulka, Woody and Vasulka, Steina (n.d.), 'Interview with Woody and Steina Vasulka by Russ Connor', New York State Council for the Arts for WNET, http://www.vasulka.org/archive/Interviews/4ConnorVasulkas.pdf. Accessed June 29, 2012.
—— (1973), 'Open circuits: the new video abstractionists… Interviewed by Jud Yalkut', March 1, WBAI-FM, http://vasulka.org/Kitchen/K_Audio.html. Accessed June 29, 2012.
—— (1985), 'About Video and the Arts…Interviewed by Rene Coelho', October 31, Amsterdam: MonteVideo.
Vasulka, Woody and Weibel, Pete (eds) (2008), *Buffalo Heads: Media study, media practice, media pioneers, 1973–1990*, Cambridge, MA: MIT Press.
Yalkut, Jud (1969), *TV as a Creative Medium*, Howard Wise Gallery, http://www.eai.org/artistSupportDocs.htm?id=257. Accessed June 29, 2012.
Yates, Frances (1966), *The Art of Memory*, Chicago: University of Chicago Press.
Youngblood, Gene (1970), *Expanded Cinema*, New York: E. P. Dutton.
Yuill, Simon (2008), 'All Problems of Notation Will be Solved by the Masses', *Mute*, 2: 10, http://www.metamute.org/en/All-Problems-of-Notation-Will-be-Solved-by-the-Masses. Accessed June 29, 2012.

Notes

1. For more on Pešánek, see Jiří Zemánek (1996–97), *Zdeněk Pešánek 1896 – 1965*, Praha: Gema Art Gallery. For more on Grygar, see Milan Grygar (1999), 'Milan Grygar: Image and sound – Collection of Modern and Contemporary Art', September 14 – November 11, The National Gallery in Prague, Praha: Gema Art Gallery.
2. In *Expanded Cinema*, Youngblood's rampant use of the term 'consciousness' (126 times in the book) suggests the belief in the necessity of a new form of communication as synthesis of various stimuli: this new consciousness can be 'oceanic', 'cosmic', 'collective', of course 'expanded' (or 'inevitably expanded'), also 'widened', 'more intellectually competent', even 'transnational teledynamic video consciousness'; it is contrasted with 'existing', 'yesterday's', 'old', 'ordinary', or 'narrowly-focused' ones.
3. For more about image processing see Furlong (1985: 233–37); and Lucinda Furlong (1983), 'Notes Toward a History of Image Processed Video', *Afterimage*, 11; and Sherry Miller Hocking (1983), 'Electronic Video Image Processing: Notes Towards a Definition', *exposure: New Technology*, 21: 1.
4. In Woody's words: 'In fact I'm looking for some possibility of acquiring a knowledge which would probably give me some security. So I would say that would be the main line since I've been watching with great interest what I'm doing as disrelated individual to what I am' (W. and S. Vasulka n.d.).
5. In these first years, when portapak cameras became accessible in the US, the workers in the emerging media arts field shared a certain affinity that was based on the media's specificity, which disappeared when the fact of sharing the tool ceased to be sufficient.
6. In the time Woody and Alfons met, Alfons was working on the documentary about '9 Evenings: Theatre and Engineering', a legendary performance series interconnecting avant-garde artists from theatre, dance and new media disciplines with research scientists and engineers from Bell Telephone Laboratories. The event took place in 1966 in New York. Here Woody also met Don White, a scientist who introduced him to the principles of holography in 1967.
7. This technique is used for creating images of time phenomena, e.g., in sport photography. An example of its use from the analog sphere is by tool maker Glen Southworth, who experimented with slit-scan by moving images forward and back against the slit. In digital, it is possible to extract single cuts from a sequence of video frames and chain them in a new image. Steina began to experiment with this technique using Image/ine software, developed in cooperation with Tom Demeyer in 1997 in the Amsterdam center, STEIM. In her performance *Bent Scans*, she uses real-time deformation of video recordings, inducing so called 'warped time'.
8. The work is described in the exhibition catalog for Anon (1978), 'Vasulka: Steina – Machine Vision, Woody – Descriptions', Buffalo: Albright-Knox Art Gallery.
9. Schilling develops this direction in the project of 'binocular stereoscopic videosystems', described in a grant application 'Electronic Spaces' in 1973.

10. The history of The Kitchen, which the Vasulkas managed from its founding in 1971 until 1973, is wonderfully documented at http://vasulka.org/Kitchen/index.html.
11. The VCS3 ('The Putney') was developed by Peter Zinovieff, Tristam Cary and Dave Cockerell from Electronic Music Studios of America (Amherst, MA) in 1968. This analog, duophonic synthesizer, also called a 'voltage-controlled studio', could influence audio signals and their interconnection.
12. Siegel exhibited only the part of the work called *Einstein*; while original work also included parts *Beatles*, *Tomorrow Never Knows* and *Symphony of Planets*. The work was shown again in 1973 in The Kitchen in better quality thanks to the new colorizer he used (Siegel 1984).
13. In 1975 he created 'Siegel Video Systems Processing Chrominance Synthesizer', distributed by Siegel-Ferraro Electronics company. Because the designing and manufacturing of tools was taking more and more of his time, in 1978 he stopped making video and concentrated on tool development.
14. In Vasulka (2008), Woody mentioned that he forgot to include another function that would not only separate the fields but would also cause intersections.
15. Later, in 1984, Peter Weibel also came to teach to Buffalo.
16. Woody reportedly acquired the Rutt/Etra for about $5,000 or $6,000 (a price common for friends of the inventors), while the commercial price was around $16,000.
17. In 1975, the Rutt Electrophysics company from New York began to produce them; two models were on market: RE 4-A (including a 525-line monitor) and RE 4-B (including a 1050-line monitor).
18. More information about Rutt/Etra can be found in Hocking, Sherry Miller (1986), 'Rutt/Etra: Notes on Development', http://www.experimentaltvcenter.org/ruttetra-notes-development. Accessed March 28, 2013.
19. From 'Tapelist', http://www.vasulka.org/archive/ExhFest7/VideoDataBank/tapelist.pdf. Accessed March 28, 2013.
20. Anon (n.d.), 'Vasulka/Sharits Stroboscopic Project', [unpublished manuscript], Collection of Woody and Steina Vasulka.
21. 'MindFrames: Media Study at Buffalo 1973–1990' ran from December 16, 2006 – March 25, 2007, at ZKM Center for Art and Media, Karlsruhe, Germany.
22. In Hagen (1978), Woody claimed that in 1975 Donald McArthur designed the basic architecture of a digital system and developed a binary specification of the screen, Walter Wright built the first programming schemes, and Jeff Schier revised and stabilized the current hardware and developed display modules for the ALU (Arithmetical Logic Unit). Alternative names for the tool were 'Emulsifier,' 'Vasulka Imaging System' or 'Imager'.
23. 'The Brotherhood: A Series of Six Interactive Media Constructions', NTT InterCommunication Center, Tokyo, Fall 1998. The catalog is available online at http://vasulka.org.
24. More of Woody's ideas about interactivity appear in the essay 'Digital Space: A Summary' written together with David Dunn, online at http://www.vasulka.org/Woody/Brotherhood/Text.html#03.
25. See http://vasulka.org for the explanation of the tables for *The Brotherhood*.
26. In *Binary Lives*, Woody also says here that he doesn't want to leave it to destructive instincts of other people, even if he feels that something like deprivation of the central position of the author is in the air.
27. In 'Eigenwelt der Apparatewelt: Pioneers of Electronic Arts' at 'Ars Electronica' in 1992, accompanying the exhibition was a unique catalog with barcodes inside, which triggered the image material from the disk (photographs, technical drawings, audio and video files), interconnecting the physical book with electronic space.
28. Online playlists combined materials from servers located at ZKM, and were managed from Cologne by Robert O'Kane: 'It was also, by the standards of media presentation in an art museum or gallery, a remarkably inventive one, that could permit other exhibition sites worldwide to reconfigure portions of the *MindFrames* to their own needs and have routed from a central source each desired visual work to its specific destination precisely on schedule' (Minkowsky 2008: 33).
29. Not surprisingly, these works have gained probably so far the largest recognition in the field of film studies from all of Woody's work. Raymond Bellour in his essay 'The Images of the World' writes about the paradox of electronic creation, which on one hand deals with unreal, abstracted time and tries to erase the connection with the 'real' world; and on the other, increasingly works with historical imagery (Renov and Suderburg 1997).
30. Selfridge's ideas were revived by Daniel C. Dennett in his book *Consciousness Explained* (1991).
31. Ray Kurzweil in his book *The Age of Spiritual Machines* (1999) predicts the emergence of machines with human-like intelligence in the near future. Concerning DNA computers, see, for example, Martyn Amos' book *Genesis Machines* (2006), in which he describes the experimental computers constructed with the use of DNA code.

The Emergence of Video Processing Tools
Television Becoming Unglued

Volume 1

edited by Kathy High, Sherry Miller Hocking and Mona Jimenez

intellect Bristol, UK / Chicago, USA

First published in the UK in 2014 by
Intellect, The Mill, Parnall Road, Fishponds, Bristol, BS16 3JG, UK

First published in the USA in 2014 by
Intellect, The University of Chicago Press, 1427 E. 60th Street,
Chicago, IL 60637, USA

A catalogue record for this book is available from the
British Library.

Cover image: Photo courtesy Experimental Television Center Archives.

Production manager: Tim Mitchell
Cover designer: Ellen Thomas
Copy editor: Michael Eckhardt
Typesetting: John Teehan

ISBN 978-1-84150-663-0
ePUB ISBN 978-1-78320-301-7
ePDF ISBN 978-1-78320-300-0

Printed and bound by Hobbs the Printers Ltd, UK

SECTION 2: PEOPLE AND NETWORKS