Notes for a history of female forms in the electronic arts

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ABSTRACT

L'articolo si focalizza sulle pratiche pionieristiche delle artiste degli anni Sessanta e Settanta impegnate nelle arti elettroniche: analizza una serie di dispositivi ed esperienze progettuali per approfondirne la ricerca tecnologica, la natura estetica e i motivi ricorrenti. Si compone di quattro sezioni: la prima documenta il processo di marginalizzazione delle donne; la seconda identifica i contesti pubblici e privati e le pratiche dell'epoca; la terza analizza tre esperienze intermediali (Suzanne Ciani; Lillian Schwartz; Steina Vasulka); la quarta propone alcuni elementi per (ri)scrivere una storia delle forme femminili nelle arti elettroniche attraverso un approccio media-archeologico.
Parole-chiave. Arti elettroniche; Videoarte; Musica elettronica; Culture mediali; Archeologia dei media; Storia delle donne

The article deals with the pioneering practices of female media artists in 1960s and 1970s engaged in the electronic arts: it analyzes a range of devices and projects to delve into their technological research, aesthetic nature, and common recurring motifs. It consists of four sections: the first documents the process of marginalization of women artists; the second identifies public and private contexts and practices; the third analyzes three intermedial experiences (Suzanne Ciani; Lillian Schwartz; Steina Vasulka); the fourth proposes some traits to (re)write a history of female forms in the electronic arts with a media archaeological approach.
Keywords. Electronic arts; Video art; Electronic music; Media cultures; Media archaeology; Women's history

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Rediscovering the term 'electronic arts' and the role of female artists

This article frames the first steps of a research project that focuses on the practices of female media artists engaged in the field of electronic arts. The phrase 'electronic arts' is preferred here for a set of reasons: to encompass all electronic media, including sound media such as radio, telephone, and synthesizer[1]; to take away the lead of the visual[2] in art experiences that have been indeed largely intermedial and multisensory, overcoming the limitation to 'video art' works[3]. As the multimedia artist Lillian Schwartz underlined: «a video frame is a group of signals[:] video, like music, is an analog event composed of waves measured on the basis of frequency in hertz»[4]. Thus, the aim is to go beyond the medium specificity and the distinctions between arts for outlining a history of forms in the electronic arts. This was accomplished mostly by female artists, who mixed their tools, customized their technical devices, and tested original practices to obtain multimedia artworks: they suddenly understood that those 'new' media, notably electronics and telecommunications, were the right instruments to develop original and personal artforms that were able to finally give them proper and wide representation in arts and cultures.

The term 'electronic art' was adopted by artist Nam June Paik to title his first exhibition at Galeria Bonino in New York (1965)[5] and by media theorist

[1] On the sonic dimension of electronic media cf. B. Viola, *The Sound of One Line Scanning*, in *Sound by Artists*, edited by D. Lander, M. Lexier, Art Metropole-Walter Phillips Gallery, Toronto-Banff 1990, pp. 39-54; W. Ernst, *Sonic Time Machines: Explicit Sound, Sirenic Voices, and Implicit Sonicity*, Amsterdam University Press, Amsterdam 2016, pp. 25-30.

[2] Cf. P. Dubois, *Vidéo et écriture électronique. La question éthique,* in *Esthétiques des arts médiatiques*, edited by L. Poissant, Presses de L'Université du Québec, Sainte-Foy 1995, pp. 156-173.

[3] Media scholar M.M. Gazzano challenged the term 'video art' and promoted the phrase 'electronic arts', cf. M.M. Gazzano, *"Videoarte". Etimologia e genesi di un concetto controverso*, in *Kinema. Il cinema sulle tracce del cinema. Dal film alle arti elettroniche, andata e ritorno*, Id., Exòrma, Roma 2013, pp. 23-49; Id., *Comporre audio-visioni. Suono e musiche sulle sponde dell'Atlantico all'origine delle arti elettroniche*, in *Le arti multimediali digitali. Storia, tecniche, linguaggi, etiche ed estetiche del nuovo millennio*, edited by A. Balzola, A.M. Monteverdi, Garzanti, Milano 2004.

[4] L.F. Schwartz, L.R. Schwartz, *The Computer Artist's Handbook: Concepts, Techniques, and Applications*, Norton & Norton, New York 1992, p. 206.

[5] He frequently used «electronic» in titles or texts, cf. N.J. Paik, *We Are in Open Circuit: Writings by Nam June Paik*, The MIT Press, Cambridge 2019, pp. 201-203. To frame the pivotal role of Paik's

Gene Youngblood in his analysis of Paik's works (1970)[6]. Then, the phrase was institutionalized by gallerist Howard Wise when he created the no-profit organization Electronic Arts Intermix (1971)[7], a facility that «assist[s] projects undertaken by artists working to explore the potentials of the electronic media as a means of expression and non-commercial communication»[8]. Referring to electronic arts means to overcome medium specificity of music, film, and video to identify a broader intermedial field only delimited by the technology and the practices that were engaged, as recollected in texts by John Cage, Allan Kaprow, Dick Higgins, and Youngblood[9]. This field was characterized by an original synesthetic, synthetic, and multi-sensory art, which led to an expansion of perceptual qualities and consciousness[10].

Electronic arts raised in a time of changes for artists, audience, and institutions. By 1960s and 1970s arts focused on the creation of a shared and often unexpected process[11], rather than that of an artifact, operating a convergence of languages and tools to attain a form of «total art», as Kaprow called it[12], or

exhibition, cf. S. Lischi, *La lezione della videoarte. Sguardi e percorsi*, Carocci, Roma 2020, pp. 21-33.

[6] Cf. G. Youngblood, *Expanded Cinema*, E.P. Dutton, New York 1970, p. 304.

[7] Cf. documents on the foundation of Electronic Arts Intermix (EAI), included statements and grant requests to the National Endowment for the Arts and the New York State Council on the Arts, EAI, *Grant Proposal: Organizational Information*, in Electronic Arts Intermix, <https://www.eai.org/supporting-documents/195/w.1210.0> (last accessed: 20 December 2024); Id., *Documents*, in Electronic Arts Intermix, <https://www.eai.org/webpages/1212> (last accessed: 20 December 2024).

[8] H. Wise, *Electronic Arts Intermix, Inc: at the Leading Edge of Art*, New York 1973, p. 10, in Electronic Arts Intermix <https://www.eai.org/user_files/supporting_documents/leadingedge_2.pdf> (last accessed: 20 December 2024).

[9] Among the texts published at the time discussing intermedial concepts and artworks that engage electronic media cf. J. Cage, *Silence: Lectures and Writings*, Wesleyan University Press, Middletown 1961; A. Kaprow, *Assemblage, Happenings & Environments*, Harry N. Abrams, New York 1966; D. Higgins, *Intermedia,* in «Something Else Newsletter», n. 1, 1966, pp. 1-3; Youngblood, *Expanded Cinema*, cit.

[10] Cf. *Ivi*., p. 135.

[11] Cf. Kaprow, *Assemblage*, cit., p. 159.

[12] Id., *Notes on the Creation of Total Art*, in «Essays on the Blurring of Art and Life», edited by J. Kelley, University of California Press, Berkeley-Los Angeles 2003, pp. 10-14.

«TOTAL ELECTRONIC OPERA», as Paik put it[13]. In the information age of the electronic media, artists worked on processes[14] that called for actions and feedbacks by the audience, as Michael Shamberg recalled[15]. As Johanna Gill noted, at the time they were operating with new devices for several reasons: to criticize generalist TV and to act on the broadcasting system that was controlled by a few networks; to overcome dissatisfaction with traditional art languages, which were considered obsolete; and to criticize the commodification of artworks, now turned into products by the art system[16]. Thus, since the 1960s, electronic art processes have revealed a theoretical background and an intermedial nature that, from the viewpoint of several female artists, disclosed a political stance, detectable in performances by Charlotte Moorman[17] or works by Martha Rosler[18] and Dara Birnbaum[19]. Cut-up, collage, and remix became trans-disciplinary practices *par excellence*, of which a prime example is Birnbaum's *Technology/Transformation: Wonder Woman* (1978-79).

This essay focuses on the period of emergence and development of electronic forms of music and moving images in the U.S., where contexts and protagonists in the history of electronic arts can be found and where we can detect processes of canonization and marginalization. The main goal is not only to demonstrate how female artists, as in other areas of mediality, were overlooked and undervalued, their presence in centers of technological research often ig-

[13] N.J. Paik, *Electronic Opera (1967)*, in *We Are in Open Circuits*, Id., cit., p. 201.

[14] Cf. *Pioneers of Electronic Art*, edited by D. Dunn, Ars Electronica, Linz 1992, p. 22.

[15] Cf. M. Shamberg, Raindance Corporation, *Guerrilla Television*, Holt, Rinehart & Winston, New York 1971. The topic is discussed in F. Spampinato, *Art Vs. TV: a Brief History of Contemporary Artists' Responses to Television*, Bloomsbury, New York 2021, pp. 97-109.

[16] Cf. J. Branson Gill, *Video: State of the Art*, in *Pioneers of Electronic Art*, edited by Dunn cit., pp. 63-65.

[17] Cf. B. Piekut, *Experimentalism Otherwise: the New York Avant-Garde and Its Limits*, University of California Press, Berkeley 2011, pp. 140-176.

[18] Rosler mystifies the 'mythical beginnings' of video art as told by such male protagonists as Paik and McLuhan, cf. M. Rosler, *Video: Shedding the Utopian Moment*, in «Block», n. 11, 1985-1986, pp. 27-39.

[19] Cf. the recent interview taken by the artist for her exhibition at Fondazione Prada (2023), *Milan Osservatorio. Dara Birnbaum*, in fondazioneprada, <https://www.fondazioneprada.org/project/dara-birnbaum/?lang=en> (last accessed: 20 December 2024).

nored, but also how it was precisely women's art practice that prefigured the need to understand electronics across media boundaries, identifying an 'electronic interzone', whether visual, sound, or audiovisual. Women were firstly engaged with electricity, which offered the tools to go beyond the concept of medium specificity[20]. Thus, the objectives of this exploration are twofold: to reveal how the integrated approach to electronic arts was primary and was actually distorted by consequent medium-specific histories and discourses ('history of video art' or 'history of electronic music'); to reintegrate a piece of the big picture of the history of electronic arts that has been *repressed*[21] and to redefine their canon by balancing such a *his-torytelling*[22], in which the initiatives of female artists, especially musicians, had been almost absent or considered less relevant.

The exhibition *Eigenwelt der Apparatewelt: Pioniere der Elektronischen Kunst – Pioneers of Electronic Art* (1992) at Ars Electronica, curated by Steina and Woody Vasulka[23], presented a focus on original media patented by such designers as Don Buchla, Robert Moog, Bob Hearn, Shuya Abe and Paik, confirming the pivotal role of sound media in the development of video and installation art, as well as the early stage of experimentation that considered an electronic field with no medium specificity. Woody stated that the devices conceived by these engineer-

[20] Cf. J. Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television*, Duke University Press, Durham 2000; D. Galili, *Seeing by Electricity: the Emergence of Television, 1878–1939*, Duke University Press, Durham 2020.

[21] The term refers both to the sociocultural conditions that have allowed or not allowed the presence of women in the arts and in the canon, and to the Freudian repressed understood as the key to interpreting the position assigned to the feminine in Western societies and the anxieties generated by its reemergence. Cf. especially L. Nochlin, *Why Have There Been No Great Women Artists?,* in «ARTnews», January 1971; L. Irigaray, *This Sex Which Is Not One*, Cornell University Press, Ithaca 1985; J. Kristeva, *Powers of Horror. An Essay on Abjection*, Columbia University, New York 1982.

[22] The term is in relation to «herstory», which was firstly used in feminist theory in R. Morgan, *Sisterhood Is Powerful: an Anthology of Writings from the Women's Liberation Movement*, Vintage Books, New York 1970.

[23] Cf. Steina's video-diary on the making of the exhibition, *The Making of Eigenwelt der Apparatewelt* (col, stereo, 15"08"), 1992, *Steina and Woody Vasulka fonds*, in Daniel Langlois Foundation Archives, <https://www.fondation-langlois.org/html/e/page.php?NumPage=436> (last accessed: 20 December 2024).

artists were crucial to the aesthetic and formal developments of electronic arts, an expansion that begun in sound media to be articulated into visual and audio-visual media from structural elements, such as frequencies and voltages. In line with the exhibition, the article focuses on the medial dimension of early electronic arts and analyzes a range of technologies, art practices, and design experiences conducted by female artists. It consists of four sections: the first documents the process of marginalization of women by the art world and the canon from an historic viewpoint; the second identifies contexts and practices of the time in which women operated and shaped techniques in electronic arts; the third section analyzes three intermedial experiences based on the collaboration between artists and engineers, that of Suzanne Ciani with Bill Hearn in the context of the group Experiments in Art and Technology (E.A.T.), that of Schwartz with Kenneth Knowlton at Bell Labs, and that of Steina Vasulka with the technologies used in the years of activity at The Kitchen and SUNY Buffalo; the fourth section presents the outcomes and proposes some traits to (re)write a history of female forms in the electronic arts, by applying a media archaeological approach to media cultures that refers to Wolfgang Ernst's theories on materiality of technologies, sonicity, and processuality[24], taking into account Erkki Huhtamo's theory of *topoi*[25] on the recurring themes in media discourses.

Historic evidence of the marginalization of female electronic artists

Lisa Rovner's documentary film *Sisters with Transistors* (2020) reconstructed the careers of a group of pioneering female electronic musicians. We can consider this film as a symptom of the marginalization of women's practices in media and arts, which contains the element of the repressed: in fact, since the years in which these artists worked, their parabolas were neglected by historians and curators,

[24] «Sonicity is where time and technology meet. […A]s a neologism is meant to be kept apart from acoustic sound and primarily refers to inaudible events in the vibrational (analog) and rhythmic (digital) fields. Sonicity is intended to sound awry so that it is differentiated from sound, a culturally familiar term that is academically somewhat restricted to musicology. Sonicity names oscillatory events and their mathematically reverse equivalent: the frequency domain as an epistemological object» Ernst, *Sonic Time Machines*, cit., pp. 21-22.

[25] Cf. E. Huhtamo, *From Kaleidoscomaniac to Cybernerd. Towards an Archeology of the Media*, in «Leonardo», vol. xxx, n. 3, 1997, pp. 221-224.

as can be traced in the words of Pauline Oliveros in 1970[26] and Rovner in 2021[27].

In order to frame what had been repressed, it is necessary to go back to those years, starting from one of the most influential texts on installation art, Kaprow's *Assemblage, Happenings & Environments* (1966): of the 32 artists featured, 7 are women (e.g. Yayoi Kusama); furthermore, the works of Kaprow, Dine, Oldenburg, Rauschenberg, and Whitman are the most recurring. These latter names had been supported by galleries, enshrined by critics, and canonized by art history, whereas there is evidence that the work of their female colleagues, little supported by the apparatus at the time, had been largely removed from the *his-torytelling*, starting by their exclusion from art venues also reported by Kusama in *Kusama: Infinity* (2018) and Nan Goldin in *All the Beauty and the Bloodshed* (2022). Nevertheless, these films provided historical evidence of female artists' works and impact, re-establishing their roles and allowing us a desirable rewriting of the canon.

Reviewing the programs of past exhibitions, a similar picture can be found. In *Television as a Creative Medium* (1969) at Howard Wise Gallery in New York, we can identify, among a list of male artists, only the presence of Moorman with Paik[28]. *Open Circuits: An International Conference on the Future of Television* at MoMA (1974) was organized by men in leading roles in their institutions[29] and featured a small presence of women, often attributed to partnership work with men[30]. In this cultural context a need for visibility and connection emerged, which was expressed by initiatives such as the Women's Video Festival (1972-74) and Tokyo-New York Video Express (1974). They were respectively organized by Steina with filmmaker Susan Milano at the independent space The Kitchen in New

[26] Cf. P. Oliveros, *And Don't Call Them 'Lady' Composers*, in «The New York Times», 13 September 1970.

[27] Cf. M. Seidel, *Sisters with Transistors: Discovering Electronic Music's Female Innovators*, in «The Quietus», 24 April 2021, <https://thequietus.com/culture/film/film-sisters-with-transistors-lisa-rovner-interview/> (last accessed: 20 December 2024).

[28] Cf. Howard Wise Gallery, *TV as a Creative Medium*, now in Electronic Arts Intermix, <https://www.eai.org/user_files/supporting_documents/tvasacreativemedium_exhibition-brochure.pdf> (last accessed: 20 December 2024).

[29] Cf. Electronic Arts Intermix, <https://www.eai.org/> (last accessed: 20 December 2024).

[30] Cf. *Conference Participants*, in *Ivi*, <https://www.eai.org/webpages/1245> (last accessed: 20 December 2024).

York, and by Shigeko Kubota between US and Japan[31].

Since the 1980s, the female presence has even decreased. In the catalog *The Castelli-Sonnabend Videotapes & Films* (1974), on the collection of the prominent gallery, out of 15 people we find 5 female artists[32], a presence that disappeared in an updated catalog for the Italian festival Taormina Arte (1989)[33]. A similar underrepresentation can be observed in *New American Video Art. A Historical Survey 1967-1980* (1984), a traveling exhibition by Whitney Museum[34], where, among a total of 41 participants, the female incidence was limited to 9 artists, including Steina with Woody (who, instead, was also present with his solo work).

Now, we can bridge these gaps to the presentation of some pivotal female approaches, tools, and practices in the electronic arts to delve into their technological research, aesthetic nature, and common recurring motifs. This path starts from the contexts of production, mainly labs and studios, where women of science and art had the possibility to work and experiment with electronic devices.

Electronic contexts, tools, and practices

The Twentieth century was marked by an intense activity in designing devices and licensing patents related to electronics and telecommunications. Working spaces of various consociate natures were formed to experiment with the latest intermedial art experiences using 'new' media. We can find projects supported by the public sphere, such as expos and national broadcasts, and by the private sphere, such as universities and corporate research centers, as well as studios independently formed. In 1970s and 1980s, among public institutions the radio stations supported the creation of artworks, as in the case of Berkeley's KPFA,

[31] Cf. *Women's Video Festivals 1972-74*, in *Ivi*, <https://www.eai.org/webpages/1174> (last accessed: 20 December 2024).

[32] Cf. *Castelli/Sonnabend Videotapes and Films*, in CastelliGallery, 3 April 2020, <https://www.castelligallery.com/blog/castelli-sonnabend-videotapes-and-films> (last accessed: 20 December 2024).

[33] Cf. *I film e i video della Galleria Castelli-Sonnabend*, in *Intervalli tra film video televisione*, a cura di V. Valentini, Sellerio, Palermo 1989, pp. 62-72.

[34] Cf. J.G. Hanhardt, *New American Video Art. A Historical Survey 1967-1980: Introduction*, Whitney Museum, New York 1984, doc. n. ETC2881, in Experimental Television Center Archive, <https:// archive.org/details/ETC2881> (last accessed: 20 December 2024).

where Ciani made the tracks for *Voices of Packaged Souls* (1970), an exhibition project carried out in Brussels with the sculptor Harold Paris, with sounds recorded in other labs: «I used little snippets of sounds that I had made with the Buchla at the San Francisco Tape Music Center, recorded sounds, and processed sounds on the computer at the Artificial Intelligence Laboratory at Stanford University»[35]. Local TV stations also fulfilled a key role, investing in music-video experiments, especially KQED in San Francisco, WGBH-TV in Boston, and 13/WNET in New York. The electronic practices developed works on common concepts that represented a real fusion of sound and vision, such as the feedback effect used by Vasulka and Paik[36]. According to Hays, who worked with artists at WGBH experimenting with the Paik-Abe synth (fig. 1):

> The most dynamic image was feedback. […] Given the tools at my command, and my own sensibilities to music as they had developed then, I proceeded on the working proposition that there existed a dynamic relation between feedback and other image types, as well as between feedback and music, both being time-based forms of art; and so feedback would be, for my purpose, at the core of music-image conception. […] Early in my work with feedback, I began to see it not just as an image type, but as a medium of light. I liked to think of it as a new kind of electronic light[37].

[35] Cfr. M.T. Soldani, G. Delli Paoli, *Suzanne Ciani. Sulle onde delle emozioni*, in «Ondarock», <2024: https://www.ondarock.it/interviste/suzanneciani.htm> (last accessed: 20 December 2024).

[36] On Vasulkas cf. P. Bode, *Upstate History of Video Project. Interview with Steina Vasulka, April 1, 1998. Complete transcript*, doc. n. ETC2573, in Experimental Television Center Archive, pp. 5, 8, <https://archive.org/details/ETC2517> (last accessed: December 20, 2024); Id., *Video: State of the Art*, cit., pp. 83-85. On Paik, cf. Id., *We Are in Open Circuit*, cit., pp. 94-96, 170-171.

[37] R. Hays, *WGBH Music-Image Workshop. Report of Activities: June 1972 through January 1974 by* Ron *Hays*, 1974, doc. n. ETC2517, in Experimental Television Center Archive, p. 7, <https://archive.org/details/ETC2517> (last accessed: December 20, 2024).

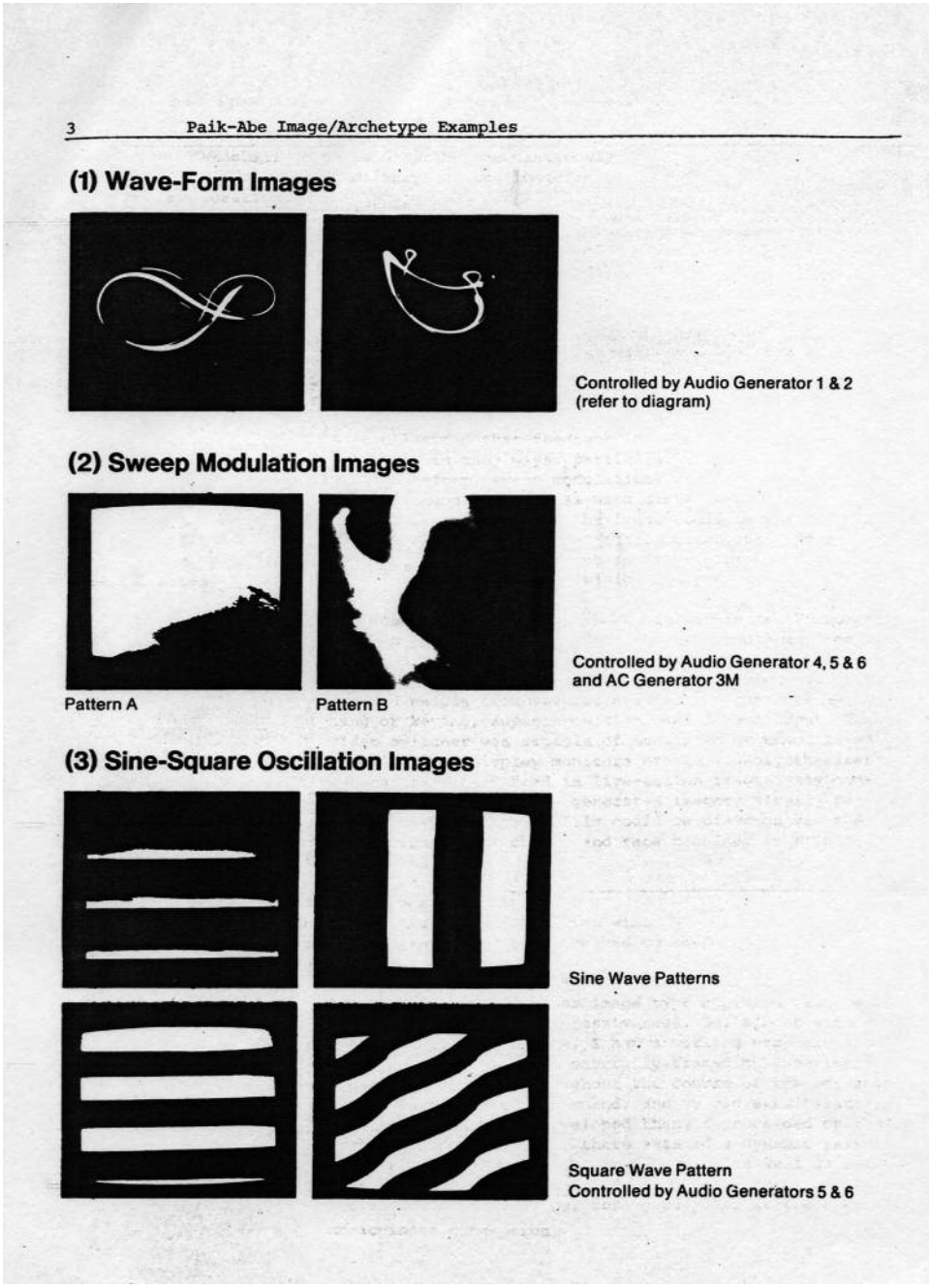

3 Paik-Abe Image/Archetype Examples
(1) Wave-Form Images
Controlled by Audio Generator 1 & 2
(refer to diagram)
(2) Sweep Modulation Images
Pattern A
Pattern B
Controlled by Audio Generator 4, 5 & 6
and AC Generator 3M
(3) Sine-Square Oscillation Images
Sine Wave Patterns
Square Wave Pattern
Controlled by Audio Generators 5 & 6

Fig. 1

Universities also created research centers dealing with intermedial processes on theoretical and practical levels, such as the Experimental Television Center[38]. Among the private initiatives, IBM and Bell Labs granted residencies, where, in the former, John Whitney generated audio-visual composition using terms as «counterpoint» and «polyphony»[39]. Finally, independent studios, which basically arose out of artists' initiative, were recognized as hubs for electronic arts[40], such as San Francisco Tape Music Center, with Oliveros, and The Kitchen.

Female Intermedia: the inseparable link between arts, devices, and labs
Suzanne Ciani and E.A.T.: liveness in motion

Ciani's name is linked to technologies created by Don Buchla. After attaining her bachelor's degree at Wellesley College in Massachusetts, during which she listened to the first virtual instrument sound at MIT labs, and her master's degree at the University of California at Berkeley, both in composition, Ciani met Buchla[41]. She then worked as a synthesizer welder in his factory and began to collaborate with the audiovisual industry mainly in producing electronic music and sounds for advertisements[42]. The composer adopted and tested over time two instruments, the Buchla 100 and 200, which she used mainly in her performances, as well as making various devices also related to voice processing, such as the Voice Over, developed together with Harald Bode[43].

[38] Cf. Experimental Television Center, <https://www.experimentaltvcenter.org/> (last accessed: 20 December 2024).

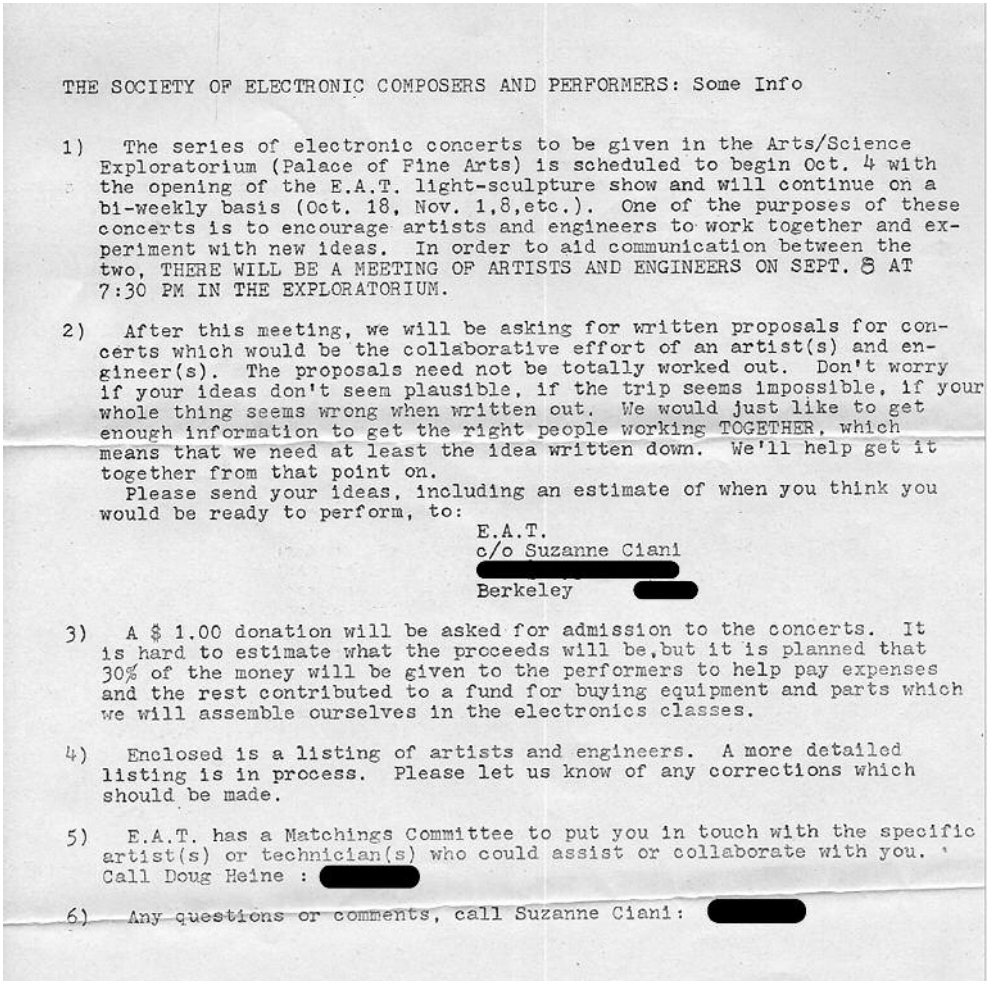
[39] Youngblood, *Expanded cinema*, cit., p. 215.

[40] D. Dunn, *A History of Electronic Music Pioneers*, in *Pioneers of Electronic Art*, edited by Id., cit., pp. 29-63.

[41] Cf. Soldani, Delli Paoli, *Suzanne Ciani,* cit.

[42] Cf. *Ibid.*

[43] Cf. M.T. Soldani, *Unpublished interview to Ciani received by personal communication*, 17 August 2024.



THE SOCIETY OF ELECTRONIC COMPOSERS AND PERFORMERS: Some Info

1) The series of electronic concerts to be given in the Arts/Science Exploratorium (Palace of Fine Arts) is scheduled to begin Oct. 4 with the opening of the E.A.T. light-sculpture show and will continue on a bi-weekly basis (Oct. 18, Nov. 1,8,etc.). One of the purposes of these concerts is to encourage artists and engineers to work together and experiment with new ideas. In order to aid communication between the two, THERE WILL BE A MEETING OF ARTISTS AND ENGINEERS ON SEPT. 8 AT 7:30 PM IN THE EXPLORATORIUM.

2) After this meeting, we will be asking for written proposals for concerts which would be the collaborative effort of an artist(s) and engineer(s). The proposals need not be totally worked out. Don't worry if your ideas don't seem plausible, if the trip seems impossible, if your whole thing seems wrong when written out. We would just like to get enough information to get the right people working TOGETHER, which means that we need at least the idea written down. We'll help get it together from that point on.
Please send your ideas, including an estimate of when you think you would be ready to perform, to:

E.A.T.
c/o Suzanne Ciani
[redacted]
Berkeley [redacted]

3) A $ 1.00 donation will be asked for admission to the concerts. It is hard to estimate what the proceeds will be,but it is planned that 30% of the money will be given to the performers to help pay expenses and the rest contributed to a fund for buying equipment and parts which we will assemble ourselves in the electronics classes.

4) Enclosed is a listing of artists and engineers. A more detailed listing is in process. Please let us know of any corrections which should be made.

5) E.A.T. has a Matchings Committee to put you in touch with the specific artist(s) or technician(s) who could assist or collaborate with you. Call Doug Heine : [redacted]

6) Any questions or comments, call Suzanne Ciani: [redacted]

Fig. 2

In 1969, the composer organized an initiative at the Exploratorium in San Francisco in the function of the California branch of E.A.T.[44], planning a series

[44] Cf. *Ibid.* In the documentation received by personal communication, on 9 August 2024, (fig. 3), Rose Libby and Doug Heine are mentioned respectively as the contact with E.A.T. and as a collaborator. About the managing role of Frank Oppenheimer in the Californian branch of the group cf. SOLDANI, DELLI PAOLI, *Suzanne Ciani,* cit.; R. WHITTAKER, *A Conversation with Doug Heine: from Pipe Fitting to Cosmic Particles*, in conversations, 29 August 2020, p. 50, <https://www.conver

of audiovisual concerts that resulted from the collaboration among artists and engineers. During the first meeting between participants on September 8 (fig. 2), Ciani established a collaboration with the engineer Hearn, a curator at the Exploratorium. They made the live debut in that space on October 4, 1969, along with the opening of E.A.T.'s «light-sculpture show», linking the Buchla modular analog synthesizer to the Vidium hybrid synthesizer[45], an «analog XYZ driver/sequencer» patented by Hearn[46] that Ciani defines «sound sensitive visual TV»[47]. The live audiovisual performance was generated by the interaction of Vidium with Buchla's modules and controls, which processed sound into images: «The Vidium generated graphic patterns based on stereo sound inputs generated by the Buchla»[48]. For Ciani, that model of audio synthesizer has specific characteristics that determine how the performer can generate and shape sounds within a space with the audience in real time, linking the experience of music listening to the co-presence of bodies in the room, confirmed by the predilection for quadraphonic sound system. Accordingly, the movements through voltages system created sounds and space, while Buchla's feedback structure ensured the development of an improvised concert to be composed 'live':

My goal [...] was the performance. And the Buchla [...] was designed by Don Buchla to be a performance instrument. [...] The lights give you a lot of information, there are a lot of color-coded cables, with two different types of cables. It is really a communicative instrument: when I play it, I know what is happening inside the machine, there is a feedback system. [...]
In these instruments, since they are about electricity and controlling the voltage, the way you control the sound is through the voltage. It's not like the traditional instrument where you have physical limitations, here you have a wide spectrum for control. The

sations.org/story.php?sid=671> (last accessed: 20 December 2024).

[45] Soldani, *Unpublished interview to Ciani*, cit.

[46] Vidium was the first among several electronic machines that Hearn patented over time and later proposed to other artists such as the Vasulkas, cf. *Pioneers of Electronic Art*, edited by Dunn, cit., pp. 104-107. See also the mail exchanges between Hearn and the Vasulkas, which includes his CV, declarations, and instructions of the machines, doc. n. vasulka10549, in Vasulka.org, <https://archive. org/details/vasulka10549/> (last accessed: 20 December 2024).

[47] Soldani, Delli Paoli, *Suzanne Ciani,* cit.

[48] Soldani, *Unpublished interview to Ciani*, cit.

sound is always moving, it's not really blocked, it's moving, it's going here, it's going there… it's moving in space[49].

The Buchla turns out to be an instrument devoted to maximizing the experience of 'liveness'[50], especially when compared to other musical devices that were being tested in those years, such as Max Mathews' software, with whom Ciani collaborated at Stanford. Its technical characteristics, in fact, distinguish it on a material level from the instruments of computer music, leading to different outcomes in the conception of composition: being an analog instrument, the Buchla functioned according to the reactions of the machine to the non-quantitative inputs given by the musician through the manipulation of controllers, so it was performed in real-time and the result was in real-time; differently, GROOVE was programmed by the composer, so the result requests the digitization of signals, through an analog-to-digital converter, plus time to process prompts and data[51].

The Vidium is an instrument designed with the same 'rationale' as the Buchla, so it works on processing sound into patterns that are transformed and shaped in real time (figs. 3-4). Even for Hearn, the encounter with E.A.T. and Buchla was indeed significant:

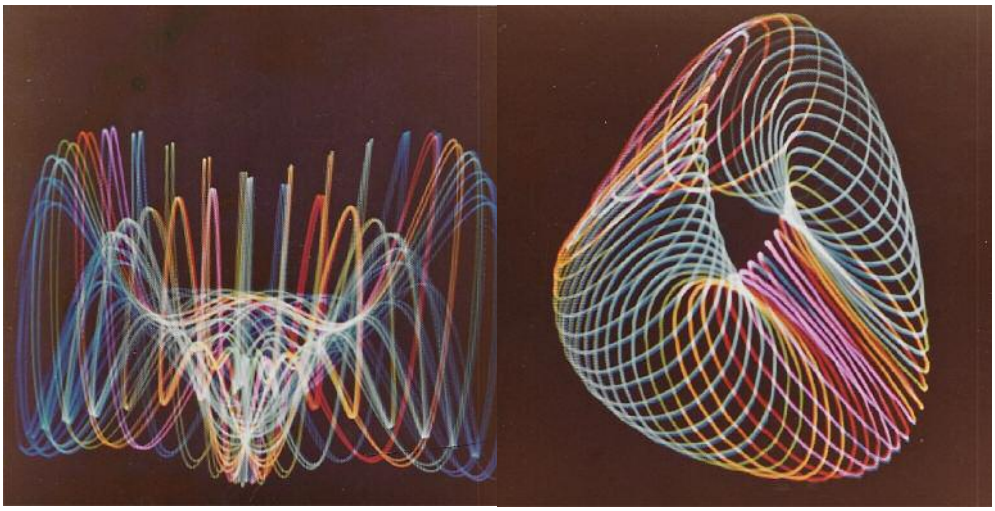
> Through E.A.T. I met a number of budding electronic music composers. I helped them build music synthesizers and when I developed the Vidium, they found that it was a really sympathetic way of producing images directly from their signals to get a visual synthesis of what they were doing sonically. […] Don Buchla was the strongest influence I ever had in terms of the way he did things. If you look at this, you'll see that it's very similar to his synthesizers in the philosophy of what it does: control voltages, logic voltages, signal voltages and unshielded banana jacks, so that you can stack them which makes the flow much simpler. I think technically you can say that this machine could have been designed by Don Buchla[52].

[49] *Ibid.*

[50] Cf. P. Auslander, *Liveness: Performance in a Mediatized Culture*, Routledge, London-New York 1999; P. Sanden, *Liveness in Modern Music: Musicians, Technology, and the Perception of Performance*, Taylor & Francis Group, New York-London 2013, pp. 88-112; Viola, *The Sound of One Line Scanning*, cit.

[51] This operational difference between working with video or computer was also highlighted by Lillian Schwartz, cf. Schwartz, Schwartz, *The Computer Artist's Handbook*, cit., p. 216.

[52] B. Hearn, *Vidium, 1969*, in *Pioneers of Electronic Art*, edited by Dunn, cit., p. 105.



Figg. 3-4

Still in 1969 at Berkeley, Hearn took part in an audiovisual performance of feedback-centered improvisation using the same device, this time on input from the analog Moog synthesizer of Skip Sweeney, a member of the Video Free America collective[53]. A trace of the latter performance can be found as it was edited by Sweeney and broadcasted on WNET in the *Video and Television Review* show, while the earlier performance can be solely traced in Ciani's archives.

Lillian Schwartz and Bell Labs: performing the artmaking

Schwartz created kinetic sound sculptures with sensors, as well as computer-generated artworks. Similarly to Ciani, she collaborated with E.A.T. by taking part in the pivotal exhibition on media arts *The Machine as Seen at the End of the Machine Age* (1968-69) that was curated by Pontus Hultén at MoMA[54], a friend of Billy Klüver. She presented a multimedia interactive sculpture, *Proxima Centauri* (1968), made with found objects such as her mother's sewing machine. The exhibit gave her the chance to get to know Knowlton, an engineer-artist at Bell Labs, where

[53] Cf. the video *Illuminating Sweeney* (1975) is online on the official website of the distributor Video Data Bank, <https://www.vdb.org/titles/illuminatin-sweeney> (last accessed: 20 December 2024).

[54] Cf. *The Machine as Seen at the End of the Machine Age*, in MoMA, <https://www.moma.org/calendar/exhibitions/2776> (last accessed: 20 December 2024).

she became the first female artist-in-residence accomplishing the status of 'resident visitor' (1968-2002); later, she was in residence at TV Lab/WNET and collaborator of MIT Media Lab, where she experimented with Symbolics, a computer software of artificial intelligence. Among her computer films produced at Bell Labs, we can find: *Pixillation* (1969), *UFOs* (1970), *Olympiad* (1971), *Mutations* (1972), *Googolplex* (1972), *Metamorphosis* (1972), and *Trois Visage* (1977).

Pixillation (1969) is the main outcome of the collaboration between Schwartz and Knowlton, which was composed using BEFLIX. It is an animation that mixes scenes conceived by the computational machine with shots of drawings furtherly painted on film rolls, blending the languages of abstract film, computer animation, and video art. Schwartz experimented also with soundtracking, adopting either computer or electronic techniques: «The first composition […] was made by Dick Moore, who used GROOVE. The second track was by Frank Lewin [… who used] all four tracks available on film at the time for his composition played on harpsichord, ondioline, and celesta. Gerhon Kingsley composed two soundtracks with his analog Moog synthesizer»[55]. For the artist, in *Pixillation* the aural dimension had a special role since it functioned as the «drum roll on the eyes»[56], establishing the work as synesthetic cinema. Its composition was intended to achieve what Michel Chion later termed «audiovision»[57], but also disclosed spatial and multidimensional qualities when projected and broadcasted, since, for Schwartz, «orchestrated music can be thought of as a kinetic sculpture in the sense that the music is shaped de novo each time it is played live»[58].

Together with her book[59], the main documentation on Schwartz's practices with moving images is the documentary film *The Artist and the Computer* (1976), directed by John K. Ball and produced by Bell System, that stressed the emphasis on process and testimony[60]. «Imagination, intuition and emotion» are the key-

[55] Schwartz, Schwartz, *The Computer Artist's Handbook*, cit., p. 194.

[56] Quote in M.G. Mattei, *Il percorso storico della computer art*, in *Le arti multimediali digitali*, edited by Balzola, Monteverdi, cit., p. 272.

[57] Cf. M. Chion, *L'audio-vision. Son et image au cinéma*, Nathan, Paris 1990.

[58] Schwartz, Schwartz, *The Computer Artist's Handbook*, cit., p. 177.

[59] Cf. *Ibid.*

[60] On the emphases cf. M. Cucco, M.T. Soldani, F. Spampinato, *Vite d'artista. Forme, enfasi e mercati del documentario biografico d'arte contemporanea*, in «L'avventura», n. 1, 2024, pp. 66-68.

words that the artist chose to present her work. Telling the story that brought her to Bell Labs, her voice underlines the capabilities of computer for «remembering, restoring […] and playing back to you what you have in your mind». She explained the tools involved, such as the light pen that creates a physical connection with the machine underlining a process activated by gestures. According to her, this intuitive method doubled the approach of a painter on oil canvas, which required other skills: «editing, knowledge of color and optical effects, the ability to combine sounds and pictures». Finally, the artist highlighted how crucial the skillfulness in computer programming and the collaboration in team are.

The Artist and the Computer shows how the documentation of artist' practice in labs, working on computational machines with scientists, is critical for developing audiovisual electronic works. Corporations such as AT&T and IBM, which were devoted to conception and commercialization, awarded the status of artist-in-residence to explore the aesthetic potential of the computer and to create appealing models for the audience[61]. At Bell Labs, engineers were able to draw upon aesthetic approaches to develop the internal and external design of machines. In this manner, corporate funds had been invested to create artistic patterns and prototypes in an experimental fashion.

Hybridity returns as a key concept that defines working with computer-generated images before the full digital era, as in the workflow of Whitney and Stan VanDerBeek[62]. Their films involved: computational images, electronic music, and found footage; the use of magnetic microfilm recorder, video monitors, and cameras; the processes of recording and editing on printed rolls. Schwartz's pioneering experimentations were overlooked in respect to those of male artists that had worked with these technologies, such as Paik. Her name mostly appears in books dedicated to computer art or new media art – branches subdivided and, over time, separated from the electronic arts[63].

[61] Cf. D. Wershler, L. Emerson, J. Parikka, *The Lab Book. Situated Practices in Media Studies*, University of Minnesota Press, Minneapolis 2021, pp. 187-212.

[62] Cf. Youngblood, *Expanded Cinema*, cit., pp. 135-256.

[63] Her name is only quoted in J. Reichardt, *The Computer in Art*, Studio Vista-Van Nostrand Reinhold C., London-New York 1971, pp. 23-24, 77; H. Franke, *Computer Graphics/Computer Art*, Phaidon, London 1971, pp. 77, 129; while it disappears in T. Dreher, *History of Computer Art*, Lulu, Morrisville 2020, pp. 119-200.

Steina Vasulka, The Kitchen and SUNY Buffalo: self-feedbacking in time

For Steina, an Icelandic musician and partner of Czechoslovakian filmmaker Woody, the approach to video came through the exhibition *TV As a Creative Medium*. The initial art experiences of the couple in New York fostered a collaborative dimension focused on the first electronic devices they obtained: a Portapak camera, a Buchla synthesizer, a video recorder, a player, and three b/w monitors[64]. Between 1969 and 1970, they employed these tools to record cultural events and experiment «hook[ing] the two up and sometimes [using] the audio signal to generate video images, and sometimes [using] the video signal to generate sounds»[65]. According to Steina, the common denominator of those instruments was the equal electronic signal: «We approached the art material, meaning that we dealt with voltages and frequencies. We are dealing with the signal, that is the audio signal and the video signal»[66]. This set-up defines the dialogic nature among devices, sound, and electronic image in the early works, which characterizes Steina's approach. According to Woody: «What was really, truly significant to us at that time was something nobody really detected. That was to make pictures by audio frequencies, and to get audio frequencies out of pictures»[67].

This configuration, which was initially enriched mainly with monitors where live feedback could be realized and different portions of transmitted images could be switched in delay, provided Steina with the possibility of processing sound and working with the electromagnetic spectrum. This enabled her to articulate vertical and horizontal pulsations by taking on, not only a spatial, but also a graphic dimension[68]. The production of the electronic versus kinematic image

[64] Cf. P. Bode, *Interview with Steina Vasulka, April 1, 1998*, doc. n. ETC2573, in Experimental Television Center Archives, pp. 5-13, <https://archive.org/details/ETC2573> (last accessed: December 20, 2024).

[65] Cf. Branson Gill, *Video: State of the Art*, cit., p. 83.

[66] *Ibid.*

[67] *Ibid.*

[68] «Experiments with an oscilloscope (an instrument making visible 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» L. Dolanova, W. Vasulka, *Woody Vasulka: Dialogue with the (Demons in the) Tool*, in *The Emergence of Video Processing Tools. Vol. 1*, edited by K. High, S. Miller Hocking, M. Kimenez, Intellect Ltd, Bristol 2014, pp. 284-285.

was also distinguished through movement, so its absence of fixity: «What this does is disregard the reference of being locked into a single frame. It travels; there are two-time layers. One is static, and the other is dynamic and all this is exposed»[69]. Dynamism was emphasized from her earliest audiovisual performances, such as the one at Max Kansas' City steakhouse[70], and was articulated in Steina's early experimental phase.

Because of their participation in these live electronic shows, the Vasulkas were approached by Andy Mennick, who proposed them to take over a rundown kitchen in the Mercer Arts Center in Soho, renamed The Kitchen by the couple[71]. The technological equipment in the space was gradually expanded by tools that other artists were providing, and regular programming was established, comprising closed-circuit video performances, single-channel video projections, and concerts that were curated by Rhys Chatham. The Vasulkas ran the space from 1970 to 1973, receiving support from the New York State Council of the Arts and afterward from Wise (Howard Wise Gallery/EAI). The Kitchen was routinely visited by such artists as Paik, Moorman, Shirley Clarke, Laurie Spiegel, and Mary Lucier. Events organized under Vasulkas' direction included: the mentioned Women's Video Festival and the Computer Art Festival (1973-75), which featured early computer films of Schwartz and Doris Chase[72]. In 1973, the Vasulkas moved to Buffalo, where first Woody (1973) and then Steina (1979) became professors. There, Steina made video works that experimented with feedback, delay, noise, signal, and live transmissions, such as *Distant Activities* (1972), *From Cheektowaga to Tonowanda* (1975), *Orbital Obsession* (1977), *Violin Power* (1970-1978), *Bad* (1979), and *Cantaloup* (1980).

Violin Power (figs. 5-6) represents a paradigmatic moment for the electronic signal experiments, operating the synergy between sound and visual machines through manipulations and combinations of waveforms, frequencies, and voltages in a closed circuit. Characteristic of the video's sound image is the Rutt-Etra

[69] W. Vasulka, in Branson Gill, *Video: The State of the Art*, cit., p. 84.

[70] Cf. Bode, *Interview with Steina Vasulka, April 1, 1998*, cit., p. 12.

[71] Cf. *Ivi*, pp. 14-30.

[72] Cf. *Ivi*, p. 26; *Computer Art Festivals*, in Electronic Arts Intermix, <https://www.eai.org/webpages/1173> (last accessed: 20 December 2024).

synth processing Steina's violin signal, which is also filtered by a keyer, and the Phase Shifter sound synthesizer devised by Bode, whose modification of the electronic image signal into tilting and stretching lines gives the illusion of an almost 3-D image[73]. The work is centered on a self-portrait of Steina in constant transformation through the changes in the video signal managed by the sonic action of violin playing by that luminous and flexible body-entity that Woody defined «time-energy object»[74]. At one point, the very image of the artist becomes pure line patterns in the electronic space-time, and finally returns to the culturally accepted image of the female musician as a 'canonized violinist' – «c'est moi!» says Steina ironically.

Figs. 5-6

All the frames that make up the work, created over about ten years, recorded a fluctuating and precarious self, not inscribable in what used to be the frame, but vibrant through the dialogue with machines and the interactions between different configurations. As Gagnon states, this closed-loop self-portrait shows «an identity becoming intermittent and fragile, caught in the act between mastery and control, self-affirmation through the virtuoso performance, and the dissolution of identity through sound waves»[75]. In the year of completion, Steina presented the work at the opening installment of the TV show *Vasulka Video*,

[73] Cf. J. Gagnon, *A Demo Tape on How to Play Video on a Violin*, in *The Emergence of Video Processing Tools. Vol. 1*, edited by High, Miller Hocking, Kimenez, cit., p. 313.

[74] *Ibid.*

[75] *Ivi*, p. 314.

which was broadcast live on WNED Buffalo channel and was the first of six episodes about Vasulkas' work[76]. In the studio, among her instrumentation, the artist commented, even technically, on her work process while the video was displayed on various monitors, which she usually used to create. The *Violin Power* self-portrait transmitted on multiple screens engages a potentially endless process of feedback, in which Steina looks at her closed-circuit image in the monitor and then turns to the camera, re-circulating an image of herself in the network.

Waves as generative principles of the electronic arts

The experiences of Ciani, Schwartz and Vasulka in 1960s-1970s, analyzed here, primarily indicate two aspects: that female artists working with electronic tools were highly skilled and supported the implementation of machines and techniques; that collaboration, that is, the relational dimension, is one of the preferred conditions for working in the emergent electronic arts, inherent to the interest in the materiality of media. The practices activated by female artists in electronic arts particularly enhance the concept of 'liveness' in the processual dimension of making art: it is evident in the case of Ciani's performance with Hearn, where the signals of the two synths created a personalized 'sonic-image' and an experience of sonicity that existed only *hic et nunc*; it is central in the creation of signal experiments in *Violin Power*, where Steina shaped an image of herself through the dialogic relationship with her instrumentation; it is implicit for Schwartz, whose performativity was connected to freeing paint from the fixity due to electronic music, as well as to the gestures of using the pen on the monitor, controlling the joystick, coloring, cutting, and assembling the works.

The liveness guaranteed by switching and transforming the audio-video signals in the electronic devices determines a performative dimension that creates a 'tempor(e)al dimension' to be crossed (by performers and audience), on which Ernst insists, marking the fact that electronic media work on temporality:

> Sound and music let us experience transient time. It is this processuality that the sonosphere shares with high-electronic media. [...] A privileged alliance between sound events and operative media reveals the moment that their common denominator is detected: both come into being only when being in time. [...] Passing time[77].

[76] Cf. Record file online on Electronic Arts Intermix, <https://www.eai.org/titles/vasulka-video> (last accessed: 20 December 2024).

[77] Ernst, *Sonic Time Machines*, cit., pp. 22, 25, 29.

These are malleable and dematerialized audiovisuals, which have an electronic essence that is distinct from the photochemical processes of photography and cinema, as identified by Viola[78], and move through space in the form of electrons passing through bodies with frequencies that are audible but not to the human ear, which can hear them only through amplification technologies. The performativity of electronic media that is articulated in live events and practices by female artists thus enables a strategy that can challenge some of the cornerstones of the canon of Western arts and music, such as composition and the fixation on paper or recordings, as well as the role of institutional archives and the discipline of music philology in protecting that (white male) canon: «To some extent, hearing is a memory, but in ways radically different from static storage and the archive. Reverberative sonic memory challenges the symbolic order of the archive»[79].

This electronic process has been based on waveform and waves, especially radio and sound waves, that are visual, spatial elements of both analog and digital nature. According to Jeffrey Sconce, «the structuring metaphor of the 'etheric ocean'» was used to explain the wireless communication of radio and TV in the early days, as well as to describe a new social order that was shaped by electronic media and urban life[80]. Waves also become *topoi* appropriated metaphorically by female artists to define their own identity: Spiegel titled a piece *Old Wave* (1980), Ciani produced the album *Seven Waves* (1982), and Jonas mirrored herself on a waved surface of water in *Disturbance* (1974). For these artists, audiovisual electronic devices enable action in time through performativity and, through the waves, they create movement in space that is, in essence, 'tempor(e)ality'. As Ernst points out: «We are now trying to visualize space which exists only as electro-

[78] Cf. Viola, *The Sound of One Line Scanning*, cit.

[79] Ernst, *Sonic Time Machines*, cit., p. 27.

[80] «Oceanic metaphors proved versatile in capturing the seeming omnipresence, unfathomable depths, and invisible mysteries of both radio's ether and its audience […]. Following the logic of this metaphor, the electronic message, once set loose from the swift currents of the insulated wire to fare upon the open sea of the electromagnetic spectrum, became a small boat tossed about on the waves of this etheric ocean, just as many citizens found themselves adrift on the new century's social currents», J. Sconce, *The Voice from the Void: Wireless, Modernity and the Distant Dead*, in «International Journal of Cultural Studies», vol. I, n. 2, p. 214.

magnetic forces. It's the notion of the organization of energy in time that for me is the key to all sorts of changes within life»[81].

Other operational and conceptual *topoi* still bring us towards the creation of a spaced-timed 'otherness', an electronic mediasphere that can transcend what is tangible for human senses: the 'feedback', a practice that defines both the dialogical relationship of the artists with the devices and the conflicting relationship with the vertical power structure of the broadcasting system[82], reveals a dynamic 'sonic-image' that implies the idea of infinity, endlessness; the 'delay', a tool and effect that allows the duplication and layering of signal(s) over time, accumulating signal(s) in multiple tempor(e)alities co-present with the body in the space. These are the tools that female electronic artists customized and activated in live events – at the Exploratorium and the Kitchen, in the studio and in the lab – to challenge the conditions of creating and sharing in an art world dominated by men.

Thus, the female artists who approached electronic media at the time have been able to operate actions to free themselves from the Western canon through the development of customized technological processuality with a collaborative attitude. This was articulated through the transmission and reception of electronic signals, their manipulation and control by oscillators, as well as by the co-presence of *live* subjects in person or in telepresence, as in the teleconcerts of Maryanne Amacher, Oliveros, and Vasulka. The early practices of Ciani, Schwartz, and Vasulka in 1960s and 1970s, mostly overlooked, must be reconnected to those of such multimedia artists as Laurie Anderson and Björk, who, respectively, from 1980s and 1990s have been acclaimed both at a critical and popular level. They emerged as electronic music composers and were finally welcomed in art institutions, as it is confirmed by their solo exhibitions curated at MoMA (2015)[83] and the Moderna Museet (2023)[84]. Today, electronic female artists, such as Caterina

[81] Vasulka, in Branson Gill, *Video: the State of the Art*, cit., p. 85.

[82] Cf. K. Horsfield, L. Hildebrand *Feedback: the Video Data Bank Catalog of Video Art and Artist Interviews*, Temple University Press, Philadelphia 2006; D. Joselit, *Feedback: Television against Democracy*, The MIT Press, Cambridge 2007.

[83] *Björk*, MoMA, New York, March 8 - June 7, 2015, <https://www.moma.org/calendar/exhibitions/1458> (last accessed: 20 December 2024).

[84] *Laurie Anderson. Looking into a Mirror Sideways*, Moderna Museet, Stockholm, April 1 – September 3, 2023, <https://www.modernamuseet.se/stockholm/en/exhibitions/laurie-anderson> (last

Barbieri, are called to contribute to intermedial projects and have a consolidated role in the world of arts[85]. Their positions should be reframed in a history of contemporary arts in light of early experiences of female electronic artists.

accessed: 20 December 2024).

[85] Cf. at Venice Biennale, *Due qui / Two Hear* exhibition (2024) <https://creativitacontemporanea.cultura.gov.it/padiglioneitalia2024-biennalearte/>; *Caterina Barbieri is the New Artistic Director of the Music Department*, in La Biennale di Venezia, 5 November 2024, <https://www.labiennale.org/en/news/caterina-barbieri-new-artistic-director-music-department> (last accessed: 20 December 2024).