Figure 1. Nina Sobell, *EEG: Video Telemetry Environment* (also known as *Brainwave Drawings*, 1975), installation at the Contemporary Arts Museum, Houston. Courtesy of Nina Sobell

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Intimate Connections: Alternative Communication Threads in Nina Sobell's Video Performances and Installations (1974–82)

Cristina Albu

Reflecting on the performative and interactive coordinates of her video practice, artist Nina Sobell states: "I became the public and the image in between. I dove into the intimacy of the screen. I made no rules, no requirements to entertain. I could conjure mystery, melancholy, unabashed sensual sentiment, or cold detachment."[1] In 1975, visitors to her *EEG: Video Telemetry Environment* at the Contemporary Arts Museum in Houston could partake in a half-intimate, half-public scenario that bore witness to the artist's dedication to fostering open-ended communicative possibilities.[2] They joined in a ritual that at first sight more resembled the preparations for a medical visit than the initiation into an aesthetic experience. After signing up in pairs to take part in the environment, visitors had electrodes attached to their heads to have their brainwave frequency measured (fig. 1). They sat down in a room set up with a couch, a coffee-table, and a TV monitor to witness

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Figure 2. Nina Sobell, *Brainwave Drawings* (1974–), screenshot from video documentation of interaction with the installation. Courtesy of Nina Sobell

otherwise imperceptible communicative acts established between their brains. Gradually, all associations with a medical examination gave way to participants' immersion in a meditative experience. On the screen, they could watch a live video broadcast of themselves as well as a pair of wavy lines oscillating in conjunction with the rhythmic activity of their respective neural systems. At times the images would become suffused with intense color tones, which were randomly produced despite visitors' conviction that they could influence them via their mental activity.[3] The cybernetic circuit established across participants' bodily thresholds alerted them to the contingent nature of mental activity modeled by interactions with others. In some instances, participants could observe the convergence of the vibrating lines into a full circle, which denoted a temporary synchronization between their brains' rhythms (fig. 2). Their access to a double layer of visual information, encompassing both their body language observable via the video interface and the abstract signs of their neural activity,

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encouraged them to self-regulate their body rhythms and possibly aspire to greater interpersonal attunement.

In what follows, I delineate how Nina Sobell's *EEG-Video Telemetry Environment,* better known as *Brainwave Drawings* (1973–),[4] relates to her feminist video performances from the 1970s and to works by other artists that employed biofeedback with the aim of heightening sensitivity to the flux of consciousness at a time when ecosystemic modes of thinking about the mind, body, and society were gaining ground.[5] Her performance works have not been discussed in correlation with her interactive art and technology projects, even though both bodies of work relate to obstacles in communication and the role of interpersonal inferences in the modeling of selfhood.[6] By reconnecting these loose knots in the historical construction of Sobell's artistic trajectories, I show that her performative attacks on behavioral and verbal taboos staged solely for the camera lens are indelibly linked with her inquiry into more immediate, though invisible, ways in which we consciously or unconsciously impact other people's psychic states. Both sets of works are informed by an arduous search for intimacy—an experience of physical and emotional closeness that empowers individuals to withstand societal conventions and genuinely open up to others.

Paradoxes of Mother-Infant Communication through the Video Lens

In the midst of social movements in the late 1960s, video emerged as a promising alternative to television by empowering people to create their own documentation of events and generating more open-ended communicative exchanges. It also stood out as an instrument for expanding self-reflective processes by allowing individuals to observe their body language as if from a third perspective, lodged neither solely in their subjectivity nor in the voyeuristic gaze of an onlooker. In artist Paul Ryan's words, it enabled "one to think of self not as center on a private axis, but as part of a trial and error nexus of shifting information pathways," as part of a modulating cybernetic circuit.[7]

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For feminist artists, video constituted a medium unconstrained by prior conventions, which allowed them to mock television shows that featured women fulfilling normative roles and to present themselves as liberated subjects taking charge of constructing their own personae in front of the camera. Notable examples of their strategic manipulation of video include Joan Jonas's embodiment of Organic Honey, an alter ego she developed in 1972 to expose the masks women adopt in their negotiation of identity, and Martha Rosler's blunt transformation of household items into tools of self-expression and empowerment in *Semiotics of the Kitchen* (1975). Whether integrating video in performances for a live audience or closely observing their live images in the video monitor while recording in the studio, women artists actively choreographed their postures and gazes to undermine preconceived notions of womanhood. As Lucy Lippard points out in her lucid assessment of the critical reception of women's body art in the 1970s, such performative acts were often judged as mere manifestations of narcissistic impulses when in fact they were in most instances radical tools for transforming women's bodily presence from object to subject of representation in art.[8] The video interface had an empowering quality, permitting female artists to define themselves through corporeal and visual means that oscillated between spontaneous and preplanned modes of self-representation in relation to an imagined gaze. Self-reflective acts in women's performances for the camera did not simply epitomize a solitary search for individuality but exhibited a vivid awareness of the social systems within which individuals act and define themselves in relation to others.[9]

Sobell first started experimenting with video technology during her MFA studies at Cornell University in the early 1970s. As the first woman to be accepted in the university's graduate program for sculpture, she faced significant constraints in terms of studio space allocation and financial support.[10] Sobell took these obstacles in stride and reached out to other departments to receive support for her creative endeavors, which often entailed the use of unconventional materials such as foam, leaves, and heat-sealed plastic bags. She approached the sculptural medium in an expanded context, putting it in dialogue with outdoor environments

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and video technology in order to expose the variability of matter in relation to shifting spatial and temporal coordinates. Sobell first used video in an art context on the occasion of her MFA exhibition *The Disintegration and Re-creation of Objects within a Sequential Time Period* (1971) when she filmed the playful interaction of exhibition visitors with sculptural objects placed both indoors and outdoors. Later she presented the recordings of past participatory responses to her work in the gallery along with closed-circuit television images featuring visitors' present reactions to the exhibition with a six-second delay.[11]

Closely observing changes in people's behavior in the presence of cameras, Sobell acquired an interest in the performativity inspired by video.[12] After moving to Los Angeles in 1971, she started filming objects such as bicycle wheels and reflective surfaces that appeared to move on their own and had a quasi-hypnotic effect. Some of her video vignettes from this period are reminiscent of Marcel Duchamp's Rotoreliefs from *Anemic Cinema* (1926). Less focused on machine aesthetics, Sobell's pieces are forcefully evocative of the poetics of lively matter as she lets the camera linger on a whole range of everyday materials that appear infused with energy. In the early 1970s, the artist shared an interest in optical effects with her then partner John Sturgeon, whose video work similarly engaged with the life of quotidian elements. Sobell and Sturgeon often took turns filming each other's performances and explored how variations in material qualities can correlate with corporeal and psychic changes. In a series of works called *Elastic Receptions* (also known as *Elastic Equations*, 1972–73), Sobell gradually shifted her attention from the life of objects to the use of her body as medium. She assumed a more active and visible role in these videos, first moving her face and body beneath translucent materials, then appearing as a shamanic figure performing ritualistic gestures on a beach. In all these instances, the camera lens was her sole designated witness. Eventually Sobell let go of materials that concealed her face in video performances and emerged as an unabashed subject, free from inhibitions. She found video liberating, a catalyst for releasing the individual from the constraints of behavioral norms in public space. For her, as for other women

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Figure 3. Nina Sobell, *Baby Chicky* (2 October 1981), video performance, Venice, CA. Photograph by Chris Shearer. Courtesy of Nina Sobell

artists, it framed a safe, intimate space.[13] She associates her video performances with a form of "behavioral art" in which "extreme intimacy, immediacy, and vulnerability all braid together."[14] These works offered her a venue for both introspection and public exposure of social constructs that impinge on self-definition.

Starting in 1974, Sobell enacted a series of video performances in which she used a chicken carcass as a character alternatively embodying the role of a mother and a baby (fig. 3). Her oftentimes sensual engagement with raw animal meat is reminiscent of Carolee Schneemann's *Meat Joy* (1964), especially at the level of both artists' interrogation of sexual norms. Sobell's use of this visceral medium bears even more resonances with Suzanne Lacy's conceptual photographic series *Chickens Coming Home to Roost* (1975–76) and her video performance *Learn Where the Meat Comes From* (1976) in which the artist draws striking parallels between the treatment of the female body and that of animal carcasses

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subjected to violence, fetishistic segmentation, and consumption. The corporeal identification between woman and animal in such feminist works opens a conceptual gateway to considering abuse of power, insensitive objectification, and indiscriminate judgments in patriarchal societies. Sobell's strategic use of the chicken analogy in video works entails additional implications since it is evocative of the mother-infant bond. Through the lens of her performances, the experience of motherhood appears highly paradoxical, characterized by an entire spectrum of contradictory feelings such as tenderness and repressive control, affective attachment and cold aloofness, joyfulness and apprehensiveness. Sobell's practice echoes what Andrea Liss calls "the feminist mother's admission that ambiguity is often the norm" as she struggles to come to terms with normative societal expectations.[15] The artist's preoccupation with the paradoxes of maternal behavior in video performances is not far removed from her concerns with obstacles in communication, which are apparent in her *Brainwave Drawings*. Both genres of works suggest that social codes stifle the possibility for more fluid affective exchanges that unavoidably imply ambiguities and dissonances characteristic of unregulated systems of information.

In *Chicken on Foot* (1974), Sobell repeatedly smashes eggs on her knee to prompt the rise of her foot dressed in a chicken carcass, which spontaneously performs lively dance movements in response (fig. 4). This one-take video performance humorously pairs a destructive act with an expression of jouissance. Art critic David James praises its wit and remarks that it serves as a perfect countermodel to commercial television since it is "entirely incompatible with mundane reality."[16] The performance also carries more serious undertones from a feminist perspective. The knee-jerk reflex instantiates the immediacy of feedback and the communicative bond established between mother and infant as she almost unconditionally starts responding to her baby's needs. Yet there is also something deeply ironic about the repetitive seesawing movements of the leg, which offer no promise of salvation to either the egg or the chicken. Both are equally entangled in a never-ending circle of life and death.

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Figure 4. Nina Sobell, *Chicken on Foot* (1974), still from video performance, B&W. Courtesy of Nina Sobell

Sobell enacts another absurd scenario with a chicken carcass in *Hey, Baby Chicky!* (1978), a video piece which even more blatantly unveils the paradoxes of the mother-infant relationship through a kitchen dance that sometimes verges on the macabre. To the upbeat tune of Wilson Pickett's "Midnight Hour," the artist unwraps a chicken package, alternatively transforming its limp body into a sexual object and a lively animal subject demanding attention and caresses. Through its humorous transgression of behavioral taboos, the piece resembles Wolfgang Stoerchle's video performances from the 1970s, which similarly challenge viewers to face their anxieties about sexuality. It is composed of four clearly delineated scenes in which the artist oscillates between the role of a woman unabashedly revealing her sexual desires and that of a mother whose body acquires a primarily nurturing function.[17] The third act of the performative interaction is the most conflicting one since the two roles overlap, prompting an encounter with the abject. As the music changes to Barbara Lewis's "Baby I'm Yours," Sobell makes a surprise appearance from beneath the table and

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Figure 5. Nina Sobell, *Hey, Baby Chicky!* (1978), still from video performance, B&W. Courtesy of Nina Sobell

starts licking and sucking on the chicken carcass. The object of consumption is then pulled up and pressed against the artist's naked breasts in a presumably nurturing, yet also somewhat morbid dance (fig. 5). As Julia Kristeva explains, the abject is experienced when the differences between subject and object collapse. In her words, it is "what disturbs identity, system, order. What does not respect borders, positions, rules. The in-between, the ambiguous, the composite."[18] In *Hey, Baby Chicky!*, it is not simply the presence of the raw meat that prompts the experience of abjection, not even its manipulation as a sexual prop, but its failure to acquire a definite signification. The chicken is simultaneously an identity marker for the woman and for the infant, a signifier both for the mother's sexual needs and the baby's dependence on her. The final scene brings some degree of comic relief, since Sobell and the carcass more clearly enact fictive characters putting on a humorous show. The artist mimics the facial movements of an elderly lady and wraps the chicken in a boa scarf. After a series of energetic dance movements, the carcass appears to almost willingly enter a purse—the abject is contained and order appears to be restored as the sharp boundaries set between subjects and objects, the living and the dead reemerge. This separation alludes to repression and surrender to social expectations, especially from the perspective of the virtual transformation of the chicken—the ambiguous source of abjection—into a mere accessory.

What might appear as an individual woman's mad turn to infanticide or a reification of the Medea myth in *Hey, Baby Chicky!* is actually the portrayal of a drama caused neither by an innate disposition to insanity, nor by fate, but by contradictory societal

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expectations.[19] This notion is better evident in Sobell's *Into the Pot You Go* (1982), a performance where the artist more explicitly voices her concerns regarding the normative path an individual needs to follow to reach social integration.[20] In contrast to prior pieces in which the artist uses the chicken carcass as a prop, this video conveys a greater urge for becoming other—identifying as closely as possible with an animal being in order to rethink what it means to be human. It also betrays a more evident preoccupation with the demands society imposes on mothers and infants. Not only does Sobell treat the raw chicken as a baby in *Into the Pot You Go*, but she herself wears a chicken carcass on her head as a mask meant to communicate a deeper bond at the level of a shared sense of alterity.

Upon entering the scene from behind a curtain, Sobell directly addresses the audience. She wonders if the baby is ready for a new lesson, lifting him up from a pot, which supposedly served as his bathtub (fig. 6).[21] Through an adroit game of make-believe infused with glissando speech variations and high-pitched tones typically associated with baby talk, the artist delivers a first lesson in self-identification through visual representation. Facing the baby chicken with four crayon drawings, out of which only one portrays a chicken carcass, she asks him to select the image that matches his identity. There is something highly absurd about this test, since the mother-teacher actually serves as a blind guide to the chicken's encounter with the pictures. Her face is completely covered up by the carcass mask as she turns the baby chicken toward the drawings.

Enforcing reward mechanisms, the artist offers the baby chicken food after he successfully completes the test. Ironically, part of it consists of scrambled eggs, a possibly subtle warning about the cruelty one is bound to encounter even between members of the same species. Sobell states that the chicken served as a "symbol for the human," a means of "showing how we disregard the physically and mentally challenged."[22] The threat posed to alterity in the social world is further signaled in subsequent lessons integrated in the performance. The mother anxiously imposes new demands on the baby chicken's abilities, expecting him to learn

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Figure 6. Nina Sobell, *Into the Pot You Go* (1982), performance, Los Angeles Contemporary Art Exhibitions. Courtesy of Nina Sobell

how to walk, talk, and eat properly. Her dialogue with the animal recalls artist William Wegman's conversations with his dog Man Ray. The dog appears as a distracted student in *The Spelling Lesson* (1973–74), a video capturing the artist's attempt at teaching him how to distinguish between words with similar pronunciations but

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different meanings. Both Sobell and Wegman cast animals in the role of human surrogates and stage humorous teaching scenarios that cunningly unveil how discipline is enforced in society. After delivering harsh commands, Sobell offers gentle encouragements to the baby chicken in order to reveal the social pressure experienced by both mothers and infants. Despite impersonating the role of the social disciplinarian, the mother figure repeatedly admits that she herself cannot keep up with what is expected from her. There is a sense of affective communion that develops between the "chicken" mother and infant at the level of the impossibility of perfectly meeting societal standards even though the performance ends on a highly dramatic note with Sobell's threatening statement: "If you can't walk and you can't talk, into the pot you go!" The piece makes visible a utilitarian view on the function of the individual in society and a sense of motherly guilt for inflicting upon the infant demands that have also been imposed on her.

Sobell's interest in showcasing both the corporeal aspects of mother-infant relationships and the unavoidable social constraints that impinge on them underscores the limitations of feminist art-historical categories that enforce divisions between a 1970s generation of artists prone to emphasize essentialist approaches to female identity and a 1980s generation illustrating its plasticity and social parameters. This artificial antagonism between biological definitions and social constructions of womanhood in feminist art has been critically interrogated both on account of its enforcement of deceptive dichotomies and its imposition of rigid chronological boundaries. Helen Molesworth argues that the presumed rupture between 1970s essentialist feminism and 1980s theoretical feminism obscures the affinities of women artists' practices with minimalism, conceptual art, and the critique of art institutions.[23] Similarly, Kate Mondloch contests this fallacious division, indicating that the social negotiation of identity is already evident in feminist artworks from the 1970s.[24] Sobell's performances with chicken carcasses developed between 1974 and 1982 offer a case in point. While her subversive identification with a nurturing mother brings her work in close proximity to the essentialist category of feminist art, her use of body and verbal language to undermine the fix-

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ity of this identity places her practice in dialogue with theoretical feminism. Whether implied, actual, or staged, the space of the kitchen in Sobell's performances constitutes a battleground for confronting stereotypical representations of motherhood and laying bare the contradictory inclinations women experience as they are torn between corporeal instincts and socially sanctioned modes of behavior.

In addition to showcasing the artificiality of dichotomies between feminist art generations, Sobell's practice compels us to consider the divisions generally drawn between the categories of feminist art and art and technology projects. At first sight, her performances with chicken props may appear to bear very little connection with her *Brainwave Drawings* despite the fact that they were both developed during the same time span (1974–82). Both sets of works are equally concerned with communicative processes, being driven by a search for a more honest and liberating way of exchanging information with others through abandoning socially regulated forms of discourse and embracing the language of gestures, which can subdue inhibitions. They represent two poles of a more or less explicit feminist inquiry into an aesthetic of playful exchanges that can subversively undermine or completely substitute forms of discourse that consolidate patriarchal structures. While the chicken performances correspond to a critical exploration of the specificity of female experience and an interrogation of the social construction of identity, *Brainwave Drawings* offers an alternative to essentialist modes of identity definition and a potentially liberating communicative path that unveils the fluidity and porosity of selfhood. These two facets of Sobell's practice should be seen as two sides of the same coin rather than two contrasting directions that are to be addressed in separate critical responses. In "Women's Time," Kristeva speaks of a need for merging two apparently distinct feminist projects: one driven by sociopolitical goals and one dedicated to pursuing psychosymbolic objectives by aiming "to give language to the intrasubjective and corporeal experiences left mute by culture in the past."[25] Sobell's works offer precisely such a bridge between the two projects by examining both the specific function of motherhood within the existing

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social order and the potential for overcoming certain essentialist differences between the sexes through contemplating their involvement in nonverbal exchanges that reveal the "relativity" of their "symbolic, as well as biological existence."[26] A meaningful correlation thus emerges between Sobell's video performances with chicken carcasses, which expose the variability of modes of identification with otherness, and her *Brainwave Drawings*, which unveil the dynamic transformation of participants' mental states. They both echo a search for more intimate interpersonal exchanges that reveal the concomitant singularity and fluidity of identity in relation to biological and sociopolitical criteria.

Playful Modulations of Consciousness

In 1973, Nina Sobell started to consider the idea of an environment that would render perceptible the potential attunement established between the minds of two individuals. By this time, the use of biofeedback for stimulating meditative states was becoming increasingly popular, especially in Los Angeles, where the artist was living.[27] The Biofeedback Research Institute had just been established there, and the technology was being used in the study of sleep disorders. Two years later, the *Brain/Mind Bulletin* started its run, circulating widely in art circles on the West Coast and popularizing new scientific ideas about consciousness. While most biofeedback training encouraged participants to turn inward, Sobell became intent on examining how people could utilize this technology to explore the threshold between an intensely private introspective state and a semipublic interpersonal relationship with a partner in brain wave modulations.

The roots of biofeedback technology are to be found much earlier, in the aftermath of the Second World War when the electroencephalograph device (EEG) was perfected, incorporating electronic components originally devised for radars.[28] In the 1960s, scientists started to employ this equipment in experiments testing whether humans could gradually acquire the ability to regulate their mental states while being exposed to acoustic stimuli or light flickers whose rhythm corresponds to that of their brain waves. The

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Figure 7. Photograph of a videotaped performance of Alvin Lucier's *Music for Solo Performer* at Wesleyan University, Middletown, CT, 1975 (first performed in 1965), from episode 3 of Robert Ashley's television production *Music with Roots in the Aether* (1976). Photograph by Philip Makanna. Courtesy of Lovely Music, Ltd.

aesthetic potential of biofeedback became apparent in the US in the mid-1960s as artists established collaborations with scientists to track changes in mental states by pairing variations in brain frequency with sensorial stimuli. In musical composition, ideas of biofeedback took firmer roots than in the visual arts.[29] This is easily explainable given the fact that most aesthetic experiments with this technology were geared toward the production of alpha waves, which generally cannot be produced while performers focus on visual stimuli. In 1965, Alvin Lucier created *Music for Solo Performer* after finding out about the direct correlation between the emergence of alpha brain waves and the transition into meditative states (fig. 7). With electrodes connected to his head, Lucier stood on the stage, waiting for his neural oscillations to reach the alpha threshold (13 Hz), at which their signal would be amplified and transmitted through loudspeakers to a set of percussive instruments echoing its vibrations.[30]

Similarly enticed by the idea of externalizing the fluctuating

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inner landscape of his body, dancer Alex Hay staged a performance called *Grass Field* in 1966. In a meticulous fashion, he placed one hundred numbered pieces of flesh-colored cloth on the stage while wearing electrodes on his head and back that registered variations in neural and muscular activity (fig. 8). Electronic sounds were emitted in conjunction with the mutable physiological processes taking place during this repetitive task. Eventually, Hay sat down in the middle of the stage while a close-up image of his face was projected on a central screen. He closed his eyes and suppressed self-expression, attempting to channel a more regular brain rhythm. *Grass Field* placed new demands on existing EEG technology since the artist needed to move as his neural frequency was measured. Engineer Herb Schneider had to develop a set of differential amplifiers specifically for this performance. While scientists were trying to limit the number of variables in EEG recordings in order to identify specific correlations between visual or acoustic signals and brain wave responsiveness, artists such as Hay were multiplying the number of parameters in relation to which brain activity could be made visible. They proposed new experiential scenarios that unveiled the complexity of body-mind relations.

Also interested in pushing the boundaries of existing biofeedback technology, composer David Rosenboom envisioned environments in which multiple participants could experience a combined acoustic landscape of their biological signals.[31] In 1973, he conceived an intimate interactive scenario for his *Vancouver Piece* installation. Two participants stepped into a dark and acoustically isolated room. They sat down beneath two cones of white noise as assistants placed electrodes on their heads. Separated by a two-way mirror screen made of aluminized Mylar, they were encouraged to channel the formation of alpha brain waves in order to modulate the environment (fig. 9). At the moment at which they reached a similar degree of relaxation based on their brain wave frequency, the light intensity increased on both sides of the room and the two participants were able to see each other's overlapping reflections in the mirror interface.[32]

Like Rosenboom, Sobell was concerned with triggering affectively charged communicative exchanges. Her *Brainwave Draw-*

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Figure 8. Peter Moore, performance view of Robert Rauschenberg and Steve Paxton in Alex Hay's (in collaboration with engineer Herb Schneider) *Grass Field at Nine Evenings: Theatre and Engineering*, New York, 1966. Photograph by Peter Moore. © 2019 Barbara Moore. Licensed by VAGA at Artists Rights Society (ARS), NY. Courtesy of Paula Cooper Gallery, New York, and Getty Research Institute, Los Angeles

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Figure 9. David Rosenboom, *Vancouver Piece* (1973), installation. Courtesy of David Rosenboom

ings project is more closely aligned with Rosenboom's interpersonal approach to the use of biofeedback than to Lucier's and Hay's pieces. Sobell relinquished the role of performer, offering the opportunity to museum visitors to experience the aesthetics of biofeedback as they watched their video images. Given the fact that *Brainwave Drawings*' content is modeled by art participants' communication, the work foreshadows the relational art genre theorized by Nicolas Bourriaud in the 1990s to account for the proliferation of projects enacted through the formation of interpersonal relationships between visitors.[33]

Sobell was first introduced to biofeedback technology in 1972, when John Youngblood together with engineer Mike Trivich brought an alpha wave conditioning device to her studio in Venice Beach. At the time, she wondered whether such a technological interface could actually capture the potential synchronicity between two people's mental states as they connected to each other. To put Sobell's idea in practice, Trivich suggested using an oscilloscope to visualize the neural activity of two individuals as a Lissajous figure in which two intersecting curved lines represented their different brain rhythms. These lines could converge in a full circle if partici-

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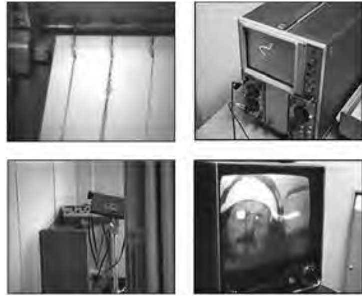
Figure 10. Nina Sobell, *Brainwave Drawings* (1974–), screenshots of interaction with the installation. Courtesy of Nina Sobell



pants managed to reach a similar neural frequency simultaneously. Otherwise, the lines would distort horizontally or vertically depending on the neural frequency of individual participants.[34]

The cybernetic system devised by Sobell and Trivich included an EEG, an oscilloscope, two video cameras, a special effects generator, and a television set that permitted participants to view a composite of their live video images and abstract renderings of their brain wave frequencies (fig. 10). In order to gain access to an EEG, Sobell contacted Dr. Barry Sterman at the Veterans Administration's Hospital in Sepulveda. She was granted access to this equipment only on condition that she offered quantitative proof of the reciprocal influence established between the brain wave frequencies of two individuals sharing the same space.[35] The project was not simply visualizing prior scientific findings but proposing an inquiry into a new research problem. Sterman's preoccupation with the accuracy of data that could serve as evidence of unconscious brain to brain communication contrasted with Sobell's driving motivation. In her view, the project was not solely meant to unveil the synchronization between participants' brain waves, but also to stimulate the development of their ability to modulate their neural rhythm through the observation of video feedback. The biofeedback scenario was complicated by the fact that participants had access to a switch permitting them to interrupt the video recording and play it back. Sobell and Trivich explained that the interaction with this system was supposed to grant participants a stronger sense of agency: "We hope to evolve the human species' innate ability to communicate nonverbally. . . . Creating a closed-circuit feedback loop to present the viewer their mental as well as physical image,

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we hope to reinforce control of one's environment."[36] The participants' ability to stop the recording allowed them to envision their experience more as a performance than as a scientific experiment over which they had little influence.

In 1975, the setting of *Brainwave Drawings* at the Contemporary Arts Museum in Houston contrasted sharply with the aesthetics of a lab environment. Participants sat in front of a TV monitor in a space that resembled a living room while the EEG and the oscilloscope were placed in a separate room. Sobell thus hoped to make participants feel more comfortable and less intimidated by the interactive scenario that turned them into performers. As the place where most families gather in the evenings, the living room served as a reminder of the need for shared experiences that consolidate relationships. Through the substitution of television broadcasts with live video images and brain wave representations modeled by participants, Sobell offered an alternative to prerecorded programs that close off dialogue and institute an alienating distance between onlookers who share the same space and focus of attention but may fail to establish communication with each other. Swapping back and forth between the kitchen space of her chicken performances and the living room of *Brainwave Drawings*, the artist maintained her feminist concerns about power hierarchies and the barriers that verbal exchanges impose on intimate connections. It is by no means surprising that quite a number of couples chose to sign up to interact with her installation in Houston. To Sobell's dissatisfaction, some even saw this as an opportunity for a compatibility test.[37] She felt this was at odds with the interactive concept for the work, which was meant to be playful yet open-ended, emphasizing ongoing feedback rather than fixed participatory goals.

To avoid misapprehensions about the stakes of the interactive scenario, Sobell embraced the role of installation guide throughout the display of *Brainwave Drawings*. She demystified technology by explaining how the EEG and video equipment worked. In her words, this felt like an act of "giving the piece to the visitors" (fig. 11).[38] This feeling of ownership over the work was reinforced by the fact that participants received an EEG ink trace of their

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Figure 11. Nina Sobell, *EEG: Video Telemetry Environment* (1975). Courtesy of Nina Sobell

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Figure 12. Nina Sobell, *EEG: Video Telemetry Environment* (1975). Courtesy of Nina Sobell

neural oscillations at the end of their interaction. Sobell personally circled the points where neural patterns converged on the chart.[39] The artist's gift served both as evidence of interconnection and as stimulus for strengthening the bond between two friends, partners, or strangers visiting the exhibition. Interestingly, participants shared ownership of the EEG trace and in some instances had to decide who would be in charge of keeping it. This further stressed the significant role of reciprocal responsibilities and acts of mutual generosity in consolidating relationships.

The highly personal implications of *Brainwave Drawings* evident at the level of the domestic setting and participants' dialogue with the artist contrasted with the more public dimension of the environment. The interactive exchanges between participants were exposed via closed-circuit video to a secondary audience. In an adjacent gallery space, Sobell placed a large screen showing images from the living room and four smaller monitors set in an arc formation featuring recordings of prior interactions (fig. 12). This juxtaposition of current and past communicative exchanges suggested that behavioral acts are always contingent on prior experience and social structures that surpass what is immediately observable at present.

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The multiple video channels in the installation unveiled a whole range of responses. In recordings of the interaction, participants could be seen closing their eyes to generate alpha brain waves, opening them to increase neural frequency, or inclining their heads toward each other with the aim of maximizing the potential for brain wave synchronicity through enhanced physical proximity (fig. 13). As the therapeutic potential of biofeedback gained recognition in the 1970s, the psychological implications of video also became more evident. While in medical circles some professionals feared that the video interface could limit the objectivity of analysis anchored around the examination of verbal cues, clinician Milton Berger argued that the pairing of multiple video channels—some of which would be live and crisp, others recorded and somewhat distorted—enabled individuals to come to terms with the fluidity of identity.[40] Sobell's pairing of the interactive video channel in the living room with recordings available in the adjacent gallery betrayed a similar interest in stimulating the negotiation of selfhood and social exchanges. A number of other American artists adopted the strategy of pairing media interfaces with different levels of reflexivity and instantaneity to destabilize a fixed sense of identity. For *Interface* (1972), Peter Campus used a glass screen to juxtapose reflections of the viewers to live video projections of their interaction with the installation. Similarly focused on the subjectivity of perception, Dan Graham designed *Present Continuous Past(s)* (1974), an environment with mirrored walls where participants could watch a slightly delayed video projection of their presence in the room while simultaneously observing their reflections. Like Campus and Graham, Sobell assembled multiple channels of visual information to offer visitors diverse perspectives on the interactive scenario. *Brainwave Drawings* underscored the value of interpersonal attunement in communication in a more explicit manner than Campus's and Graham's installations, which did not presuppose the involvement of more than one viewer for the work to be complete.

Despite the fact that *Brainwave Drawings* emphasized the fluidity of communication between two individuals, some reviewers underlined the connection of the work with the portraiture genre. In an account of the Houston display of the work, art critic

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Charlotte Moser noted that the overlap between video images and the wiggly lines offered "a remarkably complete portrait of an individual at particular moments."[41] This reading of the work primarily emphasized the oneness of selfhood and overshadowed its plasticity in relation to others. For Sobell, too, *Brainwave Drawings* can be seen as "live portraiture from the inside out," but this is not the primary goal of the work.[42] Its driving concept is the nonverbal communication between participants rather than the construction of portraits.[43] On the one hand, *Brainwave Drawings* granted visual transparency by mapping out both the exterior of the human body and the shifts in brain frequency; on the other hand, it signaled that this representation is elusive and ultimately reductive since participants' self-consciousness undergoes continuous transformation. Sobell's performances with chicken carcasses highlighted a similar distrust of fixed visual representation and linguistic codes, which enforce a stagnant sense of selfhood.

Informed by a cybernetic understanding of the brain and identity formation, *Brainwave Drawings* suggested that one's psychic state is contingent on the physical and social environment. The convergence of the oscillating lines of mental activity into a full circle could be attained only as a result of reciprocal influences. The search for individual control over the abstract representation of neural variations was detrimental to the temporary organization of the lines in a unitary form. The more participants tried to anticipate what transformations could be induced at a personal level, the less likely they were to transition into a meditative state. In his historical account of the relation between cybernetics and neuropsychiatry, Andrew Pickering argues that communication in a cybernetic system resembles "an ontological theatre" in which knowledge about exchanges emerges "as part of performance rather than as an external controller of it."[44] Connotative of unity and continuous exchanges, the circle formed on-screen by performative partners in Sobell's installation indicated the need for relinquishing authoritarian impulses and allowing for brain wave synchronicity to emerge independently of competitive impulses. It was quite rare that two participants could consistently form a circular shape. A careful observer of interactions with the work,

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Sobell remarked one instance in which a pair of visitors had this astounding ability even while speaking to each other. Upon inquiring with them about this performative feat, she found out that they were a couple and had been practicing voice-based meditation for a long period of time.[45]

The lack of absolute individual control was further underscored by the tension established between visibility and invisibility. While the mind was virtually turned inside out, participants sometimes relinquished access to visual signs of mental activity in order to activate alpha brain wave oscillations associated with meditative states. Upon closing their eyes, they allowed the flux of consciousness to evolve more freely and become attuned to variables that were not immediately perceptible. Dispensing with sight felt less constraining for participants because they knew they could replay the video images and retrospectively assess their nonverbal communicative potential. Their decision to let go of reliance on visual signs of information exchanges parallels the abandonment of linguistic expression as a primary form of communication. Both are equivalent to relinquishing representation, be it verbal or visual, as the main source of self-examination or interpersonal judgments. Thus, participants in *Brainwave Drawings* could more easily channel their attention to fluid transformations rather than to fixed reference points. The video interface also encouraged participants to ponder a state of higher-order consciousness, one that is not simply oriented toward the immediate present but implies reflection on complex correlations between past mental states and future possibilities for modeling neural frequency and communication.[46] Through the coupling of the video recording with the EEG machine, Sobell called attention to mediation, duration, and interpersonal negotiation. She emphasized not only the unconscious attunement established between self and others but also the need to consider relations that can be actively shaped by participants through deliberate communicative exchanges and inferences about past interactions.

Another productive contradiction established by Sobell relates to the conflicting roles of the pairs of viewers turned performers. By allowing them to exert control over the recording of

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video images, the artist enhanced their awareness of the fact that they were both observers and participants in the work's visual system. Although they could switch off the video to escape live visual representation, they could not stand apart from the cybernetic network. Similarly, the members of the secondary audience observing the brain wave drawings produced by others in the living room might appear as detached observers, but they were also engaged in the system established by Sobell. They affected the activity of the pair of more directly involved participants, who were aware of the presence of an audience witnessing their interaction. In line with second-order cybernetics, *Brainwave Drawings* alludes to the impossibility of fully insulating a system from the environment despite its manifestation of a fluctuating degree of operational closure. This resistance to closure is also vividly manifest in Sobell's feminist video performances, which subvert conventional social roles.

Communication beyond Language, Agency beyond Control

Be they anchored around an explicit critique of patriarchal biases or an allusion to the overlooked connections between ourselves and others, Sobell's works signal the porosity and variability of biological and social thresholds. Gaining familiarity with cybernetics through collaborations with engineers, the artist connected her prior interest in undirected play and communication with the exploration of technological mediation as a stimulus for developing a system-oriented perspective on the relation between individuals. Sobell achieved this goal through the two poles of her practice in the 1970s: her video performances, which parallel human and animal behavior, and her *Brainwave Drawings*, which showcase the electronic flux underlying both video transmission and brain operation. In each instance, she embraced an incomplete identification with alterity to foster awareness of the fact that we operate within systems that surpass the visible boundaries of our individual minds and bodies. Like other feminist artists, she resisted dichotomous modes of thinking about nature and culture, humanity and animality. In her practice, the body is as much

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a mediating interface as are the technological devices designed to facilitate, filter, or transform information exchanges.

Sobell's fascination with cybernetic systems and the relevance of nonverbal communication parallels anthropologist Gregory Bateson's speculations on the significant role of kinesics and paralanguage. While the artist was not acquainted with Bateson's book *Steps to an Ecology of Mind* in the 1970s, her practice is similarly infused with a concern about unconscious communicative exchanges that entail corporeal signals. In Bateson's view, verbal communication cannot fully substitute iconic communication through bodily cues because the body "performs functions which verbal language is unsuited to perform" by betraying involuntary responses and possibly unveiling intents that are concealed at the level of verbal expression.[47] As previously discussed, body language in Sobell's video performances with chicken carcasses distinctly points to sexual impulses that are otherwise suppressed so that mother figures can fit the conventional roles ascribed to them within society. Corporeal cues also fulfill a prominent function in *Brainwave Drawings* as participants can closely observe their mutual engagement in nonverbal communication while watching the recording of their interaction. Through combining the abstract language of vibrating lines corresponding to neural frequency with video images that can expose subtle changes in facial muscles or head movements, Sobell increased the redundancy in the system, bringing to the surface previously neglected interactive patterns. As she enhanced the visibility of changes in consciousness and bodily cues that frequently pass unnoticed, Sobell compelled participants watching recordings of their interaction to train their attention mechanisms in order to discover connections between different levels of communication.

Brainwave Drawings does not offer any explicit feminist critique but can be seen as an invitation to consider communicative exchanges that are less encoded with the patriarchal concepts that have come to dominate language. Just as Sobell's video performances involve a gestural dialogue that threatens accepted social norms, her participatory scenario involving the EEG subverts the

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power of language, suggesting that language may overshadow a more candid mode of communication freed from the conscious control that one is more prone to exert over verbal expression. As Sobell avows, her works with chicken props "might seem to be the more overtly feminist pieces, but bending the tools of technology to examine intimacy [in *Brainwave Drawings*] is definitely a feminist gesture."[48] Both works tie in with a search for private communication even in semipublic settings and with a need for more honest verbal and nonverbal dialogue liberated from the burden of societal or self-imposed constraints.

Achieving intimacy becomes a strategy of survival in a patriarchal environment that threatens the balance of affective relations through the enforcement of behavioral norms and the insidious regulation of the private sphere. Inventing interpersonal uses for existing technological interfaces, Sobell expands the feedback circuits generally associated with binary forms of interaction between humans and machines. This tactical gesture dovetails with the practice of other feminist artists who embraced a critique of male-dominated technocracy by exposing the dynamics of open systems that elude centralized control. Lynn Hershman Leeson, an artist of the same generation as Sobell, similarly used both performance and interactive media to generate a systemic understanding of society and technological apparatuses. As Christine Filippone eloquently explains, women artists in the 1960s and 1970s took advantage of the cybernetic notion of open systems to prompt "the elimination of boundaries and causal relationships in favor of process, a focus on the body as a site of social and political contestation, and consideration of the body as integral to the mind."[49] Sobell's video performances and *Brainwave Drawings* encourage precisely such an open-ended approach to modeling the context of behavior at an interpersonal level. They center on embodied forms of cognition that circumvent social control: nonverbal exchanges between mother and infant and otherwise invisible communicative threads established between the minds of individuals sharing the same environment. Both works favor unpredictability, be it related to performative impulses or communicative acts that escape conscious control. As an open system functioning

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in dialogue with other open systems, the embodied mind appears as a territory with fluid boundaries, contingent on physiological and psychological characteristics as well as on correlations with shifting social parameters.

For Sobell, intimate connections and corporeal proximity enhance awareness of systems and warrant the need to interpersonally negotiate the degrees of openness and closure between these systems whenever possible. Nonverbal exchanges offer an alternative to discursive formations that perpetuate existing power relations between genders. Their greater immediacy ensures a more plastic communicative thread, which allows for the faster formation of new patterns of interaction. Sobell's works also alleviate some of the fear of face-to-face communication by showing that individuals are not completely insulated from their peers and the environment.

On the surface, the emphasis on cybernetic interconnections may appear to encourage a state of surrender to the flow of communication by exposing the limits of individual control and the extent of social regulation. However, for artists espousing a feminist agenda, such as Sobell, the notion of open systems is bound to have the very opposite effect by highlighting both the limits and the possibilities of personal agency. In her performances with chicken carcasses, Sobell parallels the perpetuation of societal expectations through rewards for behavioral normativity with the enclosure of the animal body in a cooking pot. This repressive act is the epitome of a closed system that restricts agency and limits interactions with one's environment. Sobell offers a similar critique of the regulation of communication in *Brainwave Drawings* as she counterposes the closed loop of the video recording to the openness of ongoing communication between two individuals. This juxtaposition encourages participants to see themselves as part of systems over which they have more or less personal control. The fact that they can put a stop to the video recording creates a potential for reflecting on the immediate past and considering the future of communicative exchanges that can be modeled both through the self-regulation of attention and one's openness to outward influences. By pairing video and biofeedback technology, Sobell

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launches a quest for expanded self-consciousness and encourages participants to develop a greater sense of agency over physiological and psychological processes, with the understanding that absolute individual control is unattainable in biological and social systems.

When discussed in tandem, Sobell's video performances with raw chicken and her *Brainwave Drawings* indicate a conundrum of feminist practices in the 1970s: on the one hand, women needed to acquire a voice within the existing parameters of society, since this appeared to be the only mode through which they could gain recognition based on established value systems; on the other hand, they needed to change the social order as a whole through the introduction of alternative modes of communication that were more affective, open-ended, and nonhierarchical. Instead of perceiving these as two essentially contradictory goals, we should consider how the tension between them can push us to form a more comprehensive, system-oriented perspective on the female subject, one that accounts for the fact that it is influenced by both biological and social constraints that can undergo transformations across time. Sobell's chicken performances and her video installations based on biofeedback must not be seen as part of two separate trajectories of her practice but as equally instrumental in the expression of what Kristeva called "the speaking subject as a divided subject (conscious/unconscious)"—an individual who does not simply rely on the logical order of language reflective of social norms but who embraces sexual drives and corporeal modes of communication.[50] As protagonist of video performances disruptive of sexual taboos, and as mediator of otherwise inconspicuous mental exchanges between art participants, Sobell takes on the task of making invisible physical and psychic systems perceptible. Through the visualization of communicative processes that are consciously suppressed or actually indiscernible in the absence of technological mediation, she seeks to undermine self-abandonment and foster interpersonal awareness.

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Notes

I am very grateful to Nina Sobell for her attentive and insightful responses to my numerous queries about her art practice. I am also thankful to Christine Filippone and Izabel Galliera for their generous feedback on early drafts of this article.

1. Nina Sobell, "Performances," *Act* 2, no. 1 (1990): 51.

2. At the Contemporary Arts Museum in Houston, the installation was part of the *Gulf Coast, East Coast, West Coast* exhibition, which also included works by George Green and Ed McGowan.

3. In the context of the first public display of the work in 1975, color changes had the role of enhancing participants' emotional connection. The color effects were produced with the help of a randomly oscillating colorizer. Two different color programs were subsequently developed with the help of engineers: one by Chris Matthews for the display of the installation in his studio in Los Angeles in 1981, and one by Kong Lu for *The Artist and the Computer*, a group exhibition curated by Kathy Rae Huffman at the Long Beach Museum of Art in 1983. In these two cases, changes in color were correlated with shifts in brain wave frequency range.

4. This more popular version of the title was suggested to Nina Sobell by Paul Schimmel, who served as an assistant curator on the *Gulf Coast, East Coast, West Coast* exhibition. Sobell decided to adopt it upon noticing that participants would gradually develop a higher level of command over interactions with the interface. Nina Sobell, email correspondence with the author, 18 January 2018.

5. See Gregory Bateson, *Steps to an Ecology of Mind* (San Francisco: Chandler, 1972).

6. For a discussion focused on the feminist disruption of taboos in Sobell's performances with raw chicken, see Chris Straayer, "I Say I Am: Feminist Performance Video in the '70s," *Afterimage* 13, no. 4 (1985): 8–12; and Tal Dekel, *Gendered: Art and Feminist Theory* (Newcastle upon Tyne, UK: Cambridge Scholars, 2013). Concerning the interactive aspects of Sobell's works, see Stephen Wilson, *Information Arts: Intersections of Art, Science, and Technology* (Cambridge, MA: MIT Press, 2003). Anna Couey's essay

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"Restructuring Power: Telecommunication Works Produced by Women" constitutes an exception to the dichotomous mode of associating Sobell's works either with contributions to feminist critique or with innovations in telecommunication technology in art. Couey suggests that Sobell and other women artists have devised "spaces for horizontal communication" that encourage reciprocal exchanges rather than consolidate hierarchical social relations. While Couey addresses only the works developed by Nina Sobell in collaboration with Emily Hartzell in the 1990s, her argument can also be applied retrospectively in relation to Sobell's video performances and interactive installations from the 1970s and early 1980s. See Anna Couey, "Restructuring Power: Telecommunication Works Produced by Women," in *Women, Art, and Technology*, ed. Judy Malloy (Cambridge, MA: MIT Press, 2003), 54–85.

7. Paul Ryan, *Cybernetics of the Sacred* (Garden City, NY: Anchor, 1974), 105.

8. Lucy Lippard, "The Pains and Pleasures of Rebirth: Women's Body Art," *Art in America* 64 (1976): 75.

9. See Johannes Birringer, "Video Art/Performance: A Border Theory," *Performing Arts Journal* 13, no. 3 (1991): 64.

10. See the documentary film *Nina Sobell, Pioneer of Interactivity* (dir. Emily Hartzell, US, 1993).

11. Emily Hartzell and Nina Sobell, "Sculpting in Time and Space: Interactive Work," *Leonardo* 34, no. 2 (2001): 101.

12. Emily Hartzell, "Nina Sobell: The Years in Los Angeles: 1971–1985," Getty Research Institute, Long Beach Museum of Art Video Archive, circa 1964–2003, Box 28, Folder 22.

13. Hartzell and Sobell, "Sculpting in Time and Space," 102.

14. Nina Sobell, email correspondence with the author, 18 January 2018.

15. Andrea Liss, *Feminist Art and the Maternal* (Minneapolis: University of Minnesota Press, 2009), xvii.

16. David James discusses a 1979 remake of *Chicken on Foot* in "Laughing at TV," *Artweek* 14, no. 23 (1983): 7.

17. Maria Troy argues that Sobell's performance is "an expression of female ambivalence about motherhood." See "I Say I Am:

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Women's Performance Video from the 1970s," *Video Data Bank*, www.vdb.org/sites/default/files/ISayIAm_VDB_MariaTroy_essay.pdf (accessed 1 December 2017).

18. Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. Leon S. Roudiez (New York: Columbia University Press, 1982), 4.

19. Dekel, *Gendered*, 49.

20. *Into the Pot You Go* (1982) was recorded at the time of a rehearsal for a live performance presented at LACE (Los Angeles Contemporary Exhibitions). The work is also known under the title *Hey, Baby Chicky!*, the same name as Sobell's 1978 performance with the chicken carcass.

21. In this performance, Sobell uses masculine pronouns whenever she refers to the chicken baby.

22. Nina Sobell in conversation with Jennifer Flores Sternad, oral history interview in "Los Angeles Goes Live: Performance Art in Southern California 1970–1983" (13 July 2010), Getty Research Institute.

23. Helen Molesworth, "House Work and Art Work," *October*, no. 92 (Spring 2000): 71–97.

24. Kate Mondloch, "The Difference Problem: Art History and the Critical Legacy of 1980s Theoretical Feminism," *Art Journal* 71, no. 2 (2012): 18–31.

25. Julia Kristeva, "Women's Time," *Signs* 7, no. 1 (1981): 19.

26. Kristeva, "Women's Time," 35.

27. See Jane Howard, "Flow Gently, Sweet Alpha," *Life* 72, no. 15 (1972): 63–64, 68, 70.

28. William Grey Walter, *The Living Brain* (New York: Norton, 1963), 87.

29. Musical compositions based on biofeedback also started to gain popularity in Europe in the second half of the 1960s. The Musica Elettronica Viva (MEV) group in Italy staged multiple performances based on improvisation and EEG interfaces. Interestingly, Sobell became friends with the members of the group while studying at the Tyler School of Art in Rome (1967–68).

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30. See Larry Austin and Douglas Khan, eds., *Source: Music of the Avant-Garde, 1966–1973* (Berkeley: University of California Press, 2011), 79–81.

31. David Rosenboom, ed., *Biofeedback and the Arts: Results of Early Experiments* (Vancouver, BC: Aesthetic Research Centre of Canada, 1974), 3.

32. For a description of this work, see John Grayson, ed., *Sound Sculpture* (Vancouver, BC: Aesthetic Research Centre of Canada, 1975), 128–31.

33. Despite the participatory attributes of Sobell's work, Bourriaud would most likely consider *Brainwave Drawings* to be outside the scope of relational art because it relies on the technological mediation of communication. A discussion of participatory theorists' technological bias can be found in Cristina Albu, "Five Degrees of Separation between Art and New Media," *Artnodes* 11 (2011): 68–72; and Christiane Paul, "New Media in the Mainstream," *Artnodes* 11 (2011): 102–6.

34. For the 1981 installation of *Brainwave Drawings*, Nina Sobell collaborated with electronics engineer Chris Matthews on developing a more complex representation of synchronous and asynchronous relations between art participants' neural oscillations. The installation was exhibited at the engineer's studio. Based on visual models of EEG data that considered not only the frequency of participants' brain wave fluctuations, but also the intensity and duration of neural phases, the initial circular pattern proposed in 1975 was substituted by a series of dots, a diamond shape, a set of concentric rectangular boxes, or a series of multiplying intersecting lines. These alternative geometric models illustrated the parameters of neural activity more effectively but posed interpretative challenges for participants who needed to focus more intensely on decoding the function of visual elements.

35. Nina Sobell and Michael Trivich, "Brainwave Drawing Game" (1981), Getty Research Institute, Long Beach Museum of Art Video Archive, circa 1964–2003, Box 28, Folder 22.

36. Sobell and Trivich, "Brainwave Drawing Game."

37. In her review of Sobell's installation for the *Houston Post*, Mimi Crossley recounts that one of the Contemporary Art Museum

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staff members planned to put his brain wave communication with his girlfriend to the test before proposing to her. See "Nina Sobell," *Houston Post*, 18 May 1975.

38. Nina Sobell, email correspondence with the author, 9 March 2017.

39. This was not the case in all exhibitions of the work. Participants in *Brainwave Drawings* received such a chart in the context of the exhibition *The Artist and the Computer* at the Long Beach Museum of Art (1983).

40. Milton Berger, "Multiple Image Self-Confrontation," *Radical Software* 2, no. 4 (1973): 8.

41. Charlotte Moser, "The Ins and Outs of 'Place' at CAM," *Houston Chronicle*, 25 May 1975.

42. Nina Sobell, email correspondence with the author, 9 March 2017.

43. In an interview with Carole Ann Klonarides, Sobell explained: "I wanted to see if I could break through this kind of internal and external portrait of ourselves and visualize nonverbal communication between two people." See "Interview with Nina Sobell," in *California Video: Artists and Histories*, ed. Glenn Phillips (Los Angeles: Getty Research Institute, 2008), 208.

44. Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: University of Chicago Press, 2010), 25.

45. Verbal exchanges between participants typically interfered with their ability to enter an alpha brain state and create a full circle. During verbal communication, most individuals channeled the formation of beta brain waves, which are usually associated with goal-oriented activities. Nina Sobell, email correspondence with the author, 9 March 2017.

46. See Gerald M. Edelman, *Wider Than the Sky: The Phenomenal Gift of Consciousness* (New Haven, CT: Yale University Press, 2004), 73.

47. Bateson, *Steps to an Ecology of Mind*, 418.

48. Nina Sobell, email correspondence with the author, 18 January 2018.

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49. Christine Filippone, *Science, Technology, and Utopias: Women Artists and Cold War America* (New York: Routledge, 2017), 3.

50. Julia Kristeva, “The System and the Speaking Subject,” *Times Literary Supplement*, 23 October 1973, 1249.

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Figure 13. Nina Sobell, *Brainwave Drawings* (1974–), screenshots of interaction with the installation. Courtesy of Nina Sobell

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