The Space Between: Control and Causality in David Rokeby's *Very Nervous System*

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> *Interactive artworks offer us the tools for constructing identities, our sense of ourselves in relation to the artwork, and by implication, in relation to the world.*
> – David Rokeby[1]

> *A technology is interactive to the degree that it reflects the consequences of our actions or decisions back to us. It follows that an interactive technology is a medium through which we communicate with ourselves... a mirror. The medium not only reflects back, but also refracts what it is given; what is returned is ourselves, transformed and processed. To the degree that the technology reflects ourselves back recognizably, it provides us with a self-image, a sense of self.[2]*
> – David Rokeby

David Rokeby's *Very Nervous System* (1986-1990) is widely considered to be one of the earliest successful artistic experiments in embodied interaction with advanced technologies. At the time it was conceptualized and developed, technologies of interactivity, immersive, and responsive environments and computer-based media were still in their infancy, only just becoming accessible to the general public. Since the 1980s, of course, technological mediation has become ubiquitous in almost every aspect of our daily lives, with increasingly sophisticated media emerging at an ever more rapid pace. And yet, despite these remarkable social and technological shifts, *Very Nervous System* has continued to be exhibited widely in Canada and internationally, posing questions

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[1] David Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," in Simon Penny, ed., *Critical Issues in Electronic Media* (New York: State University of New York Press, 1995): 138.
[2] Ibid.,148.

concerning the shifting relationship(s) between sound, movement, space, the body, society, and technology that remain pressing almost three decades after its conception.

This is partly attributable to the fact that *Very Nervous System* has been anything but static. Rather, the work has been in a state of evolution alongside developments in computer technology and digital media, and the pervasive infiltration of these throughout our physical and social landscape. The transformation of the installation itself thus represents and reflects upon the changing experiences of human beings with interfaces of various types. Involving shifting configurations of video cameras, computers, image processors, synthesizers, and a sound system, each iteration of the work has become successively more complex, thus operating more smoothly and more transparently, allowing for a greater integration of—and flow of information between—the user and itself.

When one enters the work, however, one may not be immediately aware of its sophistication. Rather, the visitor will more likely appear to be simply entering an empty room. At once she will notice 'music' emanating from speakers positioned around the edges, but only upon moving around the space for a moment will she realize that the sounds are in fact responding to her presence. The apparatus of *Very Nervous System* monitors visitors' locations and which areas of their bodies are in motion, as well as the speed and degree of intensity, abruptness or continuity of their movements.[3] This information is relayed through the apparatus, which translates visitors' actions and gestures back to them as sound, resulting in a complex, viewer-responsive soundscape and offering the impression that the aural environment is an extension of the viewer's own body. What results for many participants is a powerful awareness of being watched,

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[3] Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," 146.

and consequently, an intensified awareness of one's own *presence,* one's body, and one's movement, creating a sense of self-consciousness that registers differently for each visitor as he/she (willingly or unwillingly) interacts with the invisible yet viscerally-present surveilling apparatus.

Interactivity and the Paradox of Control

"Each instrument is basically a behavior, an electronically constructed personality. It's watching you. It's looking out of the video camera at your body, and taking playing cues from your movement. These behaviors are just algorithmic definitions - computer subroutines."[4]

– David Rokeby

For Rokeby, the similarities between *Very Nervous System* and systems of regulation and observation employed in society at large go beyond the software and technologies used in his work's construction. Although certainly not the only level on which it functions, the work has potential to draw attention to the invisible yet sensed modes of tracking and surveillance that have become omnipresent since the original conception of the work. As the mediating technologies and interfaces that structure our experience and communication become increasingly transparent, and as we incorporate them into our embodied experience of the world and internalise their presence, they become more and more difficult to perceive, and thereby to critique. As Rokeby himself states: "The trouble begins as the user's awareness of the interface ends."[5] As such, Rokeby situates interactive art in relation to the contemporary politics of subjectivity and control. For him, interactive works allow the viewer to reflect on such apparatuses, dispelling their

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[4] Quoted in Douglas Cooper, *"Very Nervous System: Artist David Rokeby adds new meaning to the term interactive," Wired Magazine*, Issue 3, No. 3 (March1995); 2, accessed March 1, 2015. http://archive.wired.com/wired/archive/3.03/rokeby.html.
[5] Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," 153.

veil of transparency by making them the explicit subject of the work. As such,

problematizing the notion of control in interactive art extends to a discussion of the way

control over subjectivity operates across our transforming social, political, and

technological milieu.

David Rokeby has observed a trend among participants in *Very Nervous System*,

speaking of an initial phase of testing the system, what Rokeby refers to as 'questioning',

during which visitors gauge its responses in an attempt to try to control the outcome of

their own motions, thereby cultivating a relationship of dominance over the machine:

> People entered the installation, and set about verifying the predictability of the
> system. They made a gesture, as a question to the space, and mentally noted the
> sound that that gesture had made. They repeated the gesture once or twice, again
> as a question, and got the same result. The third repetition seemed to satisfy the
> participants that the system was in fact interactive.[6]

Due to the consistency of gesture and response, Rokeby's observations indicate that

visitors initially gain a sense that they are in full control of the system. Through the speed

of real-time 'simultaneous feedback,' *Very Nervous System* creates an environment in

which the visitor's movement and the aural response seem to occur simultaneously,

increasing the sense of unison between action and sound. However, the intellectual,

rational approach to commanding the interface in order to make particular instrumental

noises quickly backfires on these viewers once they gain this sense of control. In the

earlier iteration described by Rokeby above, for example:

> The way they held their body and the look on their face changed. They made the
> gesture again, this time as a command to the system, not a question. The physical
> dynamics of the command gesture was significantly different from the previous,
> more tentative questioning gestures, and the system responded with a different
> sound[7]

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[6] Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," 148.
[7] Ibid., 149.

A more successful communication between user and system occurs, according to the artist, when visitors abandon their quest for control and adopt a more intuitive approach, allowing themselves to respond to the music organically, even as their subsequent motions purportedly *create* this music. In this scenario, the system itself not only reacts to, but actively transforms the actions of visitors as they mediate their gestures in response to the audio output – whether 'organically' or to evoke a specific response.[8] The work thus problematizes the cause and effect relationship between perception and expression, reflecting a reciprocal power that rebounds on the viewer. Describing the feedback loop, Rokeby writes: "The interactive system responds to the interactor, who in turn responds to that response. A feedback system is created in which the implications of an action are multiplied, much as we are reflected into infinity by the two facing mirrors in a barber shop."[9] Within *Very Nervous System*, transformation occurs with each exchange between self and machine, until it is impossible to trace a clear causal relationship between sound and action. The question is begged: Who is really in control here, the visitor or the apparatus?

Beyond this unclear cause and effect relationship, the illusion of control also obscures the way visitors' actions are influenced by the parameters of the technology itself, including the narrow set of filters and responsive categories defined by the software programming. Certain sounds are easier to evoke and more gratifying, making it more likely that the gestures which produce these will be performed more frequently. And the opposite effect is also true – Rokeby notes of an earlier version of *Very Nervous*

[8] David Rokeby, "The Construction of Experience: Interface as Content," *Digital Illusion: Entertaining the Future with High Technology*," Clark Dodsworth, Jr., ed. (New York: ACM Press, 1998): n.p. Accessed at http://www.sfu.ca/~jtoal/papers/Rokeby%20ConstructionofExperience.pdf.
[9] Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," 137.

System in which there was a sound one could only 'find' by walking "as if you were carrying a forty pound weight."[10] Further, while *Very Nervous System* opens up the *possibility* to interact and impact the form of the work, it also makes it impossible to *not* interact, at least while within the field of the apparatus.

Can there be spontaneous motion in this space, during which visitors become hyper-aware of the effects of their own actions and gestures? Or are their movements reduced to contrived, self-aware actions which cannot be divorced from the evidence of their observance by an external device? At what point would one become acclimatized to this situation of constant observance, allowing these mediated behaviours to become unconscious, or to seem merely natural? Likely the answer exists at neither of these poles, and *Very Nervous System* may be most successful in that it seems to encompass a series of seeming contradictions—the tension between complicity and resistance, between freedom and self-regulation, play and power, predictability and the unexpected, improvisation and predetermination, immediacy and mediation. Rokeby states on numerous occasions that the creation of interactive interfaces carries a social responsibility: "Interactive artists are in a position to take the lead in generating a discussion of these concerns, but, on the other hand, are also in danger of becoming apologists for industrial, corporate, and institutional uses of these technologies. An awareness of the contradictions inherent in mediated interactivity is essential if we, as a society, are to move into the future with our eyes open."[11] In line with this viewpoint, *Very Nervous System* not only uses, but actively reflects upon the role of interactive and

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[10] David Rokeby, "The Harmonics of Interaction," in *Musicworks* 46, Sound and Movement (Spring 1990): n.p. Accessed at http://www.davidrokeby.com/harm.html
[11] Rokeby, "Transforming Mirrors: Subjectivity and Control in Interactive Media," 133-134.

surveillance technologies on society at large, across institutional, political, corporate, and contexts.

Subjectivity and Temporality

"VNS" is the name of the technological substrate that makes the machine and human interaction in *Very Nervous System* possible.[12] While we can think of all technology as being interactive on some level, in that it requires some kind of direct or indirect human engagement with technology, "VNS" is one of a number of unique cases in which the technology adapts to users as they participate in the interface. Interactive technology of this kind, when used as a medium for artistic intervention, has typically been seen as providing viewers with an opportunity to explore things about their own subjective position through the ways in which the technology can reflect these positions back on them.[13] While interactive technology does set the stage for the re-examination of the self, it also presents viewers with the possibility of seeing themselves otherwise. Rokeby's *Very Nervous System* allows for such an occurrence to transpire. In his installation the sounds, which are the computer's response to the movements of the participant, provide us with a paradigm with which we can begin to rethink our relationship to the world, making it possible for us to see our subjective self as being a temporal rather than spatial construction.

The interface is the device in Rokeby's work which causes this shift in subjective construction, from being in terms of spatiality to that of temporality. This is because, as

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[12] David Rokeby, interview by Andrew Dewdney and Peter Ride, *The New Media Handbook* (London and New York: Routledge, Taylor, and Francis Group, 2006), 218.
[13] Ibid., 215.

Rokeby suggests, the interface is what provides the connection between the

viewer/participant and the work:

> But the rush to stuff content into interactive media has drawn our attention away from the profound and subtle ways that the interface itself, by defining how we perceive and navigate content, shapes our experience of that content. If culture, in the context of interactive media, becomes something we "do," it's the interface that defines how we do it and how the "doing" feels. Word processors change the experience of writing, regardless of the content; they affect the manner in which that content is expressed.[14]

If we see Rokeby's work as challenging and changing the means by which we have

traditionally thought of the subject's self relationship then the cause for this is directly

related to the interface itself. *Very Nervous System's* program, "VNS," is responsible for

this shift because it engages in a responsive and fluid relationship with the

viewer/participant. The adaptive relationship that occurs between interface and user then

produces the paradigmatic shift that allows us to see the relationship between the subject

and the world not as subject and object or time and space but as subject or time and

movement.

Because the interface "VNS" responds directly to movement, viewers/participants

cannot be entirely in control of the machine reaction. Although participants get a sense of

how the system will respond to different kinds of movements, due to the fact that the

system is designed to read gesture, the sound response is extremely varied. Rokeby refers

to "gesture as a tool in this medium ["VNS"]" precisely because the system feedback is

so incredibly nuanced.[15] If we can think of gesture as the tool of the medium of the

interface then, in terms of the work *Very Nervous System,* gesture becomes the medium

of the work itself. This kind of nuanced and varied feedback loop provides us with an

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[14] David Rokeby, "The Construction of Experience: Interface as Content," np.
[15] Rokeby, *The New Media Handbook*, 219.

interesting case through which we can rethink human action and thus notions of subjectivity. As viewers/participants attempt to tailor or vary their movement based on gesture the machine will also vary its response based on its reading of these gestures. This variance in both the movement of the participant and the generated sound allows for the destabilization of the viewer/participant's and thus the subject's sense of causality (cause and effect). The unpredictable relationship between the system and the user in *Very Nervous System* allows for a nonlinear, non-causal element to seep in. It is this element or view of time as nonlinear or non-causal that allows us to see our subjective selves as also nonlinear or non-causal.

Traditionally we think of time as we represent it spatially: as a linear construction in which past precedes present from which future follows. French philosopher Henri Bergson debunks this spatiotemporal model by arguing that the past is in fact co-existent with the present. He makes this radical shift by arguing that, because the present is the only form of contact we have with the past as such, recollection or memory does not take us back towards a past that *was* but brings us into a past that *is,* one which happens alongside the present. Thus, if we think causality (time or succession) outside of a linear model as Bergson suggests we no longer have a subject. We no longer have a subject because the subject can no longer locate itself *in* space and time; it cannot be a discreet entity with a past, present, and future. This is why, in his well-known text *Matter and Memory,* Bergson notes: "Questions relating to subject and object, to their distinction and their union, should be put in terms of time rather than of space."[16] In providing a space of indeterminacy or non-causality that exists between user and interface *Very Nervous*

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[16] Henri Bergson, *Matter and Memory* [1908], trans. N.M. Paul and W.S. Palmer (New York: Zone Books, 1988), 71.

System shifts our understanding of self from one which is spatiotemporal to one which is temporal because it is nonlinear.

Rokeby's work confronts us with the dissolution of the subject through the disruption of our sense of rationality. Rather than seeing our actions as being determined by cognition in a cause and effect way as we are wont to do, *Very Nervous System* compels the viewer/participant towards intuitive or immediate experience through the ways in which the sound connects one directly with her own movement. Looking at basic understandings of the latest findings in neuroscience research can help bring the idea of nonlinear causality into a discussion of movement and sound in *Very Nervous System*. In an interview with Arjen Mulder, neuroscientist Detlef B. Linke describes the idea that the most recent brain-mind research indicates that both the body and brain respond to and create separate rhythms with different speeds.[17] As he explains,

> The cognitive potentials are capable of freedom of movement, which applies also to their relations to lower regular cycles in the bottom layers of the brain–the sensomotor cycles, for instance–which have their own peculiar temporal characteristics. The brain does not come equipped with an original metronomic default setting: the rhythms of cognitive events are situationally determined. They adapt themselves to external stimuli. The problem with any attempt to codify the information in the nervous system is precisely this absence of any indication of a proper beat.[18]

What Linke describes here means that because the cognitive rhythms are situationally determined the sensomotor rhythms function in a way which has more impact on cognitive processes rather than the other way around. Linke argues that if we see the self as being the center of determining action, as a "neuronally engineered" supervisor, then humans would actually function as conscious androids, which is obviously not the case.[19]

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[17] Detlef B. Linke, interview by Arjen Mulder, *Machine Times* (V2_ Publishing, 2000), 29-30.
[18] Ibid., 30.
[19] Ibid., 33.

Rather, the body receives the rhythms of the external world first and the brain must process them retroactively as Linke explains.[20]

   As opposed to seeing the self as a set point from which all else emanates, Rokeby's *Very Nervous System* situates the subject in a way which is more intuitive and thus closer to the ways in which our sensomotor capacity synchronizes with external rhythms, through the interactive use of sound. Rokeby's own experience of interaction with *Very Nervous System* demonstrates this effect: "An hour of the continuous, direct feedback in this system strongly reinforces a sense of connection with the surrounding environment. Walking down the street afterwards, I feel connected to all things. The sound of a passing car splashing through a puddle seems to be directly related to my movements. I feel implicated in every action around me. On the other hand, if I put on a CD, I quickly feel cheated that the music does not change with my actions."[21] As we have explored through the suggestions of neuroscientific research, Rokeby's explanation of feelings of disappointment at the music from the CD not conforming to his actions are actually a result of an emphasis on cognitive capacity which reduces the body's ability to synchronize with external stimuli rather than the other way around. In producing sounds that synchronize with human motion, *Very Nervous System* brings us towards a space which is more intuitive rather than cognitive in order to allow the self to function with these external rhythms as Rokeby describes. This relationship then between user and interface demonstrates the non-causal or nonlinear construction of the subject as time-based rather than spatiotemporally situated because it decenters a linear relation between cognition and action.

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[20] Ibid., 30-31.
[21] Rokeby, "The Construction of Experience: Interface as Content," np.

David Rokeby has widely explored the experience of 'reality' in interactive art. He wrote in 1998 that, "By defining a way of sensing and a way of acting in an interactive system, the interface defines the "experience of being" for that system."[22] *Very Nervous System* in a sense provides a microcosm through which we can explore the modes of perception and communication which operate in our general experience of being-in-the-world. By posing important questions about control and causality, the work offers a critical lens to investigate the oscillating relationship between what we perceive as reality and the mediated nature of our cognitive faculties and physical environment.

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[22] Rokeby, "The Construction of Experience: Interface as Content," np.

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