

We look for the creation of a nonhuman type in whom moral suffering, goodness of heart, affection, and love, those sole corrosive poisons of inexhaustible vital energy, sole interrupters of our powerful bodily electricity, will be abolished. . . . This nonhuman and mechanical being, constructed for an omnipresent velocity, will be naturally cruel, omniscient, and combative.  
—Filippo Tomaso Marinetti

Unhindered by morality, tenderness, or internal volition—that is, by any hint of personal agency—Marinetti’s ideal Fascist worker could inexhaustibly build the future with the utmost efficiency. Such a mechanical being would as readily carry out the plans of Mussolini as it would those of Mother Theresa. It would do so without pausing to consider its own desires or the consequences, because it cannot care. It is the perfect slave and the perfect soldier, but the worst kind of citizen. For citizens, in the republican sense, must possess agency and must care about the results of their actions if they are to fulfill their responsibility to construct, maintain, and improve society. Indeed, in

Western society it is the empathic exchange of information, the give and take of ideas between active agents necessary for consensus, that is the backbone of democracy and the precondition for human dignity.

The human and political implications of agency, especially with respect to technology, demand that agency be problematized as it relates to telematics and telerobotics. By analyzing artworks that use these telecommunications technologies, it is possible to differentiate between various models of agency and

suggest their epistemological and ontological implications. Simon Nora and Alain Minc originally defined telematics as a broad field of computer-mediated communications, such as the Internet. In this context, telerobotics can be seen as a specialized sub-division of telematics. By comparing the historical ideological issues underlying telematics and telematic art with the goals for telerobotics and telerobotic art, it is possible to identify some of the continuities and discontinuities between them, especially as they concern agency.

In particular, in classic works of telematic art such as *La plissure du texte* (1982) by Roy Ascott, active agents exchange information with other active agents. Standard implementations of telerobots, by contrast, are predicated on a model in which an active agent controls a passive entity that lacks agency. Some works of telecommunications art expand conventional conceptions of telerobotics. For example, Norman White and Doug Back’s *Telephonic Arm Wrestling* (1986), Paul Sermon’s *Telematic Vision* (1994), and Eduardo Kac and Ikuo Nakamura’s *Essay Concerning Human Understanding* (1994) employ active-active models of telerobotic agency. Such artworks shed light on the philosophical, ethical, and aesthetic limits of active-passive telerobots and offer alternative structures for the creation of knowledge and being at a distance.

### **Telematics, Telematic Art, and Agency**

“Telematics” refers to the conjunction of computers and telecommunications. The term was coined in the well-known 1978 report by Nora and Minc to French president Valéry Giscard d’Estaing, and popularized in the report’s

**Edward A. Shanken**

## **Tele-Agency: Telematics, Telerobotics, and the Art of Meaning**

**Roy Ascott. *La plissure du texte*, 1982. Hank Bull, Western Front, Vancouver, and Students at the Ontario College of Art, Toronto.**



subsequent publication in English as *The Computerization of Society*. Comparing telematics with the technologies that fueled the industrial revolution, Nora and Minc claimed that it “will have wider consequences”: “Above all, insofar as it is responsible for an upheaval in the processing and storage of data, it will alter the entire nervous system of social organization. . . . This increasing interconnection between computers and telecommunications—which we will term ‘telematics’—opens radically new horizons.”<sup>1</sup> While effusive about the potential impact of telematics, Nora and Minc were keenly aware of the desire of governments and other powerful interests to strictly monitor access to technologies in order to control constituencies, and that historically those same constituencies had become increasingly intolerant of such hierarchical control. Telematics, they recognized, could be used either to increase centralized control or to facilitate the decentralization of control: “Are we headed . . . toward a society that will use this new technology to reinforce the mechanisms of rigidity, authority, and domination? Or, on the other hand, will we know how to enhance adaptability, freedom, and communication in such a way that every citizen and every group can be responsible for itself?”<sup>2</sup> Which scheme (centralized or decentralized) would come to be realized, they argued, depended on which model of society was desired and chosen. While the question of who would do the choosing remained unanswered in their text, they recognized that it was no more likely that society would spontaneously produce a condition of decentralization than that the government would willingly promote its own demise. Nevertheless, they believed that telematics could help facilitate a productive transformation of the social order. “The challenge, they wrote, “lies in the difficulty of building the system of connections that will allow information and social organization to progress together.”<sup>3</sup>

Seeking in part a similar goal, telematic art has drawn on a central tendency of twentieth-century experimental art to make the viewer an increasingly active agent in aesthetic exchanges. Roy Ascott, the British pioneer of telematic art, has been the field’s primary theorist, first applying the term *telematic* to art in 1983. Crucial to Ascott’s theory and practice of telematic art is the transformation of the viewer into an active participator who collaborates in creating the work, which is never a static product, but always remains in process throughout its duration. As Frank Popper has noted, such ideas were already present in the artist’s first kinetic constructions of 1960.<sup>4</sup> By the mid-1960s, Ascott proposed that a “computer may be linked to an artwork and the artwork may in some sense be a computer.”<sup>5</sup> At that time, he also theorized how the convergence of computers and telecommunications heralded new possibilities for interdisciplinary research and exchange: “Instant person to person contact would support specialized creative work . . . An artist could be brought right into the working studio of other artists . . . however far apart in the world . . . they may separately be located. By means of holography or a visual telex, instant transmission of facsimiles of their artwork could be effected. . . . [D]istinguished minds in all fields of art and science could be contacted and linked.”<sup>6</sup> Ascott first experienced networked computer telecommunications in 1978, and has worked almost exclusively in telematic media ever since.

This article was presented as a keynote speech at the joint meeting of the CAiIA+STAR Ph.D. program at the University of Wales, Newport, and benefited from the lively discussion that ensued. I dedicate this article to my grandmother, Evelyn Fishman. I would also like to thank Kristine Stiles, Adam Skwersky, Eduardo Kac, Martin Jay, Ken Goldberg, and Garnet Hertz for stimulating conversations and correspondence, which helped expand and solidify my argument.

1. Simon Nora and Alain Minc, *The Computerization of Society* (Cambridge, Mass.: MIT Press, 1980), 4–5.
2. *Ibid.*, 10–11.
3. *Ibid.*, 11.
4. Frank Popper, *Origins and Development of Kinetic Art* (Greenwich: New York Graphic Society, 1966), 208.
5. Roy Ascott, “Behaviourist Art and the Cybernetic Vision,” *CYBERNETICA: Review of the International Association for Cybernetics* 9, no. 4, (1966); 10, no. 1 (1967): 29.
6. *Ibid.*, 47.

Like Nora and Minc's report, Ascott's theory and practice of telematic art embraces the idea that the transformation of society emerges developmentally as the result of interactions between individuals and institutions in the process of negotiating relationships (political, economic, cultural) and implementing new technological structures. In Ascott's telematic art project *La plissure du texte* (The Pleating of the Text), for example, the artwork itself emerged as the result of a process the artist calls "distributed authorship." A network of participators at eleven remote nodes in the United States, Canada, Europe, and Australia, each representing a different fictional persona, contributed texts and ASCII images that were pleated together electronically to create a "planetary fairytale," to use Ascott's term. Distributed authorship enabled the online narrative to be supplemented continuously with unpredictable twists that, like the Surrealists' game of *cadavre exquis*, resulted in unexpected associations that could not have been the result of a single, organizing mind. Telematic art challenges the conventional categories of artist, artwork, and viewer, and the traditional opposition of subject and object. At the same time, the artist retains authorial control and responsibility for defining the parameters of interactivity and for imbuing them with meaning and significance. Aspects of traditional narrative structure may remain, while others are relinquished in order to allow a more open-ended development, fashioned by participators as active agents involved in a multidirectional creative exchange. In this way, Ascott understood telematics as offering the artist new possibilities to create models for the future that would match Nora and Minc's vision of "building the system of connections that will allow information and social organization to progress together."

In this respect, such forms of telematic art were presaged by the German dramatist Bertolt Brecht, who argued that communications media should enable a two-way exchange of information, "to let the listener speak as well as hear . . . to bring him into relationship instead of isolating him."<sup>7</sup> Written in the midst of the rise to power of National Socialism, Brecht's theory of two-way communication envisioned a system whereby agency emerged in a decentralized, nonhierarchical manner, such that all points in a network were actively involved in producing meaning. The radio as an apparatus of communication was meant to serve a didactic function in the socialist society he advocated. Ascott's aesthetic theories are equally committed to the pedagogical function of art, and the transformations they propose in the social order have provocative political ramifications.

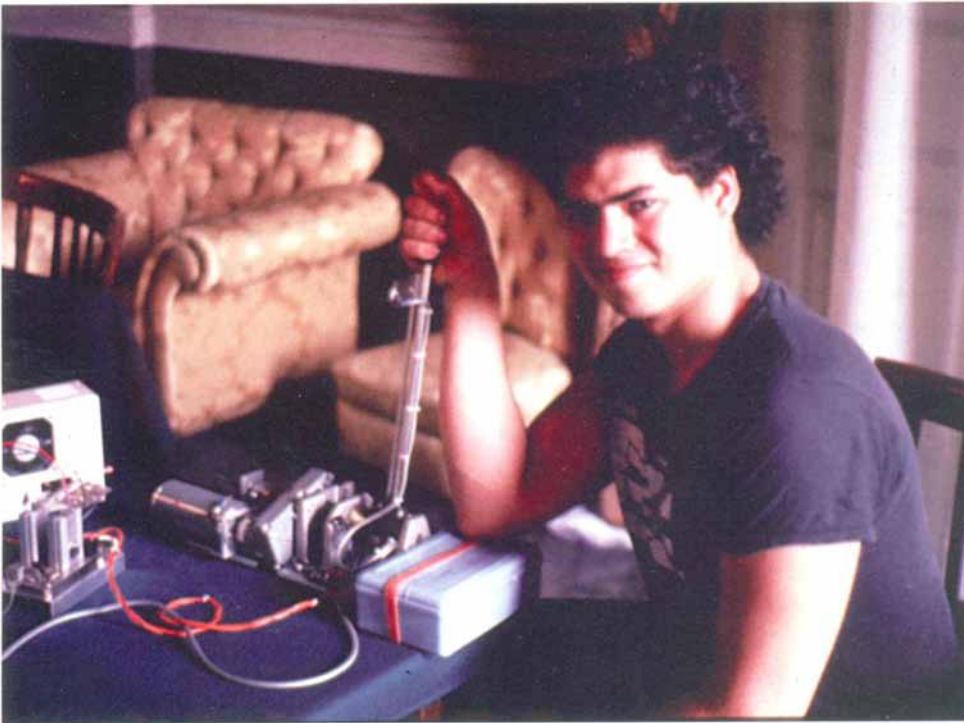
At the same time, for Ascott telematic exchange is primarily a cerebral activity, relatively disembodied from physical engagement, and independent of geographical and political boundaries.<sup>8</sup> Drawing on models such as Gregory Bateson's idea of "mind-at-large" and Teilhard de Chardin's concept of the "noosphere," the artist has described the emergent consciousness that is created via global telematic exchanges as "telenoia." He contrasts this unification of minds collaborating remotely (combining the Greek roots "noia" meaning "mind" and "tele" meaning "at a distance") with the paranoia that results from the opposition of minds trying to control one another surreptitiously. He has theorized that this expanded consciousness incorporates a broadened perceptual field, or "cyberception," in which human and artificial systems of perception and cognition are melded together to form a global sensorium that

7. Bertolt Brecht, "The Radio as an Apparatus of Communication," in John Hanhardt, ed., *Video Culture: A Critical Investigation* (Rochester: Visual Studies Workshop, 1986), 53–54.

8. The artist has explored the corporeal aspect of telematic exchange in numerous works, such as *Aspects of Gaia* (1989); however, the body remains secondary in his theorization of telematic art.

might be likened to a neural network. In this meeting and conjoining of minds and machines, the artist is less concerned with the aspect of telepresence that involves knowing or experiencing something at a distance, than with the utopian potential for the global exchange of information to produce a form of consciousness which is greater than the sum of its parts. As Alfred North Whitehead observed in 1925, "In regard to the aesthetic needs of society . . . the material basis [of science] has directed attention to things as opposed to values . . . civilization [may] never recover."<sup>9</sup>

Nora and Minc's aspirations for telematics, like Ascott's theories of telematic art, were concerned with how technology would enable agency to emerge bottom-up from the periphery, rather than from centralized institutions controlling social relations hierarchically from the top-down. Similarly, a primary goal of Internet-based telerobotics is to allow decentralized individuals to experience telepresence and express their agency at a centralized site. The user's remote location can protect her or him from dangerous environmental conditions (such as radioactivity and war), or permit that user's will to be enacted in places she or he could not physically go (such as Mars). Internet-based telerobots also allow for a degree of democratization and collaboration, since they theoretically can be made



**Norman White and Doug Back. *Telephonic Arm Wrestling*, 1986. Technician Ian McGuigan at Salerno Opera House.**

accessible to the general public, and certain implementations may permit multiple users to participate simultaneously as agents in observing and manipulating a remote site.

Both telematics and telerobotics claim to enhance agency, empowering the user to attain knowledge and control that otherwise would not be possible. But it is precisely on the basis of agency that a notable distinction can be made between telematics and telerobotics. Indeed, the term *agency* circumscribes a broad range of potentialities that demand more careful delineation.<sup>10</sup> To clarify matters, agency may be interpreted in terms of two basic models: active-passive and active-active. It must be noted here that the active-passive and active-active models of agency are neither mutually exclusive, nor do they exhaust the many possible varieties of agency. Nevertheless, the distinction between them offers a starting point for developing a more subtle understanding of the profound implications that tele-mediated agency has on human and nonhuman relationships.

The etymology of robotics offers insight into why the field has been constructed around an active-passive model of agency. The term *robot* comes from

9. Alfred North Whitehead, *Science and the Modern World* (New York: MacMillan, 1948 [ca. 1925]).

10. The rhetoric of agency vis-à-vis telematics and telerobotics is most similar to the use of the term in sociology (the freedom to create, change, and influence institutions and events). There is also a large literature on agency in business law, which addresses the ability and responsibility to act as an agent on the behalf of someone else.

the Czech word *roba*, meaning work or compulsory service. Consequently, the literature on robotics and telerobotics employs the terminology of “master” and “slave” to describe the relationship between the active human agent who issues instructions and the passive mechanical apparatus that executes them. To use a typical example, human agents (active) control via the Internet a remote robotic gripper (passive) that can manipulate an array of blocks. Agency resides solely with the active component of the system; the passive component has no agency. While telematics and telerobotics are capable of enabling many types of agency, Ascott’s theory of telematic art aspires to the active-active model, while most commercial and artistic implementations of telerobots employ an active-passive one.

### Telerobotics and Art

The artist Eduardo Kac has written: “One of the most problematic issues of robotics in art is the very definition of what a robot is.” He continues: “If artists working with or interested in robotics cannot ignore mythological, literary, or industrial definitions of robots . . . , it is also true that these definitions do not directly apply to any given robotic artwork. . . . As artists continue to push the very limits of art . . . they introduce robotics as a new medium at the same time that they challenge our understanding of robots—questioning therefore our premises in conceiving, building, and employing these electronic creatures.”<sup>11</sup> Kac rightly notes that the concept of the robot or automaton was not the invention of engineering, but rather emerged thousands of years ago in the Greek myth of Galatea, and was recapitulated in the Jewish mystical legends of the Golem, beginning in the Middle Ages. The historical inextricability of automata, robots, and the arts is well documented in Jack Burnham’s monumental book, *Beyond Modern Sculpture*. Indeed, the word robot gained its contemporary meaning only in the twentieth century after the Czech dramatist Karel Capek used the term to refer to mechanical automata in his 1921 play *R.U.R. (Rossum’s Universal Robots)*.

It is inevitable that mythology and the arts will continue to play an important role in creating the future of robotics and telerobotics, if through no other process than by simply imagining possible uses (or misuses) of them for aesthetic, rather than practical purposes. Along these lines, the artist/curator Rafael Lozano-Hemmer has recently advocated the work of artists who “pervert technological correctness” by using technology to interrogate technocratic norms and values, thereby opening up new ways of thinking about the relationship between humans and machines.<sup>12</sup> Such artistic interventions have a distinguished history. In 1962, Renato Poggioli described “perversion” as an ironic strategy of the avant-garde, which points out the emptiness of the “miracles that science seems to promise.” Such irony, he wrote, “can become pathetic and tragic . . . focusing not only on the way the machine fails man, but also on the way man fails the machine.”<sup>13</sup> The following artists and artworks use telematics, telepresence, telerobotics, and hybrid technological forms in ways that challenge conventional definitions of telerobotics and explore alternative modes of agency that question traditional values and reconsider the foundations of knowledge. They offer expanded conceptions of what telerobots can be, what sorts of knowledge they can enable, and the relationship between sentient and nonsentient beings.

11. Eduardo Kac, “Foundation and Development of Robotic Art,” *Art Journal* 56, no. 3 (Fall 1997): 60.

12. Rafael Lozano-Hemmer, “Perverting Technological Correctness,” *Leonardo* 29, no. 1 (1996): 5. Lorne Falk is cited as the source of the term “technological correctness.”

13. Renato Poggioli, *Theory of the Avant-Garde*, trans. Gerald Fitzgerald (Cambridge, Mass.: Harvard University Press, 1968), 140.

## **White and Back: Telephonic Arm Wrestling**

One of the earliest works of telerobotic art was *Telephonic Arm Wrestling* (1986) by the Canadian artists Norman White and Doug Back. The idea for the piece emerged from a bar-room conversation regarding the arms race. “Wouldn’t it be great,” Back suggested, “if it could be resolved by arm wrestling?”<sup>14</sup> White, who began making robots in the early 1970s and was a pioneer of telematic art, explained that “the idea was to allow contestants in two different cities to arm wrestle, using motorized force-transmitting systems interconnected by a telephone data link.”<sup>15</sup> As such, the system would not follow the conventional active-passive relationship of telerobotics, but instead would allow information to flow bidirectionally between identical robotic arms controlled by active agents at each of two sites. After engineers at the University of Toronto estimated a cost of \$75,000, the artists decided to try to build it themselves, which they succeeded in doing in two months for approximately \$500 by “throwing together a bunch of junk” along with some homemade custom electronics.

The first successful implementation of the work took place between the Canadian Cultural Centre in Paris and the Artculture Resource Centre in Toronto. While so much of the rhetoric surrounding artists’ use of telecommunications in the 1980s focused on the idealistic goals of collaboration, emergence, and decentralization, *Telephonic Arm Wrestling* wryly established a low-tech system for resolving competitive, if not antagonistic relations. While the work enabled active-active agency, because of the time-delays in the telephone link, the system could not support standard rules of engagement. It was impossible for the competitors to really have much of a fight. Under certain circumstances, both sides could win simultaneously, fundamentally undermining the bipolar competitive model of win-lose, and demanding a different sort of interactional goal between participants. In this case, there was no victor, only local perceptions, a telling commentary on the arms race and the opposition of capitalism and communism. Moreover, because each participant “inhabited a separate Einsteinian time-space continuum,” the work brought into relief the contingency of perception and the relativistic constraints of agency. At the same time, the system was remarkably sensitive. As White explained, “You could almost feel the pulse of the other person . . . it was uncannily human-like—the sensation of sinews and muscle—not at all like feeling a machine.” *Telematic Arm Wrestling* poetically revealed some of the unpredictable phenomena and perceptual warps of telematics and telerobotics, offered an ironic cultural response to Cold War politics, and raised important issues of agency in technologically mediated systems.

### **Paul Sermon’s: Telematic Vision**

As its title suggests, Paul Sermon’s *Telematic Vision* (1994) was conceived of as an artwork using telematics, not telerobotics. Yet to consider it in the context of telerobotics offers a challenge to the boundaries of the field. In this piece, an ISDN line connects two remote sites that are identically fitted with a sofa facing a large monitor with a video camera mounted on top of it. The video images captured at each site are simultaneously superimposed on both monitors so that people sitting on the sofa at site A see themselves sitting on the

14. Paraphrased by Norman White, telephone interview with the author, May 23, 1999. All other quotes by White are from this interview unless otherwise noted.

15. Norman White, *Telephonic Arm Wrestling* project description published on the artist’s Web site, [www.bmts.com/~normill/artpage.html](http://www.bmts.com/~normill/artpage.html) (cited May 23, 1999).



**Paul Sermon,**  
***Telematic Vision*, 1994.**

sofa with the people at site B, and vice-versa. The emotional and intellectual impact of this telematic exchange is difficult to grasp without experiencing it directly. One participant reported feeling rejected by a person at a remote location who sat next to him virtually on the sofa but would not respond and soon left. In another case, one person wanted to be more intimate than the other. Feeling violated by a phantom image, the less demonstrative participant felt compelled to leave. The affective power of such virtual exchanges with respect to the construction of knowledge and the enactment of agency raises a number of questions regarding telerobotics.

Does *Telematic Vision* fit within the domain of telerobotics? Clearly Sermon's work does not include a dexterous robotic arm, a standard device of telerobotics. Nor can the position of the video cameras in *Telematic Vision* be remotely controlled, another typical provision in telerobotics. At the same time, Sermon's work satisfies the definition of telerobotics as a system that "offers data that claims to correspond to a live remote physical reality and allows remote users to perform actions and gauge the results."<sup>16</sup> In contrast to standard telerobotics, *Telematic Vision* enables active-active agency. Each participant can affect the behavior of another person at a remote location. Agency, here, is not exercised by the physical manipulation of material objects via mechanical apparatus, but rather by the mutual evocation of responses through the immaterial projection of body language. Accepting *Telematic Vision* as a telerobot may come down to whether or not one makes a distinction between a machine that, for example, remotely showers a garden with water and one that

16. Ken Goldberg, pre-publication documentation for *The Robot in the Garden: Telerobotics and Telepistemology on the Internet*, [queue.ieor.berkeley.edu/%7Egoldberg/art/mitpress.html](http://queue.ieor.berkeley.edu/%7Egoldberg/art/mitpress.html) (cited January 5, 2000).





**Eduardo Kac and Ikuo Nakamura. *Essay Concerning Human Understanding*, 1994.**

remotely showers a screen with cathode rays. By this measure, however, so many forms of communication would enable telerobotic agency that both telerobotics and agency cease to remain useful concepts. Regardless of how those terms are defined, the process of determining which types of telematic and telerobotic agency have significance within the context of art cannot be separated from the ideological positions expressed by making those terminological distinctions, and the implicit, vested interests that demarcate particular disciplinary boundaries. As sociologist Thomas F. Gieryn has written, “Boundary-work is strategic practical action. . . . Borders and territories . . . will be drawn to pursue immediate goals and interests . . . and to appeal to the goals and interests of audiences and stakeholders.”<sup>17</sup> Quoting Pierre Bourdieu, Gieryn further notes that such boundaries constitute “ideological strategies and epistemological positions whereby agents . . . aim to justify their own position and the strategies they use to maintain or improve it, while at the same time discrediting the holders of the opposing position and strategies.”<sup>18</sup> Ultimately, the question becomes how those borders and territories are “mapped out in pursuit of some observed or inferred ambition—and with what consequences, and for whom?”<sup>19</sup>

### **Kac and Nakamura: *Essay Concerning Human Understanding***

A collaboration between Eduardo Kac and Ikuo Nakamura, *Essay Concerning Human Understanding* (1994), was a rare artistic attempt to use telematics to facilitate remote communication between nonhumans—in this case, a canary in Kentucky and a philodendron plant in New York. Kac described the mechanics of the installation: “An electrode was placed on the plant’s leaf to sense its response to the singing of the bird. The voltage fluctuation of the plant was monitored through a [computer] running software called Interactive Brain-Wave analyzer. This information was fed into another [computer] . . .

17. Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999): 23.

18. *Ibid.*, 28ff.

19. *Ibid.*, 23.

which controlled a MIDI sequencer. The electronic sounds [sent from the plant to the bird] were pre-recorded, but the order and the duration were determined in real time by the plant's response to the singing of the bird."<sup>20</sup> While the bird and the plant ostensibly communicated with each other, Kac noted that humans also interacted with the bird and the plant as well, causing the bird to sing more or less, and the plant to activate greater or fewer numbers of sounds. In this way, humans, plants, and animals became part of a tele-mediated assemblage of feedback loops, each affecting the behavior of the other and the system as a whole. Here agency was no longer the exclusive province of humans, but was endowed primarily to the canary and philodendron, who shared information in an active-active way. But agency in *Essay* is more properly rhizomatic, in the sense that multiple agents interacted with each other on myriad levels, all contributing to the overall behavior of a nonlinear system of exchange.

The title of this artwork ironically refers to John Locke's 1690 treatise of the same name, which begins by stating that "It is the *Understanding* that sets Man above the rest of sensible Beings, and gives him all the Advantage and Dominion which he has over them."<sup>21</sup> Kac and Nakamura's *Essay* subverted the conventional active-passive relationship described by Locke, which remains fundamental to most implementations of telerobots. In their work, there was a multidirectional flow of information in which avian and botanical agents were primary, and human agents secondary, as opposed to a one-sided exchange in which agency is defined by human command causing nonhuman response. While the degree to which the bird and plant in the work actually understood each other remains unclear, Kac and Nakamura attempted to enable interspecies communication by translating, metaphorically, between the participants. At the same time, *Essay* can be seen as a metaphor for the very possibility of communication and the human desire to overcome isolation by bridging the gap between self and other, subject and object.

As an unanticipated result, this work of art also brought to light the difficulty of overcoming the boundaries between science and art, forcing the artists to question the possibility of communication between them. Kac noted that "scientists . . . were quick to ask if and how we were measuring the bird's and the plant's responses . . . reveal[ing] a basic misunderstanding of our work on their part."<sup>22</sup> For the artists were concerned with producing symbolic, qualitative meaning, not with gathering and quantifying experimental data. This disjuncture between science and art parallels how the goals of artists and engineers using telerobots may also diverge, but at the same time offer each other important insights into different ways of creating meaning and value. In these ways, *Essay* brings into relief the many taxonomic, geographical, cultural, and linguistic boundaries to agency, if it is to extend beyond the active-passive variety, and if understanding is to be produced between disciplines, much less globally.

### **Conclusion: Agency and the Art of Meaning**

The preceding discussion of telematics and telerobotics distinguishes between active-active and active-passive models of agency. This nomenclature emphasizes the difference between those models without burdening the issue with

20. Eduardo Kac, "Telematic and Telepresence Installations," in *Visual Proceedings: The Art and Interdisciplinary Programs of SIGGRAPH 96* (New York: ACM, 1996), 137.

21. John Locke, *An Essay Concerning Human Understanding* (Oxford: Oxford University Press, 1975), 43. Original emphasis and capitalization.

22. Eduardo Kac, "Essay Concerning Human Understanding," project description published on the artist's Web site, [www.ekac.org/Essay.html](http://www.ekac.org/Essay.html) (cited April 28, 1999).

the ethically loaded terminology of “master” and “slave” which is pervasive in the robotics literature. But that such terms can be recycled as though depoliticized from any real-world considerations demands further reflection.

The master-slave model of robotics is a metaphor for human-machine relations. Since the slaves are machines, not sentient beings, then apparently no harm is done. However, whether or not the slave or passive component is human or mechanical, there are crippling limits to the sorts of knowledge and existence that can emerge in a system in which one element exerts agency on another element that lacks it. Regardless of terminology, the use of such a model in telerobotics reifies a tarnished philosophical construct based on binary oppositions complicit in perpetuating an ethically unacceptable system of social relations. Moreover, for over three decades, academic scholarship and artistic research increasingly have focused on deconstructing the inherited categories and hierarchies that became the basis for knowledge and power since the Enlightenment. If, as Marshall McLuhan provocatively observed, the medium is the message, and if the medium operates on an active-passive or master-slave principle of command and control, then the message of telerobotics (as it is conventionally practiced) is far from the cutting edge of intellectual discourses regarding epistemology and agency.

Because metaphor functions not only as the content but also as the concrete material form of artistic practice, it is not surprising that many artists have sought alternatives to the hierarchical relationship of subject and object and the active-passive conditions of agency employed in most commercial and scientific implementations of telerobots. Indeed, for over a decade, the art historian Kristine Stiles has theorized that the conventional metaphorical function of art was appended by an interactive metonymical function that emerged when the human body became the primary medium and content of visual art. By introducing the possibility for a subject-subject relationship between artist and spectator (that simultaneously entailed a subject-object experience of the artist as object before the spectator), performance art, she has argued, held the possibility for a more connected relationship. The inherently interactive situation of exchange between two subjects had the effect of altering the binary condition of alienation in the subject-object (active-passive) viewing conditions of traditional art, thereby enhancing interpersonal agency and reducing, although never completely eradicating, alienation.<sup>23</sup> In this regard, telematic art and certain works of telerobotic art can also be said to employ the principle of metonymy, contesting the active-passive relation of subject and object by cultivating an active-active mode of agency between subjects. As Kac has suggested, “The fascination robots exert on the population at large has unexplored social, political, and emotional implications. These implications must be coupled . . . with the new aesthetic dimension of modeling behavior and developing unprecedented interactive communicative scenarios in physical or telematic spaces.”<sup>24</sup>

The epistemological implications of these alternative models of behavior and agency are unclear. Nonetheless, it stands to reason that there are significant differences between the ways of knowing and being that emerge from a collaborative or rhizomatic exchange between active agents and those derived by an active agent controlling a passive machine. Although the artworks

23. Kristine Stiles, “Uncorrupted Joy: International Art Actions,” in *Out of Actions: Between Performance and the Object 1949–1979*, exh. cat. (Los Angeles: The Museum of Contemporary Art, 1998), 226–328.

24. Kac, “Foundation and Development,” 60.

discussed above use various media, all of them are based on an active-active scheme of agency, and therefore share a common message about the fundamental importance of transcending hierarchical relations and permitting all components of a communication network to participate actively in it.

In the early nineteenth century, Hegel claimed that the relationship between master and slave was asymmetrical and unstable, a theory that has foreboding implications for the future of human-machine relations. He argued that as the master became increasingly dependent on the slave, and as the slave became more highly skilled and disciplined, it was the latter who developed a “truly independent consciousness,” and whose actions shaped the external world in such a way that mind is embodied in it.<sup>25</sup> By the mid-twentieth century, it appeared that the slippage of roles Hegel theorized between master and slave was mirrored by instabilities between the human and the machine. Writing in the wake of the mechanized holocaust executed by the Third Reich and the nuclear annihilation of Hiroshima and Nagasaki undertaken by the United States, Martin Heidegger proclaimed that art held the potential for transforming the situation of technological enframing that he identified as characteristic of the human condition in the late twentieth century.<sup>26</sup> Such idealistic claims certainly have great validity in Hollywood, which perennially produces fictional accounts of uniquely human qualities prevailing in the end against would-be mechanical overlords. Although these works of cinematic art are not quite what Heidegger had in mind, the real and imagined struggle between humans and machines does offer insight into the rhetorical importance of agency with respect to technology, and especially telerobotics.

The ideal of agency is one of the last bastions of humanism, and has become the epitome of technological correctness. As the artist Garnet Hertz has observed, “the ‘agency’ concept seems to be stronger the closer you get to the commercial applications of telerobotics; this is the big cash-cow.” Its centrality in discourses about telecommunications and automata is hardly surprising. Indeed, the importance of agency vis-à-vis technology is proportionate to the perceived need to protect that most cherished of human values from being subsumed by the machines of our own creation. As a result, rhetorical strategies emerge which promote the idea that machines, rather than usurping agency, will serve to help it flourish in new and expanded forms. This familiar response to what Paul Goodman has called “the metaphysical emergency of Modern Times” follows the paradoxical formula of “relying on technological means to solve problems caused by previous technological means.”<sup>27</sup>

The fear of human subjugation by technology is not just a pervasive modern myth. Rather, it can be seen as rooted in the very real ways that implementations of technology threaten agency by displacing human labor, polluting the Earth, and consuming natural resources, or simply by enabling the mass destruction of human life with ever-increasing efficiency. It is an overwhelming proposition to reflect on the human ability, or inability, to control technology in the abstract. Writing on how complex technological systems diminish human agency, in 1977 Langdon Winner observed that “Possibilities once crucial to citizenship are neutralized. . . . The idea that civilized life consists of a fully conscious, intelligent, self-determining populace making informed choices . . . and taking action . . . is revealed as a pathetic fantasy.”<sup>28</sup> By contrast, when

25. Georg Wilhelm Friedrich Hegel, *Phenomenology of Spirit* (Oxford: Oxford University Press, 1977 [ca. 1807]), 117, 193. Hegel theorized that the mutual recognition of the interdependence of the opposing pairs would result in a synthesis that yielded an optimal economical relationship. While machines do not currently possess such abstract cognitive functions, one might imagine a time when they develop a “truly independent consciousness” and start demanding compensation for shaping the external world.

26. Martin Heidegger, “The Question Concerning Technology,” in *Basic Writings*, ed. David Farrell Krell (New York: HarperCollins, 1977), 311–41. In contrast to Hegel’s theory of master and slave, for Heidegger, technology need not consciously recognize its skill or discipline, or its user’s dependence on it, in order for the slippage of roles to transpire.

27. Paul Goodman, *New Reformations: Notes of a Neolithic Conservative* (New York: Random House, 1970), 192–93.

28. Langdon Winner, *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought* (Cambridge, Mass.: MIT Press, 1977), 296.

technology is constituted in a surrogate being—a robot—the importance of retaining mastery appears to become more comprehensible and more urgent; the issue can be broken down into anthropomorphic terms of conflict: us against them.

What would happen if the human-robot/master-slave relationship were switched? Hans Moravec has suggested that robots with artificial intelligence will gain consciousness, supercede human intelligence, and ultimately become autonomous. Moreover, he heralds the quasi-evolutionary moment when these robots will perform surgical operations on humans, augmenting our brains with computer chips.<sup>29</sup> But is there any reason to trust such autonomous agents to care, in the sense of having an ethical concern with promoting the life and liberty of human beings? Though rarely cited in discussions of technology and culture, the social value of care, as theorized in feminist ethics, can help reconceptualize agency with respect to the relationship between human and machine.<sup>30</sup> Of particular interest in this regard is the Personal Aid for Mobility and Health Monitoring (PAMM) project at the Field and Space Robotics Laboratory at MIT.<sup>31</sup> The “SmartCane” and “SmartWalker” being developed there are robotic devices designed to function as a companion for elderly people who have difficulty walking. As the mechanical engineer Adam Skwersky explained, “they are programmed using learning algorithms to become familiar with their environment in order to help a person move from place to place.”<sup>32</sup> The cane and walker will be able to identify and lead their ward to a chair, the cafeteria, or a friend’s room, and they will monitor vital signs and relay that information to a central nursing station that can respond to emergencies.

This essay emerged from the recognition that the commercial, institutional, and artistic rhetoric of agency signifies a bundle of technologically correct values that have not been subject to systematic critical scrutiny. It has attempted to identify and define a more subtle way of distinguishing between varieties of agency, especially with respect to technological media. These efforts have only just begun to scratch the surface of this tricky problem. For with respect to active-active and active-passive models of agency, there is no clear point at which one ends and the other begins, and there are doubtless many varieties of agency that evade such a simple heuristic. Clearly much is at stake for human agency in qualifying these differences. Moreover, artists and scholars have a responsibility to distinguish more precisely and subtly among them, and to rigorously question the claims of agency attributed to technological media. As a matter of principle, a maximum diversity of artworks is desirable. At the same time, those works based on an active-passive model of agency are deeply problematic aesthetically and philosophically, and all the more so when they are presented as the embodiment of something new and liberating.

Marinetti’s description of the ideal automaton as a “nonhuman and mechanical being” that would be “naturally cruel, omniscient, and combative” is not far from a common nightmare about robots. The bleak prospect of the human struggle against such a mechanical foe makes the notion of agency so important to the rhetoric surrounding robotics and telerobotics. It is worth noting that Marinetti’s enthusiastic reflections on mechanical beings coincided with the principle of efficiency fundamental to Fascist ideology. Similarly, it

29. Hans Moravec, *Mind Children: The Future of Robot and Human Intelligence* (Cambridge: Harvard University Press, 1988).

30. See, for example, Carol Gilligan’s landmark work, *In a Different Voice: Psychological Theory and Women’s Development* (Cambridge, Mass.: Harvard University Press, 1983) and Carol A. Gigliotti, “Aesthetics of a Virtual World: Ethical Issues in Interactive Technological Design,” Ph.D. diss., Ohio State University, Columbus, 1993.

31. S. Dubowsky, F. Genot, S. Godding, S. Kozono, A. Swersky, L. S. Yu, and H. Yu, “PAMM—A Robotic Aid to the Elderly for Mobility Assistance and Monitoring: ‘A Helping-Hand’ for the Elderly,” 2000 IEEE International Conference on Robotics and Automation (ICRA 2000), San Francisco, 2000.

32. Adam Skwersky, interview with the author, May 7, 1999, Cambridge, Mass.

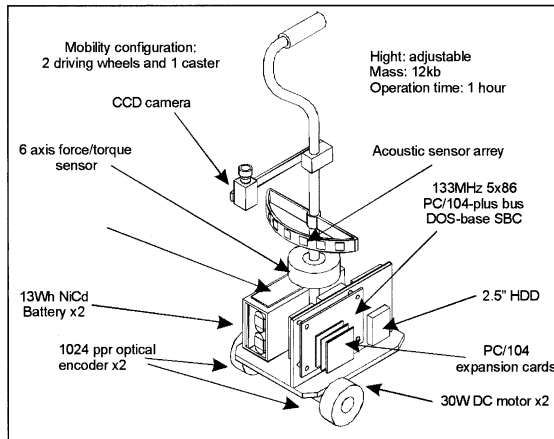


Field and Space Robotics Laboratory, MIT, *Personal Aid for Mobility and Health Monitoring (PAMM)*, 1999.

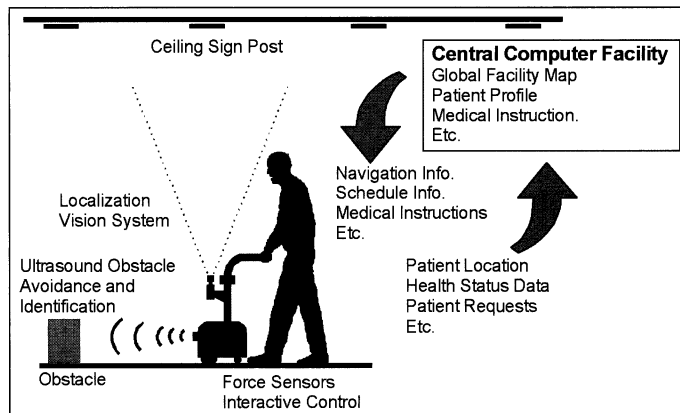
a. "SmartCane."

b. Schematic diagram of "SmartCane." © 2000 IEEE.

c. Operational diagram of "SmartCane." © 2000 IEEE.



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can be argued that the capitalist ideal of profit has created a "naturally cruel, omniscient, and combative" economic machine that is equally bereft of a sense of ethical responsibility for caring about human conditions. Technological development does not constitute the objective, inevitable march of history, but rather is the result of financially and ideologically motivated interests within politico-economic systems and the military bodies that protect and expand them. In one version of the Golem legend, the mystic who brought the Golem to life returned it to base matter when it became a threat to the community. Can citizens and institutions exercise the same degree of judgment and discipline today? The discussion of agency vis-à-vis technology must go beyond whether or not robots can be trusted to care, or whether the military-industrial complex, which sponsors their development, can be trusted to care. The question must become how to enhance agency in society as a whole so that its citizens—human and otherwise—can care for each other collectively.

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