MAINFRAME EXPERIMENTALISM

Early Computing and the Foundations of the Digital Arts

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UNIVERSITY OF CALIFORNIA PRESS
Berkeley Los Angeles London

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COMPUTER PARTICIPATOR

Situating Nam June Paik's Work in Computing

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"The BROADBAND COMMUNICATION REVOLUTION has to begin, and it must begin now." So declares Nam June Paik in 1974 in a report he wrote for the Rockefeller Foundation. It was a year before the release of the Altair 8800 would herald the birth of personal computing and just three years after the first email had been sent on ARPANET. In the report Paik clearly predicts the future of personal multimedia computers connected by online access. By "broadband communication," he explains, he means the sum total of all the tools available for the transmission of audiovisual material, including "video-telephones, fax machines, [and] interactive two-way television. "This kind of technology," he goes on to say, "[is] going to turn the television set into an 'expanded media' telephone system with thousands of novel uses, not only to serve our daily needs, but to enrich the quality of life itself." The uses he foresees for broadband communication are wide-ranging: "shopping, bibliographies, opinion polls, health care, bio-communication, [and] data transfer from office to office." When combined with a means of data manipulation and storage, these systems, he concludes with technophilic bombast, "will constitute a new kind of nuclear energy for information and the improvement of society."[1] Long before *Wired* and everyday access to the Internet, Paik offered a prescient, if utopian, vision of the future of computing. Since the mid-1960s he had been working experimentally with computers while in residence at Bell Labs. Beginning at the same time and equally as important as this work, he wrote a series of essays in which he situates computing in relation to the global effects of mass media as information was becoming increasingly easy to manipulate, transmit, and store. Over a decade before the Internet boom of the mid-1990s, and even before his 1974 report, he had already foreseen that the broadband

revolution to come would be based on a mixed-media global database of instantly accessible and transmissible cultural data.

Paik's goal with his early computer works, as was true of his contemporaneous video work, was greater audience participation. He had developed what he called "participation TV," starting with manipulated television sets made while he was living in Germany during the late 1950s and early 1960s. Like an electronic collagist, Paik used broadcast television as his grounds. He set out to transform the dross of commercial mass media into work that could dialogue with the high-modernist avant-garde. He had once said in an interview, "I make very serious art, higher than popular commercial art. . . . I always thought television was a great medium, but I hated the mass media part."[2] His first solo exhibition, in 1963, included various sets he had altered, distorting the broadcast image to the point of total abstraction.[3] Designed to be played like musical instruments, several of these sets had direct viewer interaction built into them. The stultifying effects of passive television consumption had long been decried by media critics. Paik constructed these works in an attempt to combat idle watching. Although they could be more actively played than the typical set, due to technical limitations the participation they offered was strictly limited, much more so than that offered by the remote controls just coming to market. In the one piece in the exhibition properly titled *Participation TV,* as the viewer spoke into a microphone attached to the set, the screen filled with a spray of dots. In another, untitled piece, the viewer stepped on a foot switch that caused a similarly abstract image to appear on screen. Encouraged even by these meager effects, Paik's later work would become increasingly sophisticated in its interactivity. To this end he developed a video synthesizer capable of an enormous number of transformations to the video image. His unrealized goal was for these synthesizers to become usable at home, so viewers could make their own avant-garde television mixes, participating directly in the construction of the images they saw on screen. As his electronics grew more sophisticated, so did his thinking on the participatory interrelations of man and machine, especially after his encounter with computing.

Even in his first exhibition, long before he actually used a computer, he may have been already thinking about computing, as indicated in the title of one work in particular. *Random Access* consisted of strips of magnetic audiotape glued to the wall in an intersecting network of lines. The viewer was able to take a tapehead and pass it over whichever parts of the tape he liked, at whatever speed, producing his own instantaneous electronic sound collage. The title of the piece recalls the use of random access memory in computers, which allows for nonlinear access to stored data. By placing the tape in a spatial array on the wall, Paik invented a primitive system for real-time nonlinear editing years before computer memory was used for audiotape editing. Although impractical for actual editing,

as an interactive work the piece was far more richly playable than the television sets also on display.

From 1967 through 1968, Paik was a residential researcher at Bell Labs. Working with A. Michael Noll, he produced several experimental works using the lab's computers that focused on random number generation and repetitive iteration.[4] "The more it deals with the character of randomness and repetition, the more efficient is the computer," he said in an interview from the time.[5] Intrigued by these features, rather than allow the viewer to become a participatory agent, Paik assigned that role to the computer. It became a means of discomposition, the machine making the final decisions regarding the work's form. Paik cites John Cage, his teacher and close friend, who, following his earlier work using the *I Ching*, had also been experimenting with computer-generated randomness. All computers have a built-in random number generator, so randomization is a simple task for the computer. It readily produces unexpected results. "If you're surprised with the results," Paik quotes Cage, "then the machine has composed the piece. If you are not surprised then you have composed it."[6] On the other hand, in order to realize randomness in any usable form, computers require step-by-step programming. Paik likens this to having to consciously tell his legs to take every step while attempting to walk. What he quickly realized was that, while computers could compose randomly, this randomness was available for human use only when embedded in a repetitive, iterative, programmed structure.

Paik's computer work plays with this tension between randomness and repetition. *Confused Rain* (1967) is a printout of the letters of the word *confuse* falling down the page in a random accumulation. It was, he said, "a protest against the lack of common sense in the computer."[7] Using random number generation to choose the location and the letter to be printed while iteratively tracking down the page, the computer distributed the letters like drops of falling water. While following programmed parameters determined by Paik, the machine made a concrete poem whose final appearance was randomly determined. As computer-based concrete poetry, *Confused Rain* parallels works being made around the same time by Paik's fellow Fluxus artists Jackson Mac Low and Alison Knowles, as well as important early works of computer art such as Charles Csuri's *Random War* (1967). All of this work harnessed the controlled randomness easily provided by computers. Paik's use of the word *confuse* can be read as much as a nod to the symbiosis between man and machine in the composition process—a "fusing together" to produce the final work—as the mixed-up jumble of discomposed letters tumbling down the page.

Paik made several video experiments while at Bell Labs that also explored the tension between randomness and repetition in computing. These works remained experiments for Paik, their potential going undeveloped in his art after

his time at Bell Labs came to an end. One unnamed work consists of almost nothing: a tiny white dot (actually a vertical line about four pixels high) on a black screen jumps from the center of the screen along diagonals, first to the upper left, then to the lower right, then to the upper left, and so on. The image produced is the inversion of Paik's *Zen for Film,* a length of clear leader designed to accumulate dust and scratches each time it's projected. Rather than anarchically accumulating black flecks on a white screen, the computer screens a strictly manipulated white spot moving across a field of black in a rigidly programmed, if random, sequence. Paik demonstrates how, in computing, randomness is tightly constrained and highly controlled. The other extant experiment, also unnamed, consists of too much information: across the center of the black screen, a string of what seem to be random numbers appears, changing too rapidly for the eye to follow. Paik turns the power of computing against the viewer. Rather than output information in a form useful for human consumption, this video presents information at a rate that far outpaces the abilities of human apprehension. He presents an image of information overload, of machine time surpassing human time. This was a favorite theme of Norbert Wiener, one of the authors Paik most loved to quote. "Our problem," Paik said, echoing Wiener, "is not capitalism versus socialism but the conflict of human time versus machine time."[8] Here machine time spins out of control. The machine's rapid-fire enumeration exceeds the human capacity to consume it as anything other than a blur.

The First "Snapshots" of Mars (1966), a lithograph that Paik made just before his residency at Bell Labs (figure 15.1), consists of a page of zeros and ones from printouts sent back to Earth by *Mariner* IV of the surface of Mars. These were the first images from a planet long hoped to harbor extraterrestrial life. The decoding of these images would reveal a desiccated surface utterly devoid of life. Rather than give the viewer the disappointing image of barren craters that had been circulating in the media, Paik shows a section of their binary code, the raw data that made its way through space before being translated by machine into a form fit for human vision. He presents an image of a picture designed for machine consumption, its content utterly meaningless for humans in the symbolic form in which it exists. While more gee-whiz technophilia than critique (at the bottom of the print he describes images produced from the binary code as "remarkable," which they no doubt were at the time), in *The First "Snapshots" of Mars,* as in his second video experiment, Paik reveals the disjunction between man and machine. He focuses on the significant differences between machine vision and human vision and the act of translation necessary for one to communicate with the other. Rather than rain down the page or blur across the screen, signs proceed rigidly across the page in a manner logical to the machine but incomprehensible to the human viewer.

Paik's writing on computing, begun at about the same time as his work at Bell Labs, is less focused on discomposition techniques, the limits of computing, or

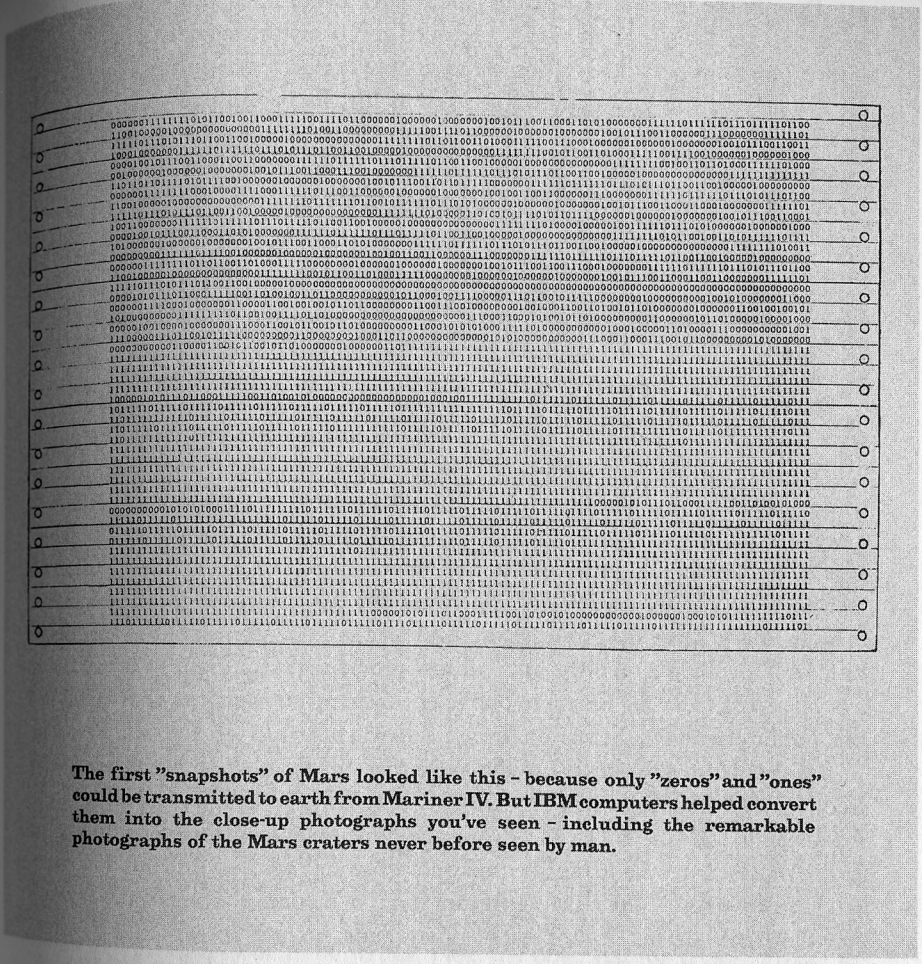

FIGURE 15.1. Nam June Paik, *The First "Snapshots" of Mars*, 1966. Digital photograph. © Nam June Paik Studios. Photographer: Lars Lohrich.

the clash between human and machine. While his computer work, like his video work, may have been undertaken in an attempt to turn electronic media to avant-garde ends, in his writing on computing he is far more populist. His numerous essays and reports are much more expansive about future possibilities for computing and its use by the general public. As he had begun to take an interest in computing, he noticed that, while thousands of books and articles were published on the subject every year, they had almost nothing to say about visual

art. Despite the innovative work of Nöll, Csuri, Béla Julesz, and Ken Knowlton, the computer industry had hardly begun to grapple with visual, let alone audio-visual, production. Paik's writing considers the explosive possibilities he foresaw for the artistic use of computing as well as for the broadband distribution of electronic images and information on a global scale. In these essays, his writing, as always, is paratactical: ideas from one field bump up against those from another in a flow that reflects the use of collage in his artworks. And yet, even with their playful discontinuities, larger themes can be parsed out of them. Rather than focus on randomness and iteration, he returns to the topic of viewer participation and how computing will offer expanded and perhaps even more democratic possibilities for the aesthetic and cultural engagement of newly emerging global publics.

During the '60s, the rhetoric of viewer participation emerged simultaneously with a discussion about the effects of the electronic mass media on the public sphere. Throughout the previous decade, television had largely been described by those academics and politicians not directly invested in its financial success as a negative influence on society. In 1961, Newton Minow, newly appointed as chairman of the Federal Communications Commission (FCC), famously described television as a "vast wasteland." He called for television and other electronic mass media to serve the public interest rather than the interest of private corporations. "The people own the air," Minow proclaimed; the right to broadcast is a public trust.[9] Calling for more public engagement in what gets shown, he saw that public attendance at station license-renewal hearings was the only solution.

It was only over the course of the 1960s that the means for more direct public feedback in the broadcasting process took shape. By the end of the decade, looking ahead to the year 2000, FCC Commissioner Nicholas Johnson could see the future more clearly. In his influential book *How to Talk Back to Your Television Set,* Johnson wrote, "The most significant trend in communications today is probably the trend toward instantaneous, ubiquitous, no-cost access to all information."[10] Johnson linked the information revolution to the revolution that was taking place in participatory democracy, as the people were clamoring for a greater say in their governance: if only the electronic mass media could be transformed into a two-way street, it would be the most efficient way to give people around the world access to the government and to one another. This became a kind of mantra for Paik and other '60s media radicals, prosaically realized with the founding of national public television, still, of course, a one-way street. More radical notions were put forward in relation to cable television and other systems, including those linked to computers, which had the potential for two-way feedback.[11]

Paik's most in-depth discussion of computing and its interactive promise came in a lengthy piece written in 1966 and published in 1967 in the Swedish avant-garde music journal *Fylkingen Bulletin.*[12] Written before Paik's residency at

Bell Labs, the essay is based on his previous work in electronics, especially video, as much as his general familiarity with computing. He establishes several possibilities for the use of computers that he thinks will be of import for artists, scientists, and the public. These will become the basis of his future work, and include the increased aesthetic possibilities for the manipulation of video scanning; the use of the computer for better video mixing; and the production of vast but readily accessible cultural archives. In his discussion of scanning, Paik describes the use of computers to create and manipulate output for the scan of the cathode ray tube, immeasurably increasing video's plasticity. Adding the computer-controlled mixing of multiple video channels will only further expand the potential for video manipulation. (Here he looks toward the video synthesizer, which, for practical reasons, was never linked to a computer despite his interest in doing so.) Newly created works as well as preexisting works could be compiled into a archival "concordance" indexed by scene as well as content—e.g., "walking, waiting, anxiety, love, fight, jealousy, eating, crying, including [the] length of the scene and emotional pitches"—and accessible to all.[13] He ultimately imagines the production of computer-controlled, ever-changing "mood art" in the form of "cathode-ray walls" designed for both public and private spaces where these techniques could presumably be brought together.

Through the State University of New York at Stony Brook, Paik received a large grant from the Rockefeller Foundation in 1967. Appointed "consultant in communications research," he was charged with the task of writing a report on the state of contemporary electronic media.[14] Published in 1968, the report is entitled "Expanded Education for the Paperless Society." It is a prescient discussion of key concerns related to computing and the database as a cultural archive. Echoing "distance learning" and even the general use of the Internet as a source of information today, Paik calls for the construction of an "Instant Global University."[15] This new school—really, a new set of techniques for teaching, learning, and information sharing—would, he writes, have the potential for cross-cultural exchange and the undermining of national identity. Magnetic archives could be used for cross-cultural participation, leading to a global common culture. The university that Paik imagines was to be based on information swapping undertaken with videotape recording, but this can easily be extrapolated to computer-based memory. Recorded information was to form a de facto database for use as in-classroom audiovisual aids. He notes that most of the "great thinkers" of the world had yet to be documented in moving images with synchronized sound, and neither had the work of composers and other artists. Magnetic recording provides almost unlimited potential for storage and replay, he says, so why haven't we captured these thinkers and their works before they fade into oblivion or obscurity? He humorously describes a music lesson in which an American orchestra could learn traditional Japanese instruments virtually, and then go to Japan

on tour in "authentic costumes," surprising the Japanese with their skill at cultural appropriation.

In several follow-up articles that more explicitly addressed computing, Paik suggests that this archive could become the source for entertainment as well as education, or even a mix of the two. Citing a successful program at Dartmouth College using computers in the classroom, he writes, "Combinations of computers and beautiful color TV synthesizers will be an effective teaching [match] for computers, media, TV, art and man-machine relationships in general."[16] He imagines that avant-garde video and education could come together through computing, in opposition to the use of preexisting electronic information systems such as television for mere entertainment and selling goods. Echoing the sentiments of Minow and Johnson, he goes so far as to call for the development of a universal market for information exchange, to be managed by public, not private, interests. He imagines that electronic information could be exchanged just as goods were then being exchanged in the European Common Community (a.k.a. the European Common Market, the European Union's forerunner). He writes that for developing world peace and even for ensuring the very survival of the planet, the building of channels for this kind of global, participatory exchange of information is now "public interest number one."[17]

Once again under the funding of the Rockefeller Foundation, Paik wrote a 1974 report, "Media Planning for the Postindustrial Society," in which he vociferously calls for a "broadband communication revolution." "Media Planning" is a position paper on why the government and philanthropists should support public development of the information superhighway rather than allow this work to be done by corporations. Paik discusses the apportionment of the airwaves for broadcasting and the need for planning the future use of information transmission, especially for public broadcasting and in opposition to commercial interests. To this end he foresees the construction of "new electronic superhighways," undertaken in the same spirit as the Great Society programs of the 1960s.[18] Paik writes of the potential of such a system:

> Assuming we connect New York and Los Angeles by means of an electronic telecommunication network that operates in strong transmission ranges, as well as with continental satellites, wave guides, bundled coaxial cable, and later also via laser beam fiber optics: the expenditure would be about the same as for a moon landing, except that the benefits in terms of by-products would be greater. . . . The gains will be tremendous, environmentally and energy-wise. And eventually telecommunication will cease to be only an ersatz and a lubricant to keep the gears running. It will become the springboard for new and surprising human endeavors. Thoreau wondered a hundred years ago: "Even if the telephone companies should ever succeed in connecting the people of Maine with the people of Tennessee, what would those people have to say to one another?" The rest is history.[19]

The rest was indeed history. With personal computing and online access, much of what Paik called for came true. When Paik said in 1993, only half jokingly, "Bill Clinton stole my idea!" he was staking a claim to his own role in "inventing" the Internet.[20] Upon election, one of the first tasks that Clinton and Gore had set out to accomplish was passage of an updated telecommunications act designed for the information age. Paik's mock indignation was triggered not by Clinton but by Gore's use of the term "the information superhighway" when Clinton and Gore were making the press rounds advocating for their ideas. As Paik had long ago begun to lobby, this new highway proposal was being promoted as a fast track to greater participation for citizens long hypnotized by too much passive television watching.

The realpolitik of Clinton and Gore's campaign was rather different than Paik's utopian vision. Clinton and Gore's lobbying culminated in the Telecommunications Act of 1996, whose goal was to minimally manage base infrastructure so as to promote more marketplace competition. Its result was greater media consolidation, with corporations now able to control multiple means of information transmission across media, from radio to broadcast and cable television to the Internet. Its only social provisions were designed to regulate pornography, and these were quickly struck down by the courts as unconstitutional. The information superhighway would become a largely deregulated conduit for any information whatsoever at maximal profit. Of course, profit has been notoriously hard to come by, and cultural wares such as music and video are often downloaded online for free, but this has helped foster the building of the cultural archive Paik foresaw. While the cost of entry for owning the means of transmission was as prohibitively high as ever, in the emerging Internet economy the cost of entry for production and distribution was so low that something like Paik's vision of a mass means of two-way information exchange would quickly and massively flourish, along with the accumulation of vast stores of cultural data. By the turn of the millennium, cheap digital video cameras, basic editing software on all home computers, and ubiquitous Internet access to endless cultural content enabled anyone and everyone to make their own electronic mash-ups and distribute them virtually, for very little cost. But consider the reality of YouTube in relation to Paik's broadband revolution. While YouTube is likely a passing phenomenon in the evolution of the Net, the file sharing of artisanal, amateur, and semiprofessional audiovisual material is not. Unfortunately, neither is the sentiment behind YouTube's catchphrase "Broadcast yourself." Rather than Paik's avant-garde video, the vast majority of Net video is closer to Warhol's notion of "fifteen minutes of fame": an endless parade of home video, broadcast to the world as if each and every citizen were a celebrity. On YouTube and other social networking sites, participation in digital democracy is driven more by narcissism than by citizenship or artistry.

By the 1990s, at the very moment that greater participation in the flow of information was becoming possible via computers, Paik had long since given up on developing participatory computing in his work. He returned, instead, to randomness and iteration. Enormous multimonitor works, such as *Megatron/Matrix* from 1995, realized his conception of cathode-ray walls using computers to help randomly switch images as they traveled from screen to screen or contracted and expanded across multiple screens. In direct opposition to two-way participation, these works exaggerate the pleasures and terrors of one-way information flow. While utilizing his early ideas of scanning, mixing, and the archive, these works limit viewer participation to watching. Containing images ranging from pornography to computer-generated graphics and commercial broadcasts, these works have a profoundly mesmeric effect. They are designed to cause a not-unpleasurable lizard-brain reaction in viewers preconditioned by years of channel surfing to enjoy disjunctive information as long as it's brightly colored and highly varied. That they reduce participation to watching, offering little understanding of the social or economic structures making such information flows possible, is both a capitulation to these systems and a putting on display of their conditions of pleasure. When considered in light of his earlier goals for participatory computing, the questions that this late work raises are troubling. The archive of global cultural materials that Paik imagined exists. Online education and artistic exchange are flourishing. And yet, in the age of YouTube, will the sum total of the electronic public sphere remain as stultifying as it was in earlier, unidirectional forms of broadcasting? Has it become impossible to imagine a global electronic public sphere that is simultaneously free, participatory, and full of high-quality information, and not drowning in a wash of blog rule?

NOTES

1. All quotes in above paragraph from Nam June Paik, "Media Planning for the Postindustrial Society," in *The Electronic Super Highway: Travels with Nam June Paik* (New York: Holly Solomon Gallery, 1997), 42.

2. Nam June Paik quoted in Douglas Davis, *Art and the Future: A History/Prophecy of the Collaboration between Science, Technology and Art* (New York: Praeger, 1973), 150.

3. The exhibition was titled *Nam June Paik: Exposition of Music, Electronic Television.* It was held at the Galerie Parnass in Wuppertal and ran from March 11 to 20.

4. Nam June Paik, *Videa 'n' Videology 1959–1973* (Syracuse, NY: Everson Museum of Art, 1997), 76.

5. Ibid., 42.

6. Ibid.

7. Ibid.

8. Nam June Paik and Paul Schimmel, "Abstract Time," *Arts Magazine* 49, no. 4 (1974): 53.

9. Newton N. Minow, "Television and the Public Interest," paper delivered to National Association of Broadcasters, Washington, DC, May 9, 1961, www.americanrhetoric.com/speeches/newtonminow.htm (accessed June 28, 2007).

10. Nicholas Johnson, *How to Talk Back to Your Television Set* (New York: Bantam Books, 1970), 132.

11. On cable television, cf. Ralph Lee Smith, *The Wired Nation: Cable TV: The Electronic Communications Highway* (New York: Harper and Row, 1972). For more on cable as well as computing and other considerations of two-way media, cf. the magazine *Radical Software,* www.radicalsoftware.org.

12. Titled "Nam June Paik: Experiments with Electronic Pictures" when it was originally published and as reproduced in *Nam June Paik: Fluxus/Video,* ed. Wolf Herzogenrath (Bremen: Kunsthalle Bremen, 1999), 114–15.

13. Ibid., 20.

14. Martia Sturken, "Private Money and Personal Influence," *Afterimage* (1987): 9.

15. Nam June Paik, "Expanded Education for the Paper-less Society," in *Videa 'n' Videology,* 31.

16. Ibid., 76.

17. Ibid., 60.

18. Because they had both appeared in the pages of *Radical Software,* Paik surely knew that Ralph Lee Smith had used the term "the electronic communications highway" in his book on cable television and the future of expanded video. Smith directly references previous national highway programs as the model for the electronic highway whose construction he calls for. Cf. especially chap. 7, "An Electronic Highway," in Smith, *The Wired Nation.*

19. Paik, "Media Planning for the Postindustrial Society," 47.

20. This is all the more ironic given Ralph Lee Smith's earlier use of the term. *Eine DATA base,* eds. Florian Matzner and Nam June Paik (Ostfildern: Edition Cantz, 1993), 110. It was Gore, not Clinton, who had begun lobbying for this legislation as senator and who, during the election campaign, had elicited the ire of GOP pundits and geeks alike when he said in an interview, "During my service in the United States Congress, I took the initiative in creating the Internet." As originally reported online for *Wired:* Declan McCullagh, "No Credit Where It's Due," March 11, 1999, www.wired.com/politics/law/news/1999/03/18390 (accessed August 14, 2007).