11. *STOCK MARKET SKIRT:*
THE EVOLUTION OF THE INTERNET, THE INTERFACE, AND AN IDEA

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Dedicated to Brenda Laurel (who asked if she could wear it), this cyberfeminist fashion statement is my response to the convergence of technology, fashion, and feminism. The potential of IPV6 and wireless access were among the motivating issues underlying this project. Like many of my other media works, *Stock Market Skirt* presents a tongue-in-cheek and intentionally ironic exploration of the relationship between the two most interesting, if not most important, expressions of late twentieth-century Western culture and individuality: lust and money.

A play on Desmond Morris's theory that the women's fashion industry responds to fluctuations in the equities market by hiking or lowering hemlines, *Stock Market Skirt* provides commentary on several levels. In an interview about the project with Matt Mirapaul for the *New York Times* "Cybertimes" review, Laura McGough, an independent curator in Washington, D.C., stated that *Stock Market Skirt* can be read in so many ways. "It's playful, it's political, it's sexy. There's a lot for viewers to sink their teeth into."[1]

In describing this project as a cyberfeminist work, I draw on ideas that I have been formulating since the early 1990s, when I began working on the essay "Cyberfeminism." This essay was first e-published in early 1993 on Stacey Horn's ECHO (East Coast Hang Out) gopher server in New York City. I considered the possible parameters of a new philosophy—postgender/transgender—that challenges popular culture's link between the erotic representation of women with the (often) terrible cultural impact of new electronic technologies: "Sex, danger, women, and machines: the plot of virtually every futuristic, sci-fi movie in which women play any role at all. Cyberfemmes are everywhere, but cyberfeminists are few and far between."[2] More important than contesting this representation of women, however, is challenging women to reclaim new technologies for themselves.

Technological convergence describes the unification of computers, television, and communications technologies. However, convergence describes

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much more than the evolution toward an environment in which electronic technologies are pervasive. Convergence is happening on more than a technological level—it is happening on a metaphysical level as well. Cultural convergence may be described as the meeting or merging of art and technology. Cyberfeminism is entering an arena in which much more than gender is up for grabs.[3]

On another level, *Stock Market Skirt* was designed to embody what many have chosen to describe as the emerging intelligence of the Internet. In an essay written for a catalogue on my work, "Remapping the Terrain," Randy Lee Cutler points out:

> It is the Internet, the posthuman flow of information that drives *Stock Market Skirt*. Women's bodies are often used as a sign of technology and desire. *Stock Market Skirt* makes manifest the libidinal economy of technology, money and gender. . . . [It is] driven by the collective unconscious of human greed and illuminated through an appetite for fashion.[4]

Alfred Korzybski coined the phrase "the map is not the territory" in *Science and Sanity,* his book about general semantics.[5] However, the task of distinguishing between artificial maps and the reality they are intended to construe, which is Korzybski's point, is rendered impossible by the fact that in mapping digital data both the "reality" and the map itself are in a state of constant flux. In *Stock Market Skirt,* the fluctuating data that are collected are grounded in experience through the manipulation of a physical object. There is a difference between this project and others, where changing data (stock market data, weather patterns, seismic data) control 3D or 2D representations. Mapping is perhaps an inadequate metaphor as we expect a map to present some pretence of permanence; the Internet is clearly not a closed system any more than it is a "place."

In the context of a presentation that I made at Carnegie Mellon's Robotics Institute, *Stock Market Skirt* was described by engineers in the audience as a tele-robotic project. Yet, unlike the majority of tele-robotic works, *Stock Market Skirt* has the potential to be interactive with the global flow of information by responding to a dynamic feed of data (rather than being interactive through the Internet as a pipeline). Using a computer program to pick stocks used to be the ultimate in investing sophistication. As this became commonplace, "quant" methods evolved to describe the use of computer models based on complex algorithms to implement arcane trading strategies. A pure quant approach takes the human element (and related emotional

factors) out of the stock-buying decision altogether. *Stock Market Skirt* illustrates the rise of algorithmic and statistical techniques to choose and implement trading strategies as well as tracking the volatility of the market.

In the Gallery, *Stock Market Skirt* is displayed on a dressmaker's mannequin, or "Judy," located next to a computer and several monitors of varying sizes. In large white type against a blue background (matching the blue of the taffeta skirt), the stock ticker symbol and constantly updated price scroll from right to left in simulation of the pixel board displays used to track stock values on traditional exchange-room floors. Stock quotes are retrieved at least once per second (depending on the speed of connection) from stock-quote pages online, with the hemline moving in response to the changing values. Custom-designed PERL scripts running under Linux retrieve and parse the code. These data are sent to a custom-designed controller that accordingly sends positive or negative pulses to the stepper motor mounted up and under the skirt. A bullish market triggers the hemline to be seductively raised, and the hemline is lowered to correspond to falling stock prices. There is a range of six hundred steps between the skirt at its most mini and at its most modest length.

Written into the program is a script that sets parameters for the present

FIGURE 11.1. PUBLIC EXHIBITION OF *STOCK MARKET SKIRT*, BELL CENTRE FOR CREATIVE COMMUNICATIONS, 1998.

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day's range of movement based on the previous day's performance of the selected stock. This range is monitored throughout the day, and is automatically adjusted if necessary. Furthermore, *Stock Market Skirt* is capable of being configured to track the price of any stock on any exchange that provides online updates: North American, European, Asian, and so forth. At the end of the trading day, *Stock Market Skirt* is programmed to switch to the next time zone to continue tracking a select stock in real time. When all the exchanges are closed, it switches to historical data until a market opens.

This media work also uses a Web cam to capture and display real-time images of the hemline as it fluctuates. A Web site simultaneously displays these images as well as the stock market quotes, which are controlling the length of the hemline. This site is made available in conjunction with the exhibition of this media work.

Developed during the boom market of the mid- to late 1990s, when the (high-tech) investment bubble first swelled and then burst, this project captured the imagination and attention of New Media journals and audiences (for example, *Flash Art* and *Tema Celeste*). *Stock Market Skirt* has also been featured in business and fashion magazines. During the first public showing of the work at the Centre for Creative Communications in Toronto (Centennial College, spring 1998), a stockbroker who had heard about the project e-mailed me that he would "rather watch the skirt than the DOW," and visionaries such as Sandy Pentland of MIT's Media Lab has described the project as "brilliant."[6] Inspired by the launch of the Hollywood Stock Exchange, the mutant offspring of celebrity culture and stock market fever, I had fleeting (though less than serious) thoughts of listing the project as an over-the-counter penny stock so that the hemline could track its own success.

Part of what inspired me to produce this project was the notion that bandwidth is political. *Stock Market Skirt* uses very little bandwidth, but connectivity is integral to the project. This has always seemed to epitomize for me the potential power of online resources. It is not always how big or fast your modem is; often what matters is what you choose to do with it. I am as mesmerized as the next New Media artist by the tools and technology that are often just beyond my reach. But as I wrote in "Technology (does not equal) Art,"[7] new media art is about more than the application of tools. Usenet is a case in point, and since it was my first experience with online resources, a description of its evolution is apropos.

In 1982, while I was a general arts and sciences student at the University of Toronto, I heard that Usenet accounts were being made available. The Internet as we know it now did not exist. I went across campus and was

rewarded with an account; my user name was simply "nancy." In 1982, there were no PC graphical interfaces or friendly operating systems; the graphical Apple Macintosh would not emerge until January 1984.

When I signed up for the Usenet account, I was required to accept or refuse subscription to a list of News Groups. There were 429 groups available when I joined and I dutifully ticked off my preferences. Access to the network at that time meant that you could read and send messages relevant to the News Groups to which you belonged, as well as to other users. I recall I was not interested in science fiction, but I thought that astrophysics might be interesting as there were actual researchers in the field participating in online discussions.

Usenet had been born at Duke University in 1979, when graduate students Tom Truscott and Jim Ellis decided to create a computer network to link together those in the Unix community using simple shell scripts to have computers automatically call one another up and search for changes in the date stamps of files. Soon a network of three sites existed: "duke" at Duke University, "unc" at the University of North Carolina at Chapel Hill, and "phs" at the Physiology Department of the Duke Medical School. When the program connecting these three sites was found to be too slow, the code was rewritten in the C programming language, and, once this was debugged, the "Invitation to a General Access UNIX Network" was presented at the 1980 Usenix Conference in Colorado. Usenet was at that time commonly described as a "poor man's ARPANET."[8]

UCLA, Stanford, the University of California at Santa Barbara, and the University of Utah were among the first sites of ARPANET, which was originally funded under the U.S. Department of Defense's Advanced Research Projects Agency (ARPA). However, only those academic computers with DOD funding had the opportunity to the ARPANET. Enter Usenet, available to anyone who had access to the Unix operating system, available at very low cost to the academic and computer research community. Posting and participating in the network was essentially free, with users paying only for their equipment and telephone calls to receive or send Netnews. "Therefore, the joys and challenges of participating in the creation of an ever-expanding network, an experience available to an exclusive few via the ARPANET, became available via Usenet to those without political or financial connections—to the common folk of the computer science community."[9]

UTZOO, established by Henry Spencer at the University of Toronto in 1981, was the first viable international node on the network. Other University of Toronto departments, and other Canadian universities, followed suit

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when they realized that this networking, done intermittently at phone-line speeds, was an inexpensive and immediate alternative to the ARPANET access that they lusted after. Spencer went on to become well known in Usenet circles as the co-author of the software (C News), which would be used throughout the UUCP universe until UUCPnet itself was incorporated into the Internet.

But even after the Usenet backbone was replaced by Internet connections, the fringes of Usenet continued to communicate using UUCP links (and C News) that remained quicker, cheaper, and easier to install and maintain. Local UUCP sites remained the most common means of connecting to Usenet, and what was referred to generally as "the Net," well into the 1990s. In fact, UUCP was still the largest computer network in the world until the TCP/IP-based Internet finally overtook it in 1994.[10]

It was more than a year after I gained access to Usenet that I finally met someone outside of the university community I could e-mail, a colleague that I worked with on an exhibition, *Portrait of the Artist as a Young Machine*, at the Ontario Science Centre in Toronto in 1983.

After I left the University of Toronto and enrolled at the Ontario College of Art, I participated in the founding of the ArtCulture Resource Centre, Toronto's first video and new media facility, eventually returning to the University of Toronto to study with Northrop Frye. Following my graduation from the University of Toronto, I produced a wide range of video and interactive installations using custom-designed controllers and often laser-disc technology, the hot "new" format of the early 1990s.

In 1995, I began to work in earnest on *Stock Market Skirt*, a project that had occurred to me as I observed the transformation of the Internet from a purely academic, if not entirely serious, resource. In the days of ARPANET and Usenet, News Group subscribers could follow the discussions of astrophysicists comparing notes on research projects, occasionally even contributing to the ongoing debate. The nature and form of online discourse changed in the early 1990s as the graphical user interface became more common and technologies such as 3D entered the mainstream; the focus began to shift to entertainment and commercial applications. In public presentations I describe this shift: the Internet is like watching "Jeopardy," a thin veneer of information with no depth or context—a mile wide but only an inch deep. Current developments such as the "semantic web" are a more positive evolution. As the value of tech stocks began to soar, I reasoned, it would only be a matter of time before online trading became commonplace as well as accessible on a 24/7 basis.

Stock Market Skirt was conceived, and I began work on it long before the technology was available to make it a reality. When I began to think about my project, the only financial resources available online were expensive proprietary subscription services that provided stock quotes, such as Reuters, Star Data, and Bloomberg—services well beyond the financial reach of all but the wealthiest individual traders, who were primarily interested in corporate investment. With the Bloomberg service, for example, it was necessary to use a dedicated terminal that it supplied and the fee was in excess of $1,200 per month.[11]

In 1995, I was able to secure historical files from the Toronto Stock Exchange close-of-day data for the previous forty years, which I used to begin designing and testing a BASIC program that would compare values and send signals to a stepper motor. Steve Kee, director of Media Relations at TSX, generously provided these files. In 1996, the dress was designed and stitched, complete with a complex system of cables, loops, and weights sewn to the interior of the skirt to ensure that the hemline length changes could take place smoothly. With the next engineer who assisted with the project (there would be several before it was finally complete in 1999), I undertook

FIGURE 11.2. *STOCK MARKET SKIRT*: BASIC RUNNING WITH TSE DATA.

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to run the project using Internet-based data, retrieved from online stock-quote services, which were just beginning to be popular. Yahoo was the first to make online financial quotes available, and out of gratitude, their stock symbol was selected as the first one I tracked: YHOO.

Initially I worked with Windows NT 3.5.1, then later NT 4.0, but found both to be extremely problematic because I was attempting simultaneously to run the controller for the stepper motor, a modem, and a large print program (for the display), which caused numerous conflicts. When I switched the OS to Linux, the project, which I had labored over for years, began working properly within a matter of days. As the project progressed, so did the availability of online data. By the time I went public with *Stock Market Skirt* in April 1998, I had my choice of sites that provided data that I could use

FIGURE 11.3.
STOCK MARKET SKIRT
UNDER DEVELOPMENT.

from markets across the globe. At that time, I was artist-in-residence at the Bell Centre for Creative Communications (Centennial College) and had access to its network and bandwidth.

As I was completing *Stock Market Skirt,* I was beginning work on a Millennium Arts project that fell into the opposite end of the bandwidth spectrum. Whereas *Stock Market Skirt* requires relatively low bandwidth, *The Library* is a fully navigable, multistoried 3D environment containing projects by select artists, which is available online at http://www.thelibrary2.com. Based on the beautiful rotunda of the Canadian Library of Parliament, the intention of this project was to create a metaphorical interpretation of a building selected for its architectural and cultural significance.

Three-dimensionality represents an opportunity to transform text and data from linear experiences into dynamic and interactive narratives. Exploring new means of collecting, storing, retrieving, and distributing information, creative approaches to navigation and way-finding emerged as guiding themes through the production of this project. In *Stock Market Skirt,* online data (stock prices) are sourced from the Internet in order to control the length of the skirt hemline. In *The Library* project, I used the Internet as an enormous database of information and images to be repurposed for my project. Proof of concept for this is my use of a constantly updated (every five minutes) satellite image of the earth's surface from space (available on the NASA Web site), retrieved, and used as the texture map for a rotating sphere (a world globe), which is the centerpiece in my 3D environment. A visitor to *The Library* environment who approaches the world globe sees a 3D representation of the earth, with the day/night line displayed in almost real time.

It was entirely appropriate that these two projects should be developed in parallel with the stock market crisis that occurred at the turn of the millennium. This crisis, due in part to the application of analog methods to digital culture, has perpetuated a flawed set of cultural priorities regarding bandwidth and interactivity. The bottleneck to creativity and productivity that has developed is the result of a mind-set and practice that limits the free and symmetrical exchange of data, the original promise of the Internet. Our challenge is to avoid replacing the limitations of the technology with the limitations of imagination.

NOTES

1. Laura McGough, as quoted by Matt Mirapaul in the *New York Times* "Cybertimes" review, February 5, 1998. http://www.vacuumwoman.com/MediaWorks/Stock/stockreview.html.

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2. Nancy Paterson, "Cyberfeminism," in *Mediaworks* (Surrey, B.C.: Surrey Art Gallery, 2001), 59.

3. Ibid., 63.

4. Randy Lee Cutler, "Remapping the Terrain," in *Mediaworks* (Surrey, B.C.: Surrey Art Gallery, 2001), 25.

5. Alfred Korzybski, *Science and Sanity* (Brooklyn, N.Y.: Institute of General Semantics, 1994).

6. E-mail from Sandy Pentland to author, August 27, 1998.

7. Nancy Paterson, "Technology (does not equal) Art," *Fuse* 20 (Fall 1997).

8. Michael Hauben and Ronda Hauben, "Netizens: On the History and Impact of Usenet and the Internet." http://www.firstmonday.dk/issues/issue3_7/chapter2/.

9. Ibid.

10. CAnet Institute Report, *A Nation Goes Online* (Canet, 2001), 41.

11. Conversation between the author and a representative of the Bloomberg service, November 1995.