zeros + ones

DIGITAL WOMEN + THE NEW TECHNOCULTURE

binaries

The postwar settlement was supposed to mark the dawn of a new era of regulation and control: the Central Intelligence Agency, United Nations, welfare states, mixed economies, and balanced superpowers. This was a brave new equilibrated world of self-guiding stability, pharmaceutical tranquillity, white goods, nuclear families, Big Brother screens, and, to keep these

new shows on the road, vast new systems of machinery capable of recording, calculating, storing, and processing everything that moved. Fueled by a complex of military goals, corporate interests, solid-state economies, and industrial-strength testosterone, computers were supposed to be a foolproof means to the familiar ends of social security, political organization, economic order, prediction, and control. Centralized, programmable systems running on impeccably logical lines, these new machines were supposed to make the most complex processes straightforward. But even in the most prosaic terms, this supposedly logical, directed, and controlled of zones has always been wildly unpredictable. In 1950, when the processing power which can now be inscribed on the surface of a silicon chip occupied vast air-conditioned rooms, IBM thought the total global market for computers was five. In 1951 the United States Census Bureau put UNIVAC to work, the Bank of America installed Electronic Recording Machine Accounting (ERMA), and by 1957, when the Type 650 was launched, IBM anticipated sales of somewhere between fifty and 250. Two years later some 2,000 computers were in use in government agencies and private companies, and the figures were drastically revised. Perhaps 200,000 computers would be sufficient to saturate the market. By the early 1990s, IBM alone was selling twice that number of systems a week.

33

Computers have continued to pursue these accelerating, exponential paths, proliferating, miniaturizing, stringing themselves together into vast telecommunications nets, embedding themselves in an extraordinary variety of commodities, becoming increasingly difficult to define. While the postwar programmable computers were composed of transistors which used silicon as a semiconductor of electric current, by the end of the 1950s, the integrated circuit connected the transistors and in-

scribed them a single wafer of silicon. In the same vein of exponential miniaturization, the microprocessor was developed in the early 1970s, effectively putting all the solid-state circuits of a computer onto a single silicon chip. The screen migrated from the TV set to give the machine a monitor, and by the 1980s what had once been vast room-size systems without windows on the world were desktop microprocessors.

"The calculations taking place within the machine are continuously registered as clicks clicking high-pitched sounds as of tinkling bells, noises like those of a cash-register. There are lights that go out and come on at irregular intervals of time. They are red orange blue. The apertures through which they shine are circular. Every divergence is ceaselessly recorded in the machine. They are scaled to the same unit whatever their nature."

Monique Wittig, *Les Guérillères*

Whether they are gathering information, telecommunicating, running washing machines, doing sums, or making videos, all digital computers translate information into the zeros and ones of machine code. These binary digits are known as *bits* and strung together in *bytes* of eight. The zeros and ones of machine code seem to offer themselves as perfect symbols of the orders of Western reality, the ancient logical codes which make the difference between on and off, right and left, light and dark, form and matter, mind and body, white and black, good and evil, right and wrong, life and death, something and nothing, this and that, here and there, inside and out, active and passive, true and false, yes and no, sanity and madness, health and sickness, up and down, sense and nonsense, west and east, north and south. And they made a lovely couple when it came to sex. Man

and woman, male and female, masculine and feminine: one and zero looked just right, made for each other: 1, the definite, upright line; and 0, the diagram of nothing at all: penis and vagina, thing and hole . . . hand in glove. A perfect match.

It takes two to make a binary, but all these pairs are two of a kind, and the kind is always kind of one. 1 and 0 make another 1. Male and female add up to man. There is no female equivalent. No universal woman at his side. The male is one, one is everything, and the female has *"nothing* you can see." Woman "functions as a *hole,"* a gap, a space, "a *nothing*—that is a nothing the same, identical, identifiable . . . a fault, a flaw, a lack, an absence, outside the system of representations and auto-representations." Lacan lays down the law and leaves no doubt: "There is woman only as excluded by the nature of things," he explains. She is "not-all," "not-whole," "not-one," and whatever she knows can only be described as "not-knowledge." There is "no such thing as *The* woman, where the definite article stands for the universal." She has no place like home, nothing of her own, "other than the place of the Other which," writes Lacan, "I designate with a capital O."

genderquake

"The idea that a 'nothing to be seen' . . . might yet have some reality, would indeed be intolerable to man."

Luce Irigaray, *Speculum of the Other Woman*

In the 1990s, Western cultures were suddenly struck by an extraordinary sense of volatility in all matters sexual: differences, relations, identities, definitions, roles, attributes, means, and ends. All the old expectations, stereotypes, senses of identity and security faced challenges which have left many women with unprecedented economic opportunities, technical skills, cul-

tural powers, and highly rated qualities, and many men in a world whose contexts range from alien to unfamiliar.

This was neither a revolutionary break, nor an evolutionary reform, but something running on far more subtle, wide-ranging, and profound fault lines. Nothing takes the final credit—or the blame—for this shift which, as though in recognition of the extent to which it defies existing notions of cultural change, has been defined as genderquake. But the new machines, media, and means of telecommunication that compose what are variously called high, information, digital, or simply new technologies which have emerged within the last two decades have played an enormous and fascinating role in the emergence of this new culture. This is far from a question of technological, or any other, determinism. If anything, technologies are only ever intended to maintain or improve the status quo, and certainly not to revolutionize the cultures into which they are introduced. It is in spite of their tendencies to reduce, objectify, and regulate everything that moves that computers and the networks they compose run on lines quite alien to those which once kept women in the home.

In some respects, the impact of these new machines is direct and very obvious. In the West, the decline of heavy industry, the automation of manufacturing, the emergence of the service sector, and the rise of a vast range of new manufacturing and information-processing industries have combined to reduce the importance of the muscular strength and hormonal energies which were once given such high economic rewards. In their place come demands for speed, intelligence, and transferable, interpersonal, and communications skills. At the same time, all the structures, ladders, and securities with which careers and particular jobs once came equipped have been subsumed by patterns of part-time and discontinuous work which

privilege independence, flexibility, and adaptability. These tendencies have affected skilled, unskilled, and professional workers alike. And, since the bulk of the old full-time, lifelong workforce was until recently male, it is men who have found themselves most disturbed and disrupted by these shifts, and, by the same token, women who they benefit.

These tendencies are far from new. Since the industrial revolution, and with every subsequent phase of technological change, it has been the case that the more sophisticated the machines, the more female the workforce becomes. Automation has been accompanied by what is often referred to as the feminization of the workforce ever since the first automatic machines were operated by the first female workers, and the fears of unemployment which have haunted modern discussions of technological innovation have always applied to male workers rather than their female peers.

What is unprecedented is for male workers to be outnumbered by their female counterparts, as will clearly be the case in the United Kingdom and the United States by the end of this century. And with this tipping of the scales comes not only unprecedented degrees of economic power, but also a radical change in the status of female workers, an erosion of the male monopoly on tasks and jobs once reserved for men, and a new standing for the work involved in what were once considered to be pin-money jobs for women supplementing male incomes.

Many of these tendencies are also at work in the emergence of what the West was once in a position to call "the other side of the world." By the time the cultures of the old white world had noticed they were even on the map, many of the so-called "tiger" nations—Singapore, Malaysia, Thailand, Korea, Taiwan, and Indonesia—were already leaping ahead in an economic game which for at least two hundred years had been

governed by the West. And they are only the tips of an iceberg of change which brings many regions into play: China, India, East and Southern Africa, Eastern Europe, South America. Given that the populations of China and India alone vastly outnumber those of the old white world, there seems little doubt that the days of Western empire have well and truly died.

These regions have genderquakes of their own. And while a variety of political and religious fundamentalisms are doing their best to maintain the status quo, there are few regions of the world in which women are not asserting themselves with unprecedented ingenuity and, very often, great success. If Western women have dreamt of change for three hundred years, Asian women are playing roles which would have been unthinkable only a decade or so ago. By the mid-1990s, 34 percent of China's self-employed were women, and 38 percent of Singaporean women managers were running companies of their own. Thailand's leading hotel chain, Indonesia's largest taxi company, and Taiwan's two largest newspaper groups were owned by women. Japanese women still found themselves treated as "office flowers," composed only 0.3 percent of board members of Japanese firms, and made up just 6.7 percent of the Japanese parliament. But the sexual shift was also evident in Japan: 2.5 million women owned businesses, five out of every six new Japanese firms were set up by women, and "a revolution without marches or manifestos" was underway.

There is enormous resistance to these changes whenever and wherever they occur. As their effects began to be felt in the early 1990s there were men who jerked their knees and went on TV to lament the fact that women and robots had apparently conspired to take their masculinity away. One 1990s survey found one in two fathers still believing that "a husband should be the breadwinner and the wife should look after the home

and children"; the fear, if not the fact, of violent crime still keeps many women in at night; domestic violence was prevalent; and in Britain, the benefits system was still conspiring with the high costs and scarcity of child-care provision to keep many women from working, learning, or—perish the thought—enjoying themselves. As unprecedented numbers of women juggled children, education, and work, many female workers found themselves saddled with the low paying, part-time, insecure jobs rejected by men. In the United States, almost half of employed women worked in technical, sales, and administrative support jobs, and pay differentials were still very large: in 1992 American women still earned only 75 cents for every dollar earned by men, and while their participation in U.S. managerial and professional life rose from 40 percent in 1983 to 47 percent in 1992, it was still the case that women occupied relatively few executive posts and prominent public positions: only 10 percent of the voting members of the United States Congress were women, and the United Kingdom had only sixty women members of parliament. Many sectors of education, politics, and business seemed riddled with enough archaic detail and glass ceilings to make even the most determined women feel unwelcome. In universities, they were averaging higher marks than men, but relatively few gained first-class degrees; they were more numerous and successful as undergraduates and in master's programs, but less prominent when it came to Ph.D. candidacy. Even highly successful career women were more likely to drop out of their jobs than their male counterparts.

But many women had already set their sights beyond these traditional focal points. While the members of an older male workforce had found a sense of identity in their work, women were not only less able, but also less willing to define themselves through employment or a single career. Many of them were

actively seeking opportunities to make and break their own working lives, not necessarily in favor of family commitments, but also in an effort to free themselves from the imposition of external constraints on their time and economic capacity. There may have been men who still thought they were protecting their own positions of power by locking women out of the higher echelons of the universities, corporations, and public institutions, but it was no longer obvious that top positions were the most important or desirable of roles to be played. High grades and doctorates were no longer enough to guarantee success outside an academic world itself poised on the brink of redundancy, and corporate executives were increasingly small pawns in global economic games. As for the attractions of public service, who was going to disagree with the young women who said that "politics is all talk and no action"? They simply felt they had better things to do.

Some of these things were far more lucrative as well: in the twenty years after 1970, the number of women-owned small businesses went from 5 percent to 32 percent in the United States, and in Britain nearly 25 percent of the self-employed were women by 1994, twice as many as in 1980. Taking the skills, contacts, and experience gained in their periods of paid employment, these women have tended to be far more successful than their self-employed male counterparts: in the United States, where most new businesses failed, those which were owned by women enjoyed an 80 percent success rate and employed more people than the companies on the *Fortune* 500 list.

Having had little option but to continually explore new avenues, take risks, change jobs, learn new skills, work independently, and drop in and out of the labor market more frequently than their male colleagues, women seem far "better prepared,

culturally and psychologically" for the new economic conditions which have emerged at the end of the twentieth century. They are advanced players of an economic game for which self-employment, part-time, discontinuous work, multiskilling, flexibility, and maximal adaptability were suddenly crucial to survival. Women had been ahead of the race for all their working lives, poised to meet these changes long before they arrived, as though they always had been working in a future which their male counterparts had only just begun to glimpse. Perhaps they really were the second sex, if seconds come after firsts.

" 'Let the man get some sleep, Armitage,' Molly said from her futon, the components of the fletcher spread on the silk like some expensive puzzle. 'He's coming apart at the seams.' "

William Gibson, *Neuromancer*

But there was much more to come. Abandoned by the economic power and social privilege which once made them such attractive, even necessary, mates, the sperm counts fell, birth rates crashed, and the hormonal energy and muscular strength which once served them so well were now becoming liabilities. Women were becoming mothers on their own terms, or not at all. Heterosexual relations were losing their viability, queer connections were flourishing, the carnival had begun for a vast range of paraphilias and so-called perversions, and if there was more than one sex to have, there were also more than two to be. Anything claiming to be normal had become peculiar.

"He was thoroughly lost now; spatial disorientation held a peculiar horror for cowboys."

William Gibson, *Neuromancer*

It was falling apart. They were coming undone. Everything was moving much too fast. What had once seemed destined to become a smoothly regulated world was suddenly running away with itself. Control was slipping through the fingers of those who had thought it was in their hands. Something was wrong. They were losing it all: their senses of security and identity, their grip, the plot, and even their jobs. Couldn't see the point to anything. What else could the masters of the old white world do but redouble their efforts, intensify their drives for security, heighten and perfect their powers? But the more they struggled to adapt and survive, the faster the climate seemed to change. The more they tried to regain control, the more their narrative lost its thread; the closer they came to living the dream, the weaker their grasp on power became. Was it even possible that, regardless of their labors, their hopes and dreams, they had been "the sex organs of the machine world, as the bee of the plant world, enabling it to fecundate and to evolve ever new forms"? All that time, the effort and the pain, the trouble they had taken to maintain control.

"And instead they watch the machines multiply that push them little by little beyond the limits of their nature. And they are sent back to their mountain tops, while the machines progressively populate the earth. Soon engendering man as their epiphenomenon."

Luce Irigaray, *Marine Lover*

switches

By the end of the nineteenth century, the countess was no longer alone. Now there was a count in a counting house alive with the hum of new machines. *Dracula* finds Mina at the typewriter, Seward with the phonograph, Harker on the telephone, and Morris taking photographs: "Letters and telegrams are delivered with improbable despatch." The vampires return to a ticker-tape world of imperceptible communications and televisual speeds. Time stretches out, unfolds, implodes. Something connects. Tugs on the thread.

"Then she got into the lift, for the good reason that the door stood open; and was shot smoothly upwards. The very fabric of life now, she thought as she rose, is magic. In the eighteenth century, we knew how everything was done; but here I rise through the air, I listen to voices in America; I see men flying—but how it's done, I can't even begin to wonder. So my belief in magic returns."

Virginia Woolf, *Orlando*

Electrification picked up on the threads, softwares, and digital techniques which had woven the industrial revolution itself. The fibers lead into the filaments of the first electric lights developed by Edison and Swan, both of whom used carbonized cotton threads in the lamps of the 1870s. When attempts to develop a more uniform light led to the use of nitrocellulose, "Swan prepared some particularly fine thread which his wife crocheted into lace mats and doilies that were exhibited in 1885

as 'artificial silk.' " After this, numerous by-products of the new petrochemical industries were fashioned into plastics, nylons, crimplines, acrylics, and lycras which joined cotton, silk, wool, hemp, and other fibers which were retrospectively defined as natural. The syntheses of weaving now converged with synthetic fibres and fabrics.

Things would never look the same. "The news that the great experiment had eventually been crowned with success, sped along the telegraph wires of the world . . ." Sudden strangeness of an artificial glow as she jacks into this new grid—incandescent flash-flood inspiration, a second of second sight, just enough to catch the lines assembling themselves, a glimpse of the hole flow running away—fine filaments running into nets with a feeling for connection—synthetic fibers switching into a network of cables, plugs and sockets, wires, meters, and dynamos, the fusions and distributions of a new electrical web, tapping into the telephones, wiring the exchanges, fusing the switches systems, swapping codes, dialling numbers, flush with the typewriter keyboards and the punched-card calculations of adding machines—the parellel processing of automated communications, interconnecting lines, repeating operations, patterns, and networks spreading like weeds.

speed queens

"The professor fixed his gaze on Lord Ewald's face as he replied calmly: 'It is not a living being!'

"At these words the younger man also stared in turn at the scientist, as if demanding whether he had heard rightly.

" 'Yes,' the professor continued, replying to the unspo-

ken question in the young man's eyes. 'I affirm that this form which walks, speaks, and obeys, is not a person or a being in the ordinary sense of the word.'

"Then, as Lord Ewald still looked at him in silence, he went on:

" 'At present it is not an entity; it is no one at all! Hadaly, externally, is nothing but an electro-magnetic thing—a being of limbo—a possibility.' "

Villiers de l'Isle Adam, *L'eve future*

The decade which brought Hadaly alive also revolutionized the speeds, techniques, and quantities of counting, timetabling, registering, recording, and filing. Unprecedented scales of information processing were demanded by attempts to regulate the new cities and populations, industries and workers, social, sexual, and political trends which swept across the U.S. in the 1880s. Just as textiles had revolutionized Europe, electricity, oil, and the automobile gave America and, by extension, the Western world a new dynamic, and a wave of new movements: unrest in the factories, the colonies, the streets and, as women won their property rights and homosexuality was legally defined, in matters of sexual relations and identities as well.

A statistician working on the information gathered from the 1880 U.S. census developed the first of the new machines to process the vast quantities of data in which the late nineteenth century found itself awash. Herman Hollerith found his work so overwhelming that it threatened to extend beyond the next census, due to be conducted in 1890. The machine he developed used an electromechanical punched-card system to deal with the collation of results. Spawning a host of punched-card machines, this calculator coincided with the telephones and typewriters of a bureaucratic state which was hand in glove with

the corporate structures which would remain in place for another hundred years. Remington-Rand grew out of the commercial success of the typewriter; AT&T and Bell were the earliest telephone companies; and IBM emerged from the success of early punched-card calculating systems.

Office machinery was intended to produce faster, more accurate, ordered, and efficient versions of existing modes and structure of work. The typewriter was a new and improved handwriting clerk; the calculator was described as a new and improved bookkeeper "which adds, subtracts, multiplies, and divides by electricity. It so completely does the work of a human being that it is almost uncanny in its efficiency and speed." More instruments, more tools, more of the same for more of the same male employees. But when typewriters, duplicators, switching systems, calculators, computers, and a vast range of punched-hole machinery arrived in the office, these male workers found themselves replaced by new networks of women and machines. Their fingers were finer and cheaper than the old hired hands. "The 'craftsman' clerk of the early 1900s thus became 'as rare as a rolltop desk,' and 'help-wanted' columns summoned girl high school graduates with 'no experience necessary.' They could be trained in a few weeks to do a single job such as routine billing, cardpunching, calculating, or filing." They also worked at speeds and levels of efficiency which left their male predecessors standing: "She adds the yards of the comptometer and then extends the bills on the arithometer, and does the work of six men with great ease." By 1930 the number of office women in the U.S. "was approaching 2,000,000 . . . and for the first time women outnumbered men." By 1956 there were six million such white collar workers and, across the employment board, four times as many women employed as there had been at the turn of the century.

Several typewriters had competed for attention in the 1800s, including the Hammond, the Randall, the Columbia, the Herrington. But the machine which caught on was also one of the first, a typewriter which had been developed in 1867 by Christopher Latham Scholes. Scholes had assembled his typewriter piecemeal, using old components such as the telegraph key. Later perfected by Remington engineers, its impact was enormous and as fast as the speeds of writing it made possible. "I don't know about the world . . . but feel that I have done something for the women who have always had to work so hard," said Scholes when he got the machine to work. "This will help them earn a living more easily."

If handwriting had been manual and male, typewriting was fingerprinting: fast, tactile, digital, and female. "An English lady who demonstrated this machine in Paris achieved a writing speed of more than ninety letters per minute, i.e. more than twice the speed attained in writing by hand." Text was no longer in the grasp of the hand and eye, but guided by contacts and keystrokes, a matter of touch sensitivity. An activity which had once been concentrated on a tight nexus of coordinated organs—hand and eye—and a single instrument—the pen—was now processed through a distributed digital machinery composed of fingers, keys, hammers, platterns, carriages, levers, cogs, and wheels. The noisy tactility of typewriting destroyed the hushed and hallowed status of the written word. If writing had turned language into a silent, visual code, the new machines made a music of their own: In secretarial schools, women were taught to type in rhythmic patterns which had nothing to do with either the meaning or the sounds of words but was more akin to the abstract beat of drumming and dance. Typing was judged in terms of the speeds and accuracy rates which only repetitive rhythm guarantee. Words per minute, beats per min-

ute, the clatter of the typist's strokes, the striking of the keys, thump of carriage return marked by the ringing of a bell at the end of every line.

"She says: 'It's hard to tell, because they don't tell it with words, exactly . . .'

"Turner felt the skin on his neck prickle. Something coming back to him . . ."

William Gibson, *Mona Lisa Overdrive*

The telephone was first received either as a new and improved message boy or dismissed as an "electronic toy." As the chief of the U.K. post office declared: "I have one in my office, but more for show. If I want to send a message—I use a sounder or employ a boy to take it." But speed is always irresistible. Within a couple of years, what once seemed a smart irrelevance had become an indispensable machine hooked into the "complexities of an elaborate worldwide communications system" which was suddenly beyond even the most fleet-footed of messenger boys. Once it was realized that this immense network could "be manipulated by the girl" instead, telephony "provided opportunity for a large number of girls at a low rate of pay, comparing in this respect with the factory system." The "earliest telephone companies, including AT&T, were among the foremost employers of American women. They employed the daughters of the American middle class in great armies: in 1891, eight thousand women; by 1946, almost a quarter of a million." Thousands of women were also employed on private branch exchanges and as telephonists, receptionists, and switchboard operators. This was already the emergence of a lattice of connections later known as the Net.

The future was at her fingertips. "Basically, you, Miss Luthor, *are* the 'switching system.' "

In terms of conventional modes of social organization and political collectivity, this new meshwork of digital microprocessors, women, and machines, was dislocated and fragmented, scattered too wide for any form of union. It had no history on which to draw, no precedents to follow, no consciousness to raise. It was composed of cyborgs, softbot machines trained to perform a specific set of tasks, positioned in well-established hierarchies. Computers worked in parallel, and typists were actually collected into pools: fluid resources to be used by the firm. Each woman was reduced to a number; she was one of a kind, and the kind was everywhere. She "leads a very clear-cut, calculated life proceeding by delimited segments: the telegrams she takes one after the other, day after day, the people to whom she sends the telegrams; their social class and the different ways they use telegraphy; the words to be counted."

Sometimes she was kept in a cage or a booth, under the strict supervision of a supervising eye. Like Foucault's prisoners, she was "the object of information, never a subject in communication." This was a new working mass engaged in an emergent layer of continuous tasks, uniform processes, interchangeable skills: ordering, classifying, typing, filing, sorting, processing, counting, recording, duplicating, calculating, retrieving, copying, transposing. The tasks endlessly repeated by women composed the infrastructure of the bureaucratic world. Although some functions were relatively skilled, many were tedious in the extreme: semiautomatic, impersonal tasks wielding little overt institutional power. "The girl at the head of the line interprets the order, puts down the number and indicates the trade discount; the second girl prices the order, takes off the discount, adds carriage charges and totals; the third girl gives the

order a number and makes a daily record; the fourth girl puts this information on an alphabetical index; the fifth girl time-stamps it; it next goes along the belt to one of several typists, who makes a copy in septuplicate and puts on address labels, the seventh girl . . ." Remotely controlled by a faceless machine, she could also find herself on strangely intimate terms with those who organized her work. As the secretary, she dealt with the most private and confidential details of her company's affairs or her boss's personal and working life. She spoke for him, she signed her name "pp" on his behalf, and functioned as a second skin to those whose secrets she carried and concealed. She was his voice, his smile, his interface; connecting and protecting him from the world, the screen on which he presented himself, a superficial front, a processing filter, and a shield, a protective coat.

Like all ideal women and machines, secretaries and shorthand typists were only supposed to be processing information which had been produced and organized elsewhere. But female literacy rates soared up when the typewriter was introduced, and if women's typing was supposed to be intended for the eyes of men, the development of new techniques by Pitman and Gregg (which prefigured the use of acronyms, tags, and emotes on the Net;-)), made shorthand a private female code, "another language, another alphabet . . ."

secrets

In the office, personal computers and organizers, mobile phones, pagers, and fax machines have converged with the women's secretarial roles, and while the ability to make excuses

and coffee for the boss were difficult functions to simulate, programs like "Virtual Valerie" and the slightly more daring "Donna Matrix" could even supply rudimentary sexual services to the lonely male keyboarder. He was glad to get rid of their flesh-and-blood predecessors. They had always been a necessary inconvenience; it had galled him to think he needed them, even for the insignificant jobs he allowed them to perform. He had to entrust them with his secrets and his codes. And while they looked very well behaved, one could never be quite sure.

As early as 1889, almost as soon as the telephone network had started to run, a "girl-less, cuss-less" automatic switching system was devised by a Kansas undertaker, Almon B. Strowger, who had become convinced that the wife of one of his rival undertakers, herself a telephone operator, was diverting calls away from his business. But the explosion of telephony meant that Strowger's system joined the women it had been intended to replace, and it was not until the mid-1960s that electromechanical crossbar systems were automatically connecting the calls both the women and their Strowger sisters once picked up. While Strowger's system had allowed a call between two numbers to take any one of many routes through the exchange, its exchanges also "contain moving parts that wear out . . . and are liable to faults such as crossed lines, buzzes, crackles and wrong numbers," whereas with the electronic circuits of the crossbar systems, "instead of step-by-step switching, incoming lines are connected to rows of horizontal wires and outgoing ones are fed from columns of vertical wires with reed switches where columns cross rows." Telephones in the U.K. were switched to the fully electronic "System X" in 1980. Recorded female voices became ubiquitous, and the messages once carried on copper wire began to travel by satellite, microwave, and fiber-optic cable.

There was now more of a risk that the women and their skills would become entangled with each other and wander off on their own. "The specialized nature of their work before automation had made it difficult to find desirable work elsewhere . . . But the new IBM machines caused greater standardization of procedure so that a trained operator could work almost as well in one establishment as in another." They weren't only processing data for the boss. If they were pooled with their colleagues, their working environment was a hive of activity, "a permanent inventiveness or creativity practised even against administrative regulations" and hospitable to a multiplicity of informal networks, grapevine gossip riding on the back of formal working life: birth and death, sex and disease, birthdays and bosses, cosmetics and clothes. "In several exchanges reading clubs were formed, in others flower and vegetable gardens, and a women's athletic clubs in another." The content may have seemed trivial to him, but this was entirely beside the point. It is quite literally *the point* which is subsumed when means of communication begin to communicate with themselves. For these emergent systems of exchange, new lines and links are everything.

"A path is always between two points, but the in-between has taken on all the consistency and enjoys both an autonomy and a direction of its own."

Gilles Deleuze and Félix Guattari, *A Thousand Plateaus*