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Title of Article or Chapter *When Alan Turing was a Computer: notes on the*

Title of Journal or Book *Connect*

Publisher *Arts International, Inc.*

Place of Publication *New York*

Date of Publication *2001*

Course *ANTH 232*

Instructor *Julie Chu*

when alan turing was a computer:

notes on the rise and decline of punch card technologies

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Pictures from the recent Florida recount seem filled with a kind of technological cringe: four bodies huddled over a single punch card, squinting, frowning, and tired. Haggard bodies haggling over an equally beleaguered technology. In a contest between a man claiming to invent the Internet and one suspected of a reading disorder, perhaps it was only poetic justice that a reading machine became the center of public controversy—a machine that teetered precariously between the literate world of the Gutenberg Galaxy and the digital revolution. The punch card machine, through which a third of Floridians attempted to make their "will" legible, provided an embarrassing glance into the messy materiality of the electoral process in the U.S. The machine's name itself—the "Votomatic"—invoked the modern obsolescence of a collective self-image; a kind of nostalgic futurism that would have fit right into the 50s space-age world of *The Jetsons* with robot maids and flying cars in tow.

One forgets how punch card technologies used to inspire awe and pride about American modernity; how crowds in the 1930s and 40s gathered around storefronts to watch these machines read and calculate stacks of cards. This was a time when punch cards were the pinnacle of high-tech and the term "computer" referred to a man calculating numbers for a living. Between the rise and decline of punch card technologies, the "computer" became a machine.

Far from coincidence, transformations of the punch card and the "computer" point to an intricate dance between media and bodies in breaking up the monopoly of writing as what German media theorist, Friedrich Kittler referred to as "the expression of individuals or the trace of bodies". This was a shift not only in the mediation of shared symbols and ideas but also in the material, sensual experience of the self and the world. Over the last two decades, Kittler has been charting how the materialities of media technologies—as blueprint and artifact, practice and habit—have preceded and shaped human discourse and the human sensorium.[1] Kittler unfortunately bypassed punch card technologies en route to a grim digital future when "machines take over functions of the central nervous system..." and "humans change their position...from the agency of writing to become an inscription surface". We have not yet arrived at Kittler's dystopic digital future but the debates and judgments over body versus machine in the Florida recounts may be pointing us in that direction.

[1] Kittler, Friedrich A. *Gramophone, Film, Typewriter.* (Stanford: Stanford University Press, 1999 [1986])

The "statistical sausage grinder"

In the "Great Inventor" historiography of the computer, Herman Hollerith's name emerges in connection with a tabulating machine he designed for the 1890 U.S. census. The Hollerith machine was not the first to feature punch cards as a central device. Weaving mills in the early 19th century were already using strings of cards with specific arrangements of punched holes to control the mechanical movement of looms in weaving patterns. Hollerith, however, was the first to hone punch card technology for the administrative purpose of storing and processing information—information designed for the state to get a firmer grip on the collective body of the nation.

Until the introduction of the Hollerith machine, the collection and processing of census data was strictly a manual operation. Enumerators recorded the personal information of people on the street. Tabulators transferred these written records into columns as tally marks on rolls of paper and then added the marks together by hand. While this system had always been expensive and time-consuming, it was clear by the 1890 census that the growth of the population had outpaced the speed of hands to count it. Faced with an immigrant-fueled population boom estimated at more than 62 million, the census bureau determined that, if the existing system of data processing remained unchanged, information from the 1890 census could not be collated in any useful form until well after the 1900 census had taken place. By this time, the 1890 data would be of marginal value. Enter the Hollerith machine.

Herman Hollerith's breakthrough did not eliminate the paper trail of state bureaucracy so much as transform the idea of what paper could store. In representing census data as punched

holes on cardstock, Hollerith effectively reduced the alphanumeric system of notation to a sign system of two—a binary of presence and absence across the surface of paper. Unlike the pen, the key punch as a writing instrument did not allow for variation in inscription. Punch cards were not designed for reading meaning out of continual flows and lines on paper. In fact, Hollerith did not design them for human reading at all but for the machine named for him. The punch card was paper made legible for reading machines.

Of course there is arguably no reason for an electrical current triggered by needles passing through punched holes to be described as "reading" in our literary sense of the word. Yet early media fascination with punch card technologies was singularly devoted to describing how the machine "read", as if by humanizing the process through which the machine detected the card's meaning, the public could be taught how to more comfortably relate to the new technology. As punch card machines became more publicly visible in libraries, police departments and businesses in the 1930s and 40s, reporters outdid one another with metaphors for the technology's utility, alternately calling it "a mechanical Sherlock Holmes", a "crime-hating robot," a "statistical sausage grinder" and "the most amazing fortunetelling machine ever devised."[2] As the machine took over the manual labor of "grinding" statistics, people celebrated it with odd references to themselves, as imitation and extension of human labor and intuition.

Early punch card machines were not the flexible "thinking" machines that computers would be—they merely took over the dirty work of sorting and counting. Just as in assembly-line factories of the same era, bodies were still required to closely supervise and choreograph the work of multiple punch card machines in the production of information. Yet while the coordinating intelligence in handling punch cards remained human, the machine was becoming integral as the decoder of our collective self-knowledge as the "population", the "public" and the "nation". By punching holes in paper, we were after all encoding ourselves for the machine.

Do not fold, spindle or mutilate

Through the 1940s, punch cards were still under the strict supervision of trained tabulators and engineers. Though the machines were gaining public visibility through storefront displays and popular press coverage, it was not until the invention of the computer in the 1950s that the technology acquired a sense of public tactility. While the reading machine remained inaccessible to the everyday person, the computer transformed the punch card itself into a familiar everyday object.

Unlike the old counting and sorting Hollerith machines, the automated computer liberated the punch card from the grunt labor of information processing by transforming the significance

[2] Lubar, Steven." 'Do not fold, spindle or mutilate': A cultural history of the punch card." *Journal of American Culture*, Winter 1992.

What the photographs by their sheer accumulation attempt to banish is the recollection of death, which is part and parcel of every memory image.

of punched holes on paper. Beyond signifying raw data, the orchestration of holes on paper could also signal instructions for processing data to the new computing machines. Simply stated, punch cards became both data and program. This broadening of the punch card's utility enabled computing technology to move from being merely the mechanical muscle behind number crunching to the command center of information processing. Unlike the Hollerith machine, the automated computer no longer required the heavy supervision of bodies throughout the process of information production. Rather, it was now bodies that needed supervision.

By the 1960s, punch cards gained ubiquity as the interface between people and their bureaucracies. While punch cards as program code remained in expert hands, they now circulated broadly between the general public and various institutions and businesses as means for processing billing and registration. Utility companies and department stores sent out punch cards as bills to make it easier to process returned checks from customers. Universities disseminated the cards to students as a means of registering and tracking their student population.

As the punch card went public, people also needed to be taught how to properly handle the technology. This pedagogic project was made apparent by the addition of printed text to the cards: the warning, "Do not fold, spindle or mutilate." As the only signs coded for human eyes, this phrase conveyed the demands of the technology for correct bodily discipline. Left to their own devices, people could not be trusted to respect the integrity of the punch card system, particularly since that system of signification was not meant for their understanding.

Not surprisingly, a text that promoted blind bodily discipline resonated within the burgeoning student movements in the 1960s. Under the leadership of the Free-Speech movement, centered at the University of California-Berkeley, "Do not fold, spindle or mutilate" became a catchphrase for student protests, encapsulating all that was wrong with the system of bureaucratic standardization and automation. The 1930s and 40s celebration of the machine as imitation and extension of human endeavor gave way in the 60s to a fixation on the punch card as a sign of human alienation from technology. Protesters at Berkeley complained about being merely "27,500 IBM cards in the registrar's office" at risk of being "torn, mutilated or spindled" by the impersonal machine of the university. The punch card as metaphor for the body captured the public's sense of being replaced by the machine. Not coincidentally, this sense of punch card anomie emerged at time when automation through programming code was making bodies less essential in the production of information. The punch card as program transformed automation into machine autonomy. As Kittler noted, "once unrestricted program processing becomes a possibility, it is difficult to recognize the point at which [humans] could say: up to this point, but no further."

University students, perhaps sensing the point of no return, physically tore and destroyed punch cards as one way of protesting against their embodied alienation from the "machine" in their lives. Others learned to subvert machine code by punching their own cards and slipping them in along official channels of information processing. In fighting code with code, these protesters were asserting their control over the "machine" and its symbolic referent, the university. Yet in the act of punching holes, they were already operating on machine logic. The line drawn between machine automation and human autonomy was being written for the recognition of electrical currents.

Ironically, as the Free-Speech movement zeroed in on the punch card as a symbol of alienation, the electoral arena was just beginning to promote the technology as the medium for expressing the "people's will." Fittingly, in embracing the technology rather late, electoral politics would set the stage for the last stand of the punch card.

Pregnant, dimpled, hanging...

By the 2000 election when the punch card machine came to public attention through controversies in Florida, the technology was no longer something to celebrate or fear. Once the sign of both utopic and dystopic visions of modernity, punch card technologies merely mocked our digital sensibilities of efficiency and progress. The Votomatic screamed "retro".

Yet in the aftermath of election day as the clamor of punch card technologies swirled around the "butterfly ballot" and the Votomatic, there was no telling that public and legal discourse would ultimately narrow itself to those notorious bits of paper called "chads". Who would have thought that in debates over voter disenfranchisement, the punched confetti of ballots would generate more political heat than outcries of racism from black Floridians, many of whom either felt police intimidation on election day or were literally turned away from polling booths?

Through the chad, the public squinted for signs of the "public will." Where the machine had found absence, people looked for the residue of embodied intention, straining to find human will where body may have met paper. In facing the machine logic of absolute knowledge, we interpreted incomplete punches through metaphors of vulnerable physicality. Uncertain chads were pregnant, dimpled, hanging...

In the contest over human intention and machine autonomy, all sorts of bodies were invoked to claim the "public will". First, there were the senior citizens of Palm Beach whose double- and mis-punches on the "butterfly ballot" were responsible for delivering the liberal Jewish vote to the conservative and sometimes anti-Semitic Pat Buchanan. These complaints of

punch card design were quickly challenged by anecdotes of eight-year old children executing perfect, intentional holes on the same ballots. Though it seems odd that non-voting subjects would be invoked in a debate about the "public will", these children provided powerful symbols of the importance of bodily aptitude to the technology of voting. In response to elderly protests, these parables of youthful skill reframed the problem as the failure of bodily discipline. Technology could not be blamed for the poor training of bodies or for the inability of hand-eye coordination to make votes legible to the machine. As the debate moved to the judicial system, it became clear that the great civic lesson of the 2000 electoral process concerned machine literacy.

In the ultimate Supreme Court decision, nine people may have been responsible for bringing finality to Election 2000. But finality was always on the terms set out by the machine. The pressure of time running out and the need for clear standards were sensibilities already conditioned by machine rhythms of speed and machine criteria for discrete, absolute responses. People reading papers designed for machines were always at a disadvantage. Their bodies could not process punched ballots with the speed and confidence of needles forming electrical currents.

Yet technology did not determine the judicial decision so much as resonate with the Court's logic. In the final judgment, the machine won not by affirmation but by default because the Court itself operated on the same kind of either/or standard—a binary code of justice. As Kittler notes, "Computers are not emanations of nature. Rather, the universal discrete machine, with its ability to erase, negate, and oppose binary signs, always already speaks the language of the upper echelons." By mid-December 2000, the judges had spoken.

When Alan Turing was a computer

In speaking of "so-called Man", Kittler recognized that he was always referencing a very small population that ever had claim to the notion of free will and a kind of disembodied, transcendent subjectivity. In the small and exclusive feedback loop of the Gutenberg Galaxy, literate white men were the only ones who could write themselves into being as free-floating subjects, unencumbered by the particularities of the body. While someone like René Descartes could conceive of an indivisible subject separate from a divisible body, most of the population was already accustomed to inhabiting a reductive existence as a segmented body. Bodies may not always have experienced segmentation in Kittler's way—as the ears, eyes and hands of the electronic media age (gramophone, film, typewriter). But surely, before the monopoly of writing was broken, bodies were already being reduced to the muscle, womb, and skin of other disciplinary

technologies (labor, reproduction, racialization). For a great majority, human essence or subjectivity has never been an out-of-body Cartesian experience but a reductive, divided embodiment (Fanon's black skin, white mask; Dubois' double consciousness). Electronics may have splintered the senses in new ways but it did not erase old embodied divisions.

Alan Turing, the mathematician who theorized "the universal machine" (the theoretical foundation of modern computation and computability), was no less divided despite his transcendent whimsies. In fact, he found his reduction to bodily identity too much to bear. For decades, Turing succeeded in keeping his bureaucratic identity as a military codebreaker and computing innovator separate from his embodied life as a homosexual. All this changed in 1952 when police, responding to Turing's report of a burglary, wound up arresting and charging him with "Gross Indecency" for naively revealing that he was involved in a homosexual relationship. Tried, convicted and stripped of his government clearance, Turing was forced to see a psychiatrist and to undergo hormone treatment. The treatment, which made him impotent and obese, resulted in two long years of severe depression and ultimately, led to his suicide. Turing, the "so-called Man" whose mind was most closely associated with the universal machine, could not escape the burden of embodiment and in the end, gave up trying. Before the automated computer finally lost its modifier and became the computer, Alan Turing had already ceded the title to the machine he helped conceive.

The narrowing of discourse in the Florida recount to the current machine logic—a discourse of bodily aptitude—-effectively shunted those so deeply embodied that they could not even broach the technology of voting. African-Americans, no strangers to bodily reduction, could not find a place in this debate of punched holes and chads. For the discussion of hand-eye coordination was moot for those who could not overcome the suspicion of skin. In the heyday of the punch card, Langston Hughes already saw clearly that the holistic, universal subject of the Gutenberg Galaxy was always a dream deferred. Should it surprise us then, that as we discuss election reform, the dream for universal *suffrage* is now being deferred to newer and better technologies?

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