Virtually Human: the Electronic Page, the Archived Body, and Human

Identity

by Allison Muri

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Disputants, many of them writers, say to me, "Words are still words—on a page, on a screen—what's the difference?" ... The changes are profound and the differences are consequential. Nearly weightless though it is, the word printed on a page is a thing. The configuration of impulses on a screen is not—it is a manifestation, an indeterminate entity both particle and wave, an ectoplasmic arrival and departure. The former occupies a position in space—on a page, in a book—and is verifiably there. The latter, once dematerialized, digitalized back into storage, into memory, cannot be said to exist in quite the same way. It has potential, not actual, locus. ... And although one could argue that the word, the passage, is present in the software memory as surely as it sits on page x, the fact is that we register a profound difference. One is outside and visible, the other "inside" and invisible. A thing and, in a sense, the idea of a thing.¹

What changes when we no longer think of the page as "real"? Since the arrival of television and the personal computer, the presentation of our ideas via configurations of electron beams rather than fixed upon a more palpable page has inspired repeated commentary upon not only how our texts will change, but also how *we* will change. Whether a lamentation for the loss of the texture and substance of the book, or an exultation for a supposed new traversing of boundaries and freedom from hierarchical structures, a predominant conclusion has been that we are altered by our media. For many writers, the "terminal" page signals profound changes to our historical perspective, to our understanding and experience

of community, to our cultural and democratic values, to our ability to teach our young to be moral and engaged citizens, to human agency and subjectivity, and even to human identity itself. Certainly, the material form of communication can shape cultural paradigms, what Harold Innis characterised as "grooves which determine the channels of thought of readers and later writers,"² but does our media actually "restructure consciousness,"³ as early media theorists such as Adorno, Ong, or McLuhan assumed and contemporary theorists have continued to do? (Adorno, for example, pessimistically claimed that the technologies of film and radio, which produce "technicized forms of modern consciousness," result in imagination's being "replaced by a mechanically relentless control mechanism"⁴). Is the material of our communication indeed such a powerful determiner of human consciousness or identity as various writers following these early media theorists have claimed? Is the electronic page a technology that can *effect*, as some have argued, freedom and democracy or cultural decline? Is the page's influence on our culture more important than our culture's influence on the page? And to what extent are such queries determined by our own culture as professors and students of the humanities who are, not coincidentally, responsible for most of the speculation upon the materiality of our texts? Whether the materiality or immateriality of the page is a causative force in shaping human identity and society would seem impossible to determine conclusively. Indeed, it would seem impossible to ever arrive at a conclusion so profoundly informed by metaphors for the page as a body presenting a visible, material form of knowledge, which in turn both reflects and moulds the invisible, immaterial entity that is our rational self or consciousness. Speculation upon the immateriality of our electronic texts, therefore, is speculation about knowledge, morality, and education, and also about human embodiment, an ever-present debate about the old

philosophical definitions of the physical body and its relationship to human "spirit," identity, or rational intelligence.

The page or computer network (material housing of the text) and the body (material housing of the self) are understood to be permeable, almost equivalent, in certain theories of electronic textuality. The so-called fusion of machine and human in networked communications systems has been imagined as a sign not only of a transition from book culture, but also of the impending redundancy or evolution of the human body. Michael Heim, for example, has written that "At the computer interface, the spirit migrates from the body to a world of total representation. Information and images float through the Platonic mind without a grounding in bodily experience. You can lose your humanity at the throw of the dice."5 Sven Birkerts has similarly conflated book, body, and humanity in his discussion of "the fate of the book": "Maybe we are ready to embrace the pain of leaving the book behind;" he writes, "maybe we are shedding a skin; maybe the meaning and purpose of being human is itself undergoing metamorphosis."⁶ For Arthur Kroker and Michael Weinstein, human intelligence is reduced to "a circulating medium of cybernetic exchange"⁷ in the networked text. The desire to become virtual, they suggested, promotes "a radically diminished vision of human experience and of a disintegrated conception of the human good: for virtualizers, the good is ultimately that which disappears human subjectivity" (n.p.). Sadie Plant has described "the cyborg you become" when jacked into the computer as "more or less directly connected to your central nervous system; more or less hooked up to its own abstraction and the phase space in which you are both drawn out."⁸ Whatever this new entity is, she concluded, it will be "post-human." More optimistically and just as speculatively, Christopher Keep, claiming that there is "more than a simple metaphorical relationship between hypertext and the body,"9 suggests that by reading electronic texts we

are "engaged in a border experience, a moving back and forth across the lines which divide the human and the machine, culture and nature" (165). The reader thus "becomes an extended space of production, a series of flows, energies, intensities, discontinuities, and desires which refuse the (en)closure of the normative body" (179). Surely there is a little irony in some of these musings but nevertheless my rude question is this: why is it assumed that human identity is so dependent upon the material page that when texts becomes electronic, consciousness or subjectivity flows out as if by osmosis?

Our texts, like our human identities, it seems to me, are unlikely to undergo radical revolution to reflect a new "posthumanity": our texts, electronic or otherwise, are still engaged in very human themes of life, love, sex and death; we still, as ever, make war and make love; there are still those who traverse boundaries, and those who erect them. There are and will continue to be good and bad citizens, good and bad students, avid and apathetic readers. Whatever difficult choices the computer age will necessitate, electronic textuality will not change these very human traits. What *has* changed is our analogies for the page as body and the text as thoughtful reflection: the simulacra produced by computer program and displayed upon the ethereal and immaterial page subverts conventional tropes for body, mind, and human spirit. The electronic environment has enabled us to understand our bodies as computational configurations of atoms and electrons, the mind as electrochemical charge and the body as DNA: the body no longer is the cathedral for the soul. The body is a biomechanical system, a complex machine which can defy death when updated with artificial components. The electronic environment has also destabilised a centuries-old system of inscribing and disseminating principles of critique, judgment, and morality through the stable and material texts sanctioned by our educational and religious institutions. The page is a tool for teaching but in the electronic environment, anyone can be an author. And so, if we

imagine the electronic environment as virtual not real, as fleeting and malleable not permanent and canonical, as technological and commercial not literary and artistic, or as permeable and rhizomatic not fixed and hierarchical, we imagine we might predict the future: mind-body and mind-text meet figuratively at the locus of the page, and if the materiality of the page changes—so the theory goes—so must we as humans. However, a significant and generally unacknowledged part of this conversation about the incipient changes to humanity is concerned with the incipient changes to the humanities and liberal arts, and with the increasing influence of the sciences of material technologies.

Some Conceptual Frameworks: The Electronic Page and the Book of Life

What do we mean by "electronic page"? *Page*, of course, comes from the Latin *pagina*, a column of writing in a scroll. The display of text and image on a computer screen in a horizontal or vertical format similar to the dimensions of our traditional paper pages, which we read by "scrolling" up or down, corresponds quite closely to the traditional page. Indeed, the style sheets and html markup used to create web pages specifically replicate certain visual aspects of the printed page such as colour, text formatting, and image placement. Virtual reality displays could be considered a form of page as well, since the viewer scrolls through the apparently three-dimensional text of imaginary space, viewing images and reading texts that are written into the program. The electronic page is both database and bits, potentially far more malleable and responsive to user input than the paper page, but it is nevertheless a form of page that displays the artefacts of human creativity. The term *electronic* describes the flow of electronic charge that results in generating, sending, receiving, storing, and displaying the data that comprises a computer text: the text is in electronic form when bombarded onto certain types of screens to form images, or when it is transferred through circuits, or stored

temporarily in random access memory (the use of "electronic" to describe computermediated texts, however, is slightly problematic since such a text may be transferred as sound waves, or stored as physical bumps etched into the surface of a CD). The electronic page is both a visible display legible to humans, and an invisible machine-readable bits that are the information for the transmission and storage, content, layout, markup, and programmed functional capabilities of the visible page. This invisible text written on the main store of a computer is divided into manageable sections called pages, and a similar amount of data or part of a program is also called a page. The electronic page is markedly different from the paper page, but whether in fact a page is a "thing" if the data is not printed on a material substrate is a philosophical question with which I will not trouble myself here. When I write of the computer-mediated text as page I refer to a text that may be displayed visibly onscreen in a familiar format, but which is also necessarily invisible binary data written onto the surface of a computer disk or tape. The electron beams patterning the screen through a shifting flux of energy may be rewritten, lost, or recovered in moments, it may be stored as database and generated dynamically for display depending on the reader's input, but the electronic page is nevertheless a text inscribed through human ingenuity onto the physical elements of the world in which we live.

This very invisibility, changeability, and seeming instability creates the illusion of a new form of human consciousness that is permeated by, and permeates, the computer network. There is a history to this image of the mind, however: the material page has been traditionally understood as re-presenting the human form as repository for knowledge, memory, creativity, and imagination; likewise, the human mind has traditionally been presented as a writing surface. Our pages and our bodies have long converged in metaphor. Indeed, a page has a body, a header, and a footer; it might contain an appendix or index

(from the Latin meaning "indicator" or more specifically "forefinger") or footnotes or frontispiece (from the late Latin *frontispicium*, from *frõns*, "forehead" and *spic*-, denoting "see"); it might be part of a chapter (from the Latin *caput*, head); it may be part of a manuscript (from *manus*, hand), or it may be bound into a book with a spine (and the electronic page has access to memory). A material surface with boundaries, edges, and margins, for centuries the page has been made of skin, and bound in skin. And for centuries, the body has been metaphorised as book. Andreas Vesalius, known for revolutionising the pedagogy and study of anatomy, taught that not ancient books but the human body itself should be the primary text and ultimate authority in the study of human structure and today that tradition of the body as the Book of Nature is continued in digital anatomy projects.

While the body is a book to be read, the mind has been imagined as a page to be inscribed. The analogies we create to describe the human mind tend to reflect the technology of writing that we use to inscribe our thoughts. Socrates considered and rejected an analogy for memory as a block of wax which holds the impressions of sensory experience. Seventeenth-century writers such as Gassendi, Robert Burton, or Thomas Hobbes reiterated Aristotle's description of the mind in *De anima* as a blank writing tablet or *tabula rasa*. Shakespeare made use of the analogy of the mind as writing surface in Hamlet's promise: "I'll wipe away all trivial fond records" from memory, he proclaims, to better remember the words of the ghost "Within the book and volume of my brain." John Locke described the original state of human understanding (that "most elevated faculty of the soul") as a surface clear of writing. "Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas," he wrote in "Essay Concerning Human Understanding." Locke's work uses the page as trope for the inscription of both rational thought and morality. In describing "how men commonly come by their principles," Locke suggested

that children "grow up to the dignity of principles in religion or morality" through the doctrines professed by their caregivers, instilled into the unprejudiced understanding, "for white paper receives any characters." This inscription of morality as upon a blank page evokes and reinforces a system of education and morality through the page itself.

The page on the screen thus becomes emblematic of a moral shift. Take, for example, Vivian Sobchack's early concept of the hazards of electronic texts in Materialities of Communications, a collection of essays concerned with media technologies, the body, and transitions within the academic field of the humanities. The "binary superficiality of electronic space," she wrote, "distorts and liberates the activity of the consciousness" from the body.¹⁰ Arguing that the electronic text or virtual reality creates a "quasi-disembodied state" (100) and "denies or prosthetically transforms" (104) the body, she warned that the resulting "lack of specific interest and grounded investment in the human body and enworlded action...could well cost us all a future" (104). If we become "merely ghosts in the machine," she suggested, we "can ignore AIDS, homelessness, hunger, torture, and all the other ills the flesh is heir to" (106). Clearly, there is an element of hyperbole here, and my intent is not to point out the obvious embodiment of the computer user. These images encapsulate a common theme in such analyses of computer technology: electronic texts result in both disembodiment and immorality. In such works the texts of technology-texts unedited and unauthorised through any traditional system of determining literary excellence—are represented as replacing real humanity with unfeeling human-machines, and making redundant not only the body but also literature and all those creative endeavours that instil morals into the human psyche. K. Ludwig Pfeiffer's introduction to Materialities of *Communications* summarises the complexity of the position:

Certainly, one would like to know what kind of autodynamic wirings or analogues of them there are—if there are any—that test perception, guide behavior, evaluate experience, caring little or nothing for the pathetic semantic textures we weave around them. There are the brain, the hormones, and the other circuits that produce, in ways still fairly obscure, electric and chemical binarisms. But if it is one of the deadlocks of brain research that the steps from there to what still appears as meaningful cultural worlds *are extremely hard to take and have yet to be taken*, it behoves "literary" people (like most of those in this volume) not to abandon prematurely some striving toward the "nobleness of life"...even if it consists only in "literature."¹¹

The relationship between technology, human embodiment, and morals is complicated not only by a history of metaphors for body, text, and material page in an older tradition, but also by the growing prevalence of science and technology as more "useful" disciplines than the study of literature.

While the analogies between page and body are ancient and associated with a tradition of education that values the spiritual side of humanity, the convergence of text, body, and mind as code in the electronic page or digital archive is more recent, and associated with the rise of the computational sciences. Vannevar Bush's article "As We May Think," which described in theory what would be realized in computer hypertext documents ("an enlarged intimate supplement to his memory") appeared in the July 1945 issue of *The Atlantic Monthly*. In 1948 Bush's colleague Norbert Wiener published a manifesto for the new technoscience of cybernetics, which explained both organic and machine processes as communications systems. As Lily E. Kay has noted, Wiener and Bush had worked on a project together to solve partial differential equations with computers in 1940, which in turn

influenced Wiener's conception of future computing machinery as an analogy between electronic computing and the mechanics of the nervous system.¹² Wiener's theories conflated both machine and text as symbolic structures of the human body: the chapter entitled "The Individual as Word" in his popularization of the theory of cybernetics, emphasised the metaphor of human body as the Book of Life. "Earlier accounts of individuality were associated with some sort of identity of matter, whether of the material substance of the animal or the spiritual substance of the human soul," he wrote. "We are forced nowadays to recognize individuality as something which as to do with continuity of pattern, and consequently with something that shares the nature of communication."¹³ There was significant debate in the U.S. about the applicability of Wiener's information theory to genetics, but the metaphors of human life as text were nevertheless present and became, as Kay demonstrates, dominant and potent metaphors "in the general conceptualization of heredity as a genetic program, a scriptural technology."¹⁴ While representation of the body as information is a post-war phenomenon, however, the analogy of human bodies as textual, written documents was a very old one, and the image of the human body's creation as text was widespread. Indeed, some years earlier, in publishing their discovery in 1938 that the human genetic material was DNA in the form of long chains, Leeds researchers Astbury and Bell had borrowed the old metaphor of to configure human life itself as text written on a scroll:

Knowing what we know now from X-ray and related studies of the fibrous proteins, ... how they can combine so readily with nucleic acid molecules and still maintain the fibrous configuration, it is but natural to assume, as a first working hypothesis at least, that they form the long scroll on which is written the pattern of life. No other molecules satisfy so many requirements.¹⁵

This discovery marks the beginning of a shift in the understanding of the human body as God's immutable text, which William Harvey had characterised as "Nature's book…so open, and legible" in his seventeenth-century text describing the mechanics of animal generation.¹⁶ With the transcription of the invisible elements of the body made increasingly possible through technology and computers, we can not only "know" but also re-write or program the body as well as characteristics of mind, identity, or consciousness.

The electronic page or digital archive is a technological condensation of text and body, human consciousness, and human reproduction. On the one hand, old metaphors for physical body and page suggest that the death of the book parallels the redundancy of humanity. As the page becomes immaterial so is the self depicted as immaterial, flickering in a state of virtuality, our humanity snagged on the edge of the screen separating world from data. On the other hand, the idea of the conscious mind freed from the body's limitations suggests the fulfilment of a longstanding desire for transcendence, of which the electronic archive is a secularised version.

The Electronic Page and Human Spirit

The relationship of the material page and the computer text to human identity is complicated by the various terms used by writers to connote vastly different notions of that unnameable, un-locatable, and unmeasurable quotient that gives us our humanity: since writing began we have questioned where that aspect of our selves we call identity, consciousness, mind, rational thought, soul, spirit, or ghost resides. We have wondered whether it is immaterial or material, part and product of our bodies, or separate and distinct from gross matter. This very old question was a defining characteristic of early cyberpunk fiction which envisioned the consciousness as code living on without the body. William Gibson's *Mona Lisa Overdrive*,

the third and last of the series that inaugurated the phrase "data made flesh," presents the ghost in the machine as a form of sentience akin to immortality. At the novel's end, Angela Mitchell, a cyborg being whose brain has been engineered and programmed to jack into cyberspace without hardware, is killed. Her consciousness is transferred to a powerful biochip called an aleph or "soul-catcher." Angie as sentient code inhabits a high resolution, three-dimensional virtual space along with the other inhabitants of cyberspace, "ghosts," artificial intelligences, and her lover Bobby (The Count) Newmark who has entered that world between life and death by programming his own consciousness from his decaying flesh into the aleph biochip. The re-presentations of ourselves and our environment, evolving from page to microchip to biochip, reiterates an old metaphor of capturing the soul or spirit in the text. In a remediation of the lines from Shakespeare's sonnet—"So long as men can breathe, or eyes can see/ So long lives this, and this give life to thee"— Angela and Bobby are immortalised in the electronic text as long as the aleph is provided with a source of power.

The dream of the human spirit as coded consciousness free from the constraints of the body is not only a literary construct but also appears in theoretical discourse in both the humanities and the sciences. In a 1996 lecture Toshiba Professor of Media Arts and Sciences at MIT Marvin Minsky claimed that in the near future it will be possible to transfer human memories, intact, to disk.¹⁷ Also in 1996, head of British Telecom's research lab Peter Cochrane described a technology to capture human thoughts on a single silicon chip which he dubbed a Soul Catcher. "Despite specialisation and an exponential growth in knowledge," he wrote, "we still see people of outstanding ability able [to] understand and contribute more than the average. Unfortunately, they die and their expertise is lost for all time. The question is, can we capture their expertise and presence for future generations? Do they have to die

100%?"¹⁸ Somewhat tongue-in-cheek, *Business Week* later described the future technology as being able to make a rather straightforward decision by the year 2050 "to evacuate your biological body and take up residence in silicon circuits."¹⁹ The Soul Catcher would comprise "wireless links to microsensors under your scalp and in the nerves that carry all five sensory signals" to record "organized, online archives of everything that happens," (so described by D. Raj Reddy, a professor of computer science at CMU). The article concludes, "For people who chose not to inhabit silicon, virtual immortality could still ease the sense of futility that now haunts many people. Individuals would know their lives would not be forgotten, but would be preserved as a thread in a multimedia quilt that keeps a permanent record of the human race. And future generations would have a much fuller understanding of the past." Much like the genetic "map" that makes our cellular information live on generation after generation, this technology would purportedly transcribe consciousness by mapping the sequence of experience that is written upon our minds. The four-letter code of genetics, data storage miniaturisation, microprocessor-controlled prosthetics, artificial intelligence, the global grid of communication/control systems—the fusion of our understanding of our own bodies with the virtual representation of life onscreen, all problematise what were once clear conceptual boundaries between categories of body-mind and text.

Jean Baudrillard has depicted our electronic media as stealing the consciousness from the body: "[A]s soon as behavior is crystallized on certain screens and operational terminals, what's left appears only as a large useless body, deserted and condemned. The real itself appears as a large useless body." Individual consciousness he characterised as a pilot disengaged from the grounding of body, community and reality: "each person sees himself at the controls of a hypothetical machine, isolated in a position of perfect and remote sovereignty, at an infinite distance from his universe of origin," while the body then "appears

simply superfluous, basically useless in its extension."²⁰ For Baudrillard, the world of freely available information is an obscene one: "today there is a whole pornography of information and communication," he suggested, "that is to say of circuits and networks, a pornography of all functions and objects in their readability, their fluidity, their availability..." Obscenity begins, he explains, when "everything is exposed to the harsh and inexorable light of information and communication" (130). Baudrillard's play on the word obscene as the movement away from the real body in real space also emphasises a sense of indecency and moral offensiveness. And while claiming that "this is not necessarily a negative value judgment," he wrote of the disappearance of passion in the world of information-of hazard, chance, and vertigo as opposed to the passion, investment, desire, and expression of a previous era. Similarly, in his 1983 Simulations, Baudrillard criticised computer simulation as a spiritual crisis: the real, he explained, "is produced from miniaturised units, from matrices, memory banks and command models."21 Could "the divinity," he wondered, be "volatilized into simulacra," in the "visible machinery of icons being substituted for the pure and intelligible Idea of God?" (8) In Baudrillard's successive phases of the image, "the reflection of a basic reality" is good: "the representation is of the order of sacrament"; while the second order, which "masks and perverts a basic reality," inaugurates the age of simulacra and simulation and is "an evil appearance—of the order of malefice" (11–12). Baudrillard's appraisal was from a position of despair over simultaneous changes to the signs for both our arts and our bodies. "Digitality is [the] metaphysical principle (the God of Leibniz) and DNA its prophet" for the "universe of structures and binary opposites" (103) we have created, he suggested, finally concluding that simulation has damaged both our mental health and art itself, the very expression of our humanity:

art is dead, not only because its critical transcendence is gone, but because reality itself...has been confused with its own image. ...simulation pushes us close to the sphere of psychosis. ...The cool universe of digitality has absorbed the world of metaphor and metonymy. The principle of simulation wins out over the reality principle just as over the principle of pleasure. (151–2)

Baudrillard's critique of "the convergence of genetics and linguistics" (107) stands in direct opposition to the more ecstatic predictions of how the digital text will transform the human identity or spirit; but in many cases these oftentimes implausible claims may be reducible to the author's stance "for" or "against" the authority of science and technology.

The Archived Body

Floating through the skull and heart and lungs of Alexander Tsiaras's world we see every detail of our knowledge about the body and our ability to measure and define its function. We see here a body utterly and vividly intact. Only the soul has been removed. ...whatever else is to be found in this collaboration between an executed criminal and an artist we are somehow deftly aided in the ancient search for the soul. It is the oddest of ironies. The atomized, digitized body of Joseph Paul Jernigan reconstituted and imbued with a mesmerizing beauty and realism is as good an argument for the tangibility of the soul as one can find in this cheerless age of cause and effect.²²

[A] living virtual reality...originates with the merger of genetics and simulation where blood turns into electricity. ...[It] functions in the time of recombinant culture, whose sociology is based on splicing, cloning and sequencing. ...The vanishing body has been resuscitated, just short of vacuity, as the circulating body.

The body has become a circulating medium of exchange, coursing through the mediascape.... The perverted image (perverted as image exchange-value) and the ambivalent sign (fanatical and cynical) are the effects of the dependence of the mediascape on "biological" bodies as image resources and image actualizers. ...Welcome to the post-God era.²³

As the body's most invisible elements and processes have become more legible and better understood, the page has become more complex and immaterial. Consider the difference, for example, between a page in which the ink under your fingertips is raised so you can actually feel the patterns of letters, to a page that exists only in random access memory until it is saved to a mysterious and invisible position on the hard drive as magnetized bits—a pattern of ones and zeros decipherable only by the machine. And consider the difference between William Harvey's startling announcement in 1616 of his discovery of blood circulation, to the discovery in 1989 by J.R. Riordan et al. that the majority of people suffering from cystic fibrosis have a small mutation in one microscopic DNA fragment, which causes three out of one gene's 250,000 base pairs (A-T or G-C) to be missing (that is, three out of some three billion base pairs in our DNA), a deletion which in turn results in the loss of one amino acid—one molecule—out of the 1,480 in the protein for which that gene is a "blueprint." Our bodies and our texts have become similarly coded bits (1,0 encodes machine texts, while A,C,G,T codes body texts) but conceptually our understanding of body and text has been reversed. The white page with its black ink that has always been visible and accessible in the codex book is now hidden, mysterious and invisible bits accessible to and understood by only the masters of technology. The components of living bodies, the creation of both life and thought that were once hidden and mysterious in the human body are now magnified, diagrammed, documented, transcribed, archived by the

masters of technology. At the same time, the body becomes metaphorised as a text to be read, transcribed, and re-written. This fundamental change in our understanding of the body as page is illustrated most tellingly by current metaphors for study of the body no longer as Book of Nature authored by God but now as genetic blueprints co-authored by humans the published, bound, and immutable work versus the page describing the plans for a work yet to be finished. Thus Vesalius wrote of God the "Author of the human fabric," in his *Epitome* (1543) "Concerning the Organs Which Minister to the Propagation of the Species." In contrast, Victor Spitzer and David Whitlock, directors of the Visible Human Project datasets, subtitled their *Atlas of the Visible Human Male* as "Reverse Engineering of the Human Body."²⁴ Similarly, the U.S. Department of Energy's overview of the Human Genome Project, "To Know Ourselves," introduces the human genome as "The Recipe for Life."²⁵ In the rhetoric of body as archive, the notion of media theorists that the natural human body has become redundant exists in direct contrast to the medical versions of its centrality.

The transcriptions of the human body through the Visible Human Project (VHP) and the Human Genome Project, both stored in the National Library of Medicine (NLM) at the National Institutes of Health (NIH) in Bethesda, Maryland, are the most comprehensive archival projects in medical history. The Visible Human Project is the outcome of the National Library of Medicine's long range planning in 1986, which established the library's goal of "building and disseminating medical image libraries much the same way it acquires, indexes, and provides access to the biomedical literature."²⁶ The project effectively began in 1989, when the library's ad hoc Planning Panel on Electronic Image Libraries made the recommendation that the NLM build "a digital image library of volumetric data representing a complete, normal adult male and female."²⁷ Begun in 1990, the U.S. Human Genome

Project involves the identification of all 60–80,000 genes in human DNA and the sequences of the 3 billion bases that make up human DNA, the storage of this information in databases, and the development of tools for the data. The datasets resulting from both projects are the human body paginated, represented as alphanumeric code, digitized, pixelated, and available online in the National Library of Medicine's electronic collections (www.nlm.nih.gov/databases/databases.html).

The Human Genome Project, like the Visible Human Project, is a process of making the interior workings of the body visualized, archived, and legible (that is, capable of being read or deciphered). The metaphor of transcription, the analogy between human life and text, is one that has dominated the rhetoric of human DNA since its discovery. In 1967 microbiologist Robert Sinsheimer, a key figure in the inception of the Human Genome Project, wrote *The Book of Life* in which he commented "In this book are instructions, in a curious and wonderful code, for making a human being. In one sense—on a sub-conscious level—every human being is born knowing how to read this book in every cell of his body" (5). The metaphor of body as book appears frequently in descriptions of the Human Genome Project. A National Human Genome Research Institute press release from 1988 equates books and life, for example, where "Changes in the spelling of the DNA letters can increase your chances of developing an illness, protect you from getting sick, or predict the way your body will handle medicines."²⁸ Similarly, the statement published by the National Center for Biotechnology Information emphasised the Human Genome Project as a "working draft" of the "book of life."²⁹

The metaphor of the human as text informs not only promotional literature written for the public, but also actual practices. The library information for gene sequences as published documents indicates strikingly how much our bodies are actually and not only

metaphorically perceived as pages of text. Searching for "chromosome 7" through GenBank at The National Center for Biotechnology website (www.ncbi.nlm.nih.gov) will result in a number of links to various sequences catalogued just as any other text in our library systems. The descriptor for accession number AC073349 describes the document as a "working draft sequence" of a particular chromosome segment. This tiny portion of our bodies written in its four-letter alphabet is accessible online as a long scrolling document, approximately fifty single-spaced pages when printed. Writing the human body as page allows human technicians to position themselves as its authors. The catalogued segment has a title, "The sequence of Homo sapiens clone," and an author, R.H. Waterston. Another example is the National Institute of Health's patent on a cell line from a Hagahai person from Papua New Guinea, disclaimed five years after the initial application and only after much public criticism, in 1996. The claim of United States Patent No. 5,397,696 included the names of several "Inventors"; the "Title of Invention" was listed as "Papua New Guinea human Tlymphotropic virus." When the reproduction of our bodies, the most basic process of our creation, is described as a process of writing, and our "code" as being "transcribed" in our cellular DNA, genetic reproduction is seen as a process of writing, as program (from Latin programma, public notice; from Greek prographein, to set forth as a public notice: pro-, before + graphein, to write). The program—the code written to produce both the computer text and the body text—is the means to not only prolonging but also rewriting the fate of a human life.

This transcription of body as text is seen as a threat to our humanity—not merely because we are taking ownership of human bodies in potentially exploitative ways, but also because the apparent literalising of body as page is seen as displacing the position and value of human "spirit." This trepidation is perhaps best represented by the varying commentary upon the Visible Man archive for the National Library of Medicine. Creating this archive was a process of mapping by MRI and CT scans the fresh cadaver of executed murderer Joseph Paul Jernigan, freezing the body so the tissue offered the same resistance to the saw as did the bone, quartering the body and positioning it in blue gelatin, and finally milling away the surfaces of the frozen blocks from toes to head at 4 mm intervals and digitally photographing each newly exposed surface. At a resolution of .33 mm, the raw data totals 15 gigabytes, or twenty-three CDs, as the literature frequently explains (the anonymous Visible Woman dataset, at higher resolution, is about 40 gigabytes in size).

One of the most significant changes in the study of anatomy represented by the dissection of Jernigan is that the body has been cut not to reveal gross physical units such as a given muscle, organ, or tissue, but rather in cross-section as fine leaves of body. These digitised leaves of Jernigan's body now exist in the form of an enormous and readable book. Various "fly-through" animations of the sliced body available for public viewing on the Internet are created in the same way that flip-page animations are: a sequence of consecutive images shown in rapid succession are interpreted by the eye as movement (see, for example, the link "From head to toe: an animated trip through the Visible Human male cryosections" at the "Visible Human Project® Gallery"

www.nlm.nih.gov/research/visible/visible_gallery.html). The NPAC/OLDA Visible Human Viewer (www.dhpc.adelaide.edu.au/projects/vishuman/VisibleHuman.html) is a Java applet that allows the viewer to place something akin to a bookmark at any point on the body and then download that particular page as an axial, coronal, or saggital plane of the sliced body (figures 1 and 2). This viewer, in turn, resulted in the publication of a physical 120-page, full-colour book, *Head 2 Heads: A Flipbook of Slices of Life* by Optical Toys (2000), which "takes you through the human skull" (www.opticaltoys.com/head2heads.html). Not

only the visual display but also the rhetoric of the body as a book appears frequently in the project literature: for example, project officer Michael Ackerman described one of the problems with the archival material as the absence of labelling for the various systems and organs of the digitised body: "For a librarian, this is very unsettling. It's like having books lying all over the place not indexed or catalogued."³⁰ The liner notes to *Body Voyage*, the CD-ROM published by Southpeak Interactive and featuring renderings of the data by photojournalist, Alexander Tsiaras, emphasise that the data of Jernigan's body comprises "over a raw terabyte of data—the equivalent of five million typewritten pages." *Life* magazine's feature article on "The Visible Man" comments: "Jernigan had no idea that his body would itself become a textbook."³¹ The fold-out article "A Technicolor Gatefold of the Digital Man" in this issue featuring Tsiaras' work is labelled "The Whole Body Catalogue" and claims that Tsiaras used "15 gigabytes of computer data from a real body—equal to 20 million typewritten pages—to compose this picture" (38).

Whether the electronically archived body is equivalent to five million or twenty million pages, what is most prized about the collection is its legibility. The systematised visibility of this body as text provoked comment by supporters on Jernigan's "immortality"³² through being transcribed as alphanumeric text, as if in imitation of the poets' conceit of achieving immortality through the lines inscribed upon a page. Simultaneously, the body digitised and transcribed as computer text has generated some critical commentary on the violation of transcribing human embodiment. Catherine Waldby, for example, writes that "the violence of anatomy is the violence of a particular kind of writing practice, a set of techniques that destroy the fleshly body along particular analytic lines in order to inscribe its trace in various knowledge media."³³ Neal Curtis suggests that, like Franz Kafka's "In the Penal Colony," the VHP "reinforces the submission of the body to the law."³⁴ Curtis'

complaint has to do with the VHP's "confusion of a 'complete' body with an anatomically complete body" (263)—that the people involved do not recognize the dataset as a product of a "techno-medical" or "techno-scientific" discourse (261, 263). Such procedures can return a "form of life" to the body that is determined by those technical discourses, he continues: "These techniques can reanimate the body and rebirth it, but can life be reduced to a simple reconstruction of motility? Clearly not" (263). In the Visible Man there is "cruor," the blood of wounds, but no "sanguis," the blood of life (262–3), Curtis explains. True enough: these are images of a dead body. However, the fact that these images present no "exposure to sensible presence" (263) or "the irreducible vitality of sanguis" (264) does not adequately demonstrate, for me, "the universalism and determinism of such a discourse" (263)—as if technology and science are realms populated by people who do not recognize difference, who are complicit in a project of "silencing indeterminacy" (264). These criticisms, as inflated as the rhetoric of praise mentioned above, rarely acknowledge the benefits of such technology to human lives.³⁵ Nor do they adequately address the fact that both executed criminals and people who donate their bodies for research have been dissected, studied, and reproduced as image for centuries prior to this particular technology. Rather, such arguments seek to demonstrate that inscription of the body through computer technology is a debasement of humanity.

Writing on the "electronic abbatoir" though not specifically referring to the VHP, Kroker and Weinstein describe archivalists as "vampiring organic flesh, and draining its fluids into cold streams of telemetry" where archived body parts are "violently detached from the body organic...disguised in the binary functionality of data and pooled into larger circulatory flows." The aim of this bio-power, they suggest, is "the transformation of human experience into the dull codes of binary functionality."³⁶ The "violent metastasis that is

cyber-culture," is in direct opposition to a spiritual life: "In the beginning was the Word," they write, "but in the end there is only the data byte" (154). Waldby similarly explains in her book about the VHP that

after all, when a body can be rendered into data and thus cross the interface into the digital afterlife, what prevents the process from effecting some form of reversal, the digital revenant who rematerialises in real space. ...the kind of cyberpace summoned up by the VHP connotes the supernatural. ...an afterlife of the abject, the corpse which cannot or will not relinquish vitality. ...like those other animate corpses, vampires and zombies, to be vitalised by the will of another, actively prevented from a full death."³⁷

The suggestion, again, is that the inscription of technology interferes with human spirit: "For the biomedical imagination," she writes, "this arresting and deferral of death might count as a gain on the side of life.... Another step in the gradual mastery of matter, bringing it closer to the negentropy of programmable matter, the assimilation of all materiality by the metaphysics of code" but the VHP also seems to create "a new form of death-in-life, a new and horrifying destination for our own failing bodies, and a place from which they might return in uncanny form" (155–6). However disturbing we might find such treatment of dead bodies as archive, however, we need to acknowledge that these texts are ultimately only images, numbers, and letters displayed on a dynamic electronic page—no matter how "animated" they may seem. The rhetoric of a ghastly humanity floating through cyberspace and coming to life again as soulless vampires or zombies here again centres upon who we would prefer to metaphorise as "author" of humanity.

Conclusion: of Books and Spirit

As the self-proclaimed "greatest contribution to anatomy since Vesalius' 1543 publication of De Humani Corporis Fabrica,"³⁸ the Visible Human Project has developed a logo incorporating an illustration from Vesalius' text (figures 3 and 4). The image depicts a history of the various imaging techniques used to "read" the human body and re-present it as text—from lettering discrete muscle groups to representing all structures as pixels and voxels. It also serves to emphasise the project's subject as defying mortality. Flayed, frozen, sliced, and digitised, the body in this image is that of a handsome-faced and well-muscled man in a classical pose, gesturing as if in exposition, vital and full of life despite lacking skin and a good portion of his brain. In contrast, the final two panels of Vesalius' anatomised body gradually stripped of parts and life spirit shows the same subject slumped in an attitude of dejection (figures 5 and 6).³⁹ In all likelihood a condemned criminal as well, this cadaver's mortality and sin are subtly emphasised by the rope supporting or hanging the body by the neck. Vesalius' sequence of images showing the slow loss of life spirit seem to function as an explicitly moral reminder to the early-modern reader of the inevitable decay of the flesh—or that the punishment for the sinner is eternal death.

The Visible Human Project logo, in contrast, depicts life with a morality conferred by the gift of the body to medical science, as expressed by numerous writers and perhaps most enthusiastically by John Hockenberry who claims that the convicted murderer Jernigan gave his body not only to science, "but to humanity as well," concluding, "Whatever tragic legacy Joseph Paul Jernigan left in life, in death he has found grace." The slogan on this page of the *Body Voyage* codex, "Even Lazarus never looked this good," attests to the desire in popular media—so much at odds with the theorists critical of the supposed redundancy of the body—to imbue the body archived in the cybertext with a soul, with immortality, with a high moral purpose. The slogan also attests to the fact that sophisticated technology has increasingly challenged the established authority of "God's Book": the biblical story of Lazarus and religious faith ("he that believeth in me, though he were dead, yet shall he live" John 11: 25) is here overshadowed by the suggestion that Jernigan has been raised from the dead through his gift to science and the subsequent technological rendering by human authors. While the eighteenth-century criminal was judged by God and sentenced to eternal punishment, the twentieth-century convict's salvation is conferred by science and technology. The spirit of the cyborg is at stake in the environment of the electronic page because life and death, previously the realm of God or Nature, now are in the realm of the human-authored page.

In his introduction to the 1994 *Queen's Quarterly* issue entitled "The End of the Book?" Boris Castel writes of the "intimate reader/writer exchange, now under assault from the increasingly noisy signals of our surrounding electronic web," claiming that "the printed page and circuit-driven technologies are not kindred, but powerful antagonists. Human intelligence and creativity will be the losers in our Faustian pact with an increasingly seductive electronic devil."⁴⁰ This issue is a celebration of and lament for the containers for western humanist knowledge, both the libraries and the bound pages of the book, once hand-made at great expense for the promotion of humanist values. The issue is illustrated throughout with evocative photographs of splendidly ornate European libraries and wooden bookshelves replete with ancient leather-bound texts. One caption reads: "The magnificent Waldsassen monastery library in Bavaria, built in a century when knowledge was celebrating its triumphs." Robert Fulford here nostalgically reflects upon "The Ideology of the Book," commenting that "Since the Enlightenment, Western civilization has made the book the shrine of modernity, the place where we store and locate our ideals" (803). Fulford expresses

concern that costly new forms of information on computer networks and CDs will endanger the "great historical movement, the gradual broadening of knowledge, outward from its original owners, the princes and priests, toward all of humanity" (809). What are "our ideals" here? Fulford seems to be valorising only a specific kind of knowledge that stops short of computer technology. He concludes with a call to arms:

When I read about what Gates and his competitors are preparing for us, I sometimes think about those pioneers of information technology, the monks who preserved part of the wisdom of antiquity during the centuries when hardly anyone else seemed to care about it. ..."A monastery without a library is like a castle without an armoury," [a monk in Normandy in the year 1170] wrote. "Our library is our armoury. Thence it is that we bring forth the sentences of the Divine Law like sharp arrows to attack the enemy. Thence we take the armour of righteousness, the helmet of salvation, the shield of faith, and the sword of the spirit...." In the environment created by onrushing technology, scholars, librarians, teachers, writers—all those who take responsibility for generating and spreading knowledge—may well find themselves called to a similar battle. They will need to be shielded by faith in the value of their endeavours, and by the sword of the spirit. (810–11)

What are we to make of this invocation of righteousness, salvation, faith, and spirit to attack the amorphous enemy technology? The religious references by both Castel and Fulford indicate a threat to human spirit but is tempting to suggest that what is depicted is as much a threat to the humanist claim on the dissemination of knowledge and morality.

In his afterword to *The Future of the Book*, Umberto Eco invokes the words of Claude Frollo in Victor Hugo's *Hunchback of Notre Dame:* "'Ceci tuera cela' (The book will kill the cathedral, the alphabet will kill images.⁷⁴¹ Eco remarks that one significant issue raised by the participants in the symposium which instigated this collection of essays "that *eei* (the computer) *tuera cela* (the book)." The phrase is a sign of the supercession or destruction of one medium of communication by another, but it is also worth noting that what was at stake for the clergy that Frollo represents was the material housing of spirituality—where knowledge of it would originate, where it would be taught and learned, how it would be disseminated to the people. Printed books challenged some of the authority the cathedral represented. In the same way, the dissemination of knowledge through the electronic page is threatening—or invigorating—because in our secular world the "cathedral" of human consciousness or identity has for centuries been represented by the mundane and unthreatening codex or paper page. The page, material representation of mind and/or spirit, is the cathedral of the humanities. The electronic page, imagined as infiltrating human consciousness or displacing human spirit through its "ectoplasmic arrival and departure," also is imagined as invading and displacing the "spiritual" values of the humanities.

Birkerts has noted that "Literature and the humane values we associate with it have been depreciated, reincarnated in debased form. They...have been rendered safely, nostalgically, irrelevant."⁴² The literary or religious book as cultural icon of the human spirit is thus imagined by certain authors as rapidly becoming part of our history. Birkerts' suggested relationship between "the transformations that have been wreaked upon society by electronic media" and a "distance from humanism, that once-grand growth that...took man as the measure of all things, and the looked forward to the marriage of reason and spirit" (180–1) provided an emphatic statement about the valuing of the technical sciences over the humanities. What I have been tracing in the dialogue about electronic texts is a conversation based on these questions: Who gets to be the authority on—or the author of—

the human identity or spirit? What will be the culturally valued pages of the future? The electronic text is not so much the relocation of the consciousness, identity, or mind in the ethernet, but rather represents a relocation of dominant cultural allegiances: if the codex book and paper page, so closely associated with body and mind, have historically inscribed and disseminated principles of morality through stable, sanctioned texts written by institutionally approved authorities, then what the electronic text threatens most is the perception of where that authority lies.

Figures



Figure 1. NPAC/OLDA Visible Human Viewer.



Figure 2. Brain page from the Visible Human Viewer. Images from the NPAC/OLDA Visible Human Viewer are provided courtesy of Paul Coddington, University of Adelaide,

http://www.dhpc.adelaide.edu.au/projects/vishuman/.



Figure 3. Visible Human Project logo, courtesy of the National Library of Medicine, Bethesda, Maryland.



Figure 4. Second Plate of the Muscles, from Vesalius' *De humanic corporis fabrica libri septem*. Thomas Fisher Rare Book Library, University of Toronto.



Figure 5. Seventh Plate of the Muscles, from Vesalius' *De humanic corporis fabrica libri septem*. Thomas Fisher Rare Book Library, University of Toronto.



Figure 6. Eighth Plate of the Muscles, from Vesalius' *De humanic corporis fabrica libri septem*. Thomas Fisher Rare Book Library, University of Toronto.

Endnotes

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⁶ Birkerts, *The Gutenberg Elegies*, 190.

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³² *Life* magazine states that "Jernigan is back. In an electronic afterlife, he haunts Hollywood studios and NASA labs, high schools and hospitals" (February 1997), 41; *The Economist* (US) v.341 n7988 (19 October 1996) uses the heading "Virtual Immortality"; the *National Library of Medicine Newsletter* 50.6 (1995) reports that "an anonymous 59-year-old Maryland woman who donated her body to science is now immortalized on the Internet"; the *Baltimore Sun* (29 November 1995) described Jernigan as having "won a measure of computerized

immortality"; the *Denver Post* (6 June 1994) suggests the project "promises eternal life for the participants."

³³ Catherine Waldby, "Virtual Anatomy: From the Body in the Text to the Body on the Screen," *Journal of Medical Humanities* 21.2 (Summer 2000): 89.

³⁴ Neal Curtis, "The Body as Outlaw: Lyotard, Kafka and the Visible Human Project," *Body* & *Society* 5.2 (September 1999): 262.

³⁵ One of the first uses of the VHP data was by SUNY researchers in developing their "3-D virtual colonoscopy," a non-invasive imaging technology using a helical CT scanner and 3-D software to examine the colon. I believe that simulating the human body electronically instead of putting a 72-inch colonoscope up someone's ass is a demonstration of medical science's valuing rather violating or debasing human dignity and life.

³⁶ Arthur Kroker and Michael Weinstein, *Data Trash: The Theory of the Virtual Class* (New York: St. Martin's Press, 1994), 134.

³⁷ Catherine Waldby, *The Visible Human Project: Posthuman Medicine and Informatic Bodies.* (London: Routledge, 2000), 155.

³⁸ Spitzer and Whitlock, Atlas of the Visible Human Male, xi.

³⁹ The fourteen muscle figures in the second book of *De fabrica* do not appear in the order of their dissection. I identify these as the first and last panels based on the reconstruction of the two écorché sequences as originally envisioned by the artists, by G. S. Terence Cavanagh, *The Panorama of Vesalius: A Lost Design from Titian's Studio* (Athens, GA: Sacrum Press, 1996).
⁴⁰ Boris Castel, ed., *The End of the Book?* special issue of *Queen's Quarterly* 101.4 (Winter 1994): 777.

⁴¹ Umberto Eco, Afterword to *The Future of the Book*, ed. Geoffrey Nunberg (Berkeley: University of California Press, 1996), 295.

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