Conclusion

What Does It Mean To Be Posthuman?

What are we to make of the posthuman?[1] At least for me, the prospect of becoming posthuman both terrifies and gives pleasure. Perhaps I can summarize the implications of the posthuman by interrogating the sources of this terror and pleasure. The terror is relatively easy to understand. "Post," with its dual connotation of superseding the human and coming after it, hints that the days of "the human" may be numbered. Some researchers (notably Hans Moravec, but also my UCLA colleague Michael Dyer and many others) believe that this is true not only in a general intellectual sense of displacing one definition of "human" with another, but in a more disturbingly literal sense that envisions humans displaced as the dominant form of life on the planet by intelligent machines. Humans can either go gently into that good night, joining the dinosaurs as a species that once ruled the earth but is now obsolete, or hang on for a while longer by becoming machines themselves. In either case, Moravec and like-minded thinkers believe, the age of the human is drawing to a close. The view echoes the deeply pessimistic sentiments of Warren McCulloch in his old age, who remarked, "Man to my mind is about the nastiest, most destructive of all the animals. I don't see any reason, if he can evolve machines that can have more fun than he himself can, why they shouldn't take over, enslave us, quite happily. They might have a lot more fun. Invent better games than we ever did."[2] Is it any wonder that faced with such dismal scenarios, most people have understandably negative reactions? If this is what the posthuman means, why shouldn't it be resisted?

Fortunately, these views do not exhaust the meanings of the posthuman. As I have argued, human being is first of all embodied being, and the complexities of this embodiment mean that human awareness unfolds in very different ways than intelligence embodied in cybernetic machines. Although Moravec's dream of downloading human consciousness into a computer would likely come in for some hard knocks in literature departments (which tend to be skeptical of any kind of transcendence but especially transcendence through technology), literary studies shares with

Moravec a major blind spot when it comes to the significance of embodiment.[3] This blind spot is most evident, perhaps, when literary and cultural critics confront the fields of evolutionary biology. From an evolutionary biologist's point of view, modern humans, for all their technological prowess, nevertheless represent an eyeblink in the history of life, far too recent to have significant evolutionary impact on human biological behaviors and structures. In my view, arguments like those Jared Diamond advances in *Guns, Germs and Steel : The Fates of Human Societies* and *Why Sex Is Fun: The Evolution of Human Sexuality* should be taken seriously.[4] The body is the net result of thousands of years of sedimented evolutionary history, and it is naive to think this history does not affect human behaviors at every level of thought and action.

Of course, the reflexivity that looms large in cybernetics also inhabits evolutionary biology. The models proposed by evolutionary biologists have encoded within them cultural attitudes and assumptions formed by the same history they propose to analyze; as with cybernetics, observer are system are reflexively bound up with one another. To take only one example, the computer module model advanced by Barkow, Cosmides and Tooby in *The Adapted Mind : Evolutionary Psychology and the Generation of Culture* to explain human evolutionary psychology testifies at least as much to the importance of information technologies in shaping contemporary world views as it does to human brain function.[5] Nevertheless, these reflexive complexities do not negate the importance of the sedimented history incarnated within the body. Interpreted through metaphors resonant with cultural meanings, the body itself is a congealed metaphor, a physical structure whose constraints and possibilities have been formed by an evolutionary history intelligent machines do not share. Humans may enter into symbiotic relationships with intelligent machines (already the case in many places on the globe); they may be displaced by intelligent machines (already in effect, for example, at Japanese and American plants using robotic arms for assembly labor); but there is a limit to how seamlessly they can be articulated with machines, because they remain distinctively different from intelligent machines in their embodiments. The terror, then, while it does not disappear in this view, tends away from the apocalyptic and toward a more moderate view of seriated social, technological, political and cultural changes.

What about the pleasures? For some people, including me, the posthuman evokes the exhilarating prospect of getting out of some of the old boxes and opening up new ways of thinking about what being human means. In positing a shift from presence/absence to pattern/randomness, I have sought to show how these categories can be transformed *from the inside* to arrive at new kinds of cultural configurations, which may soon render such dualities obsolete, if they have not already. This process of transformation is fueled by tensions between the assumptions encoded in pattern/randomness as opposed to presence/absence. In Derrida's performance of presence/absence, presence is allied with Logos, God, teleology--in general, with an originary plenitude that can act to ground signification and give the trajectory of history order and meaning.[6] The work of Eric Havelock, among others, demonstrates how in Plato's *Republic* this view of originary presence authorized a stable, coherent self that could witness and testify to a stable, coherent reality.[7] Through these and other means, the metaphysics of presence front-loaded meaning into the system. Meaning was guaranteed because a stable origin existed. It is now a familiar story how deconstruction exposed the inability of systems to posit their own origins, thus ungrounding signification and rendering meaning indeterminate. As the presence/absence hierarchy was destabilized and absence was privileged over presence, lack displaced plenitude, desire usurped certitude. Important as these moves have been in late twentieth century thought, however, they still took place within the compass of the presence/absence dialectic. One feels lack only if presence is posited or assumed; one is driven by desire only if the object of desire is conceptualized as something to be possessed. Just as the metaphysics of presence required an originary plenitude to articulate a stable self, deconstruction required a metaphysics of presence to articulate the destabilization of that self.

By contrast, pattern/randomness is underlain by a very different set of assumptions. In this dialectic, meaning is not front-loaded into the system, and the origin does not act to ground signification. In multi-agent simulations, for example, complexity evolves from highly recursive processes being applied to simple rules. Rather than proceeding along a trajectory toward a known end, such systems evolve toward an open future marked by contingency and unpredictability.

Meaning is not guaranteed by a coherent origin; rather, it is made possible (but not inevitable) by the blind force of evolution finding workable solutions within given parameters. Although pattern has traditionally been the privileged term (for example, among the electrical engineers developing information theory), randomness has increasingly been seen to play a fruitful role in the evolution of complex systems. For Chris Langton and Stuart Kauffman, chaos accelerates the evolution of biological and artificial life;[8] for Francisco Varela, randomness is the froth of noise from which coherent microstates evolve and to which living systems owe their capacity for fast, flexible response;[9] for Henri Atlan, noise is the murmuring of the body from which emerges complex communication between different levels in a biological system.[10] Although these models differ in their specifics, they agree in seeing randomness not simply as the lack of pattern but as the creative ground from which pattern can emerge.

Indeed, it is not too much to say that in these and similar models, randomness rather than pattern is invested with plenitude. If pattern is the realization of a certain set of possibilities, randomness is the much, much larger set of everything else, from phenomena that cannot be rendered coherent by a given system's organization to those it cannot perceive at all. In Bateson's cybernetic epistemology, randomness is what exists outside the confines of the box in which a system is located; it is the larger and unknowable complexity for which the perceptual processes of an organism are a metaphor.[11] Significance is achieved by evolutionary processes that ensure those systems which survive are the ones whose organizations instantiate metaphors for this complexity, unthinkable in itself. When Varela and his co-authors in *Embodied Mind* argue that there is no stable, coherent self, only autonomous agents running programs, they envision pattern as a limitation that drops away as human awareness expands beyond consciousness and encounters the emptiness that, in another guise, could equally well be called the chaos from which all forms emerge.[12]

What do these developments mean for the posthuman? When the self is envisioned as grounded in presence, identified with originary guarantees and teleological trajectories, associated with solid foundations and logical coherence, the posthuman is likely to be seen as anti-human because it envisions the conscious mind as a small subsystem running its program of self-construction and self-assurance while remaining ignorant of the actual dynamics of complex systems. But the posthuman does not really mean the end of humanity. It signals instead the end of a certain conception of the human that may have applied, at best, to that fraction of humanity who had the wealth, power and leisure to conceptualize themselves as autonomous beings exercising their will through individual agency and choice.[13] What is lethal is not the posthuman as such, but the grafting of the posthuman onto a liberal humanist view of the self. When Moravec imagines "you" choosing to download yourself into a computer, thereby obtaining through technological mastery the ultimate privilege of immortality, he is not abandoning the autonomous liberal subject but expanding its perogatives into the realm of the posthuman. Yet the posthuman need not be recuperated back into liberal humanism, nor need it be construed as anti-human. Located within the dialectic of pattern/randomness and grounded in embodied actuality rather than disembodied information, the posthuman offers resources for re-thinking the articulation of humans with intelligent machines.

To explore these resources, let us return to Gregory Bateson's idea that those organisms which survive will tend to be ones whose internal structures are good metaphors for the complexities without. What kind of environments will be created by the expanding power and sophistication of intelligent machines? As Richard Lanham has pointed out, in the information-rich environments created by ubiquitous computing, the limiting factor is not the speed of computers, nor the rates of transmission through fiber-optic cables, nor the amount of data that can be generated and stored. Rather, the scarce commodity is human attention.[14] It makes sense, then, that technological innovation will focus on compensating for this bottleneck. An obvious solution is to design intelligent machines to attend to choices and tasks that do not have to be done by humans. For example, there are already in existence intelligent agent programs to sort email, discarding unwanted messages and prioritizing the rest. The programs work along lines similar to neural nets. They tabulate the choices the human operator makes and feed back this information in recursive loops to re-adjust the weights given to various kinds of email addresses. After an initial learning period, the sorting programs take over more and more of email management, freeing the human to give her attention to other matters.

If we extrapolate from these relatively simple programs to an environment which, as Charles Ostman likes to put it, supplies synthetic sentience on demand, human consciousness would ride on top of a highly articulated and complex computational ecology in which many decisions, invisible to human attention, would be made by intelligent machines.[15] Joseph Weizenbaum, foreseeing just such an ecology over two decades ago, argued passionately that judgment is a uniquely human function and must not be turned over to computers.[16] With the rapid development of neural nets and expert programs, it is no longer so clear that sophisticated judgments cannot be made by machines, and in some instances, made more accurately than by humans. But the issue, in Weizenbaum's view, involves more than whether or not the programs work. Rather, he regards it as an ethical imperative that humans keep control; to do otherwise is to abdicate their responsibilities as autonomous independent beings. What Weizenbaum's argument makes clear is the connection between the assumptions undergirding the liberal humanist subject and the ethical position that humans, not machines, must be in control. Such an argument assumes a vision of the human in which conscious agency is the essence of human identity. Sacrifice this, and the human is hopelessly compromised, contaminated with mechanic alienness in the very heart of our humanity.[17] Hence the urgency, even panic, in Weizenbaum's insistence that judgment is a uniquely human function. At stake for him is nothing less than what it means to be human.

In the posthuman view, by contrast, conscious agency has never been "in control." In fact, the very illusion of control bespeaks a fundamental ignorance about the nature of the emergent processes through which consciousness, the organism, and the environment are constituted. Mastery through the exercise of autonomous will is merely the story consciousness tells itself to explain results that actually come about through chaotic dynamics and emergent structures. If, as Donna Haraway, Sandra Harding, Evelyn Fox Keller, Carolyn Merchant and other feminist critics of science have argued, there is a relation between the desire for mastery, an objectivist account of science, and the imperialist project of subduing nature, then the posthuman offers resources for the construction of another kind of account.[18] In this account, emergence replaces teleology; reflexive epistemology replaces objectivism; distributed cognition replaces autonomous will; embodiment replaces a body seen as a support system for the mind; and a dynamic partnership between humans and intelligent machines replaces the manifest destiny of the liberal humanist subject to dominate and control nature. Of course, this is not necessarily what the posthuman will mean--only what it can mean if certain strands among its complex seriations are highlighted and combined to create a vision of the human that uses the posthuman as leverage to avoid reinscribing, and thus repeating, some of the mistakes of the past.

Just as the posthuman need not be anti-human, so it also need not be apocalyptic. Edwin Hutchins addresses the idea of distributed cognition through his nuanced study of the navigational systems of ocean-going ships.[19] His meticulous research shows that the cognitive system responsible for locating the ship in space and navigating it successfully resides not in humans alone, but in the complex interactions within an environment that includes both human and nonhuman actors. His study allows him to give an excellent response to John Searle's famous "Chinese room." Searle challenged the idea that machines can think by imagining a situation in which communication in Chinese can take place without the actors knowing what their actions meant.[20] Suppose, Searle said, he was stuck inside a room, he who knows not a word of Chinese. Texts in Chinese are slid through a slot in the door. He has in the room with him baskets of Chinese characters and a rulebook correlating the symbols written on the texts with other symbols in the basket. Using the rulebook, he assembles strings of characters and pushes them out the door. Although his Chinese interlocutors take these strings to be clever responses to their inquiries, Searle has not the least idea what the texts he has produced mean. Therefore it would be a mistake to say that machines can think, he argues, for like him they produce comprehensible results without comprehending anything themselves. In Hutchins's neat interpretation, Searle's argument is valuable precisely because it makes clear that it is not Searle but the entire room that knows Chinese (*Cognition*, pp. 361-62). In this distributed cognitive system, the Chinese room knows more than any of its components, including Searle. The situation of modern humans is akin to Searle in the Chinese room, for every day we participate in systems whose total cognitive capacity exceeds our individual knowledge, including such devices as cars with electronic ignition systems, microwaves with computer chips that precisely adjust power levels, fax machines that warble to other fax machines, and electronic watches that communicate with a timing radio wave to set themselves and correct their date. Modern humans are capable of more sophisticated cognition than cavemen not because moderns are smarter, Hutchins concludes, but because they have constructed smarter environments in which to work.

Hutchins would no doubt disagree with Weizenbaum's view that judgment should be reserved for humans alone. Like cognition, decision-making is distributed between human and nonhuman agents, from the steam-powered steering system that suddenly failed on a Navy vessel Hutchins was studying to the charts and pocket calculators that the navigators were then forced to use to calculate their position. He shows convincingly that these adaptations to changed circumstances were evolutionary and embodied rather than abstract and consciously designed (*Cognition*, pp. 347-51). The solution to the problem caused by this sudden failure of the steering mechanism was "clearly discovered by the organization [of the system as a whole] before it was discovered by any of the participants" (p. 361). Seen in this perspective, the prospect of humans working in partnership with intelligent machines is not so much a usurpation of human right and responsibility as it is a further development in the construction of distributed cognition environments that has been on-going for thousands of years. Also changed in this perspective is the relation of human subjectivity to its environment. No longer is human will conceived as the source from which emanates the mastery necessary to dominate and control the environment. Rather, the distributed cognition of the emergent human subject correlates with--in Bateson's phrase, becomes a metaphor for--the distributed cognitive system as a whole, in which "thinking" is done by both human and nonhuman actors. "Thinking consists of bringing these structures into coordination so they can shape and be shaped by one another," Hutchins writes (p. 316). To conceptualize the human in these terms is not to imperil human survival but precisely to enhance it, for the more we understand the flexible, adaptive structures that coordinate our environments and the metaphors we ourselves are, the better we can fashion images of ourselves that accurately reflect the complex interplays that ultimately make the entire world one system.

This view of the posthuman also offers resources for thinking in more sophisticated ways about virtual technologies. As long as the human subject is envisioned as an autonomous self with unambiguous boundaries, the human-computer interface can only be parsed as a division between the solidity of real life on one side and the illusion of virtual reality on the other, thus obscuring the far-reaching changes initiated by the development of virtual technologies. Only if one thinks of the subject as an autonomous self independent of the environment is one likely to experience the panic performed by Wiener's *Cybernetics* and Wolfe's *Limbo.* This view of the self authorizes the fear that if the boundaries are breached at all, there will be nothing to stop the self's complete dissolution. By contrast, when the human is seen as part of a distributed system, the full expression of human capability can be seen precisely to depend upon the splice rather than being imperiled by it. Writing in another context, Hutchins arrives at an insight profoundly applicable to virtual technologies: "what used to look like internalization [of thought and subjectivity] now appears as a gradual propagation of organized functional properties across a set of malleable media" (p. 312). This vision is a potent antidote to a view of virtuality that parses it as a division between an inert body left behind while a disembodied subjectivity inhabits a virtual realm, the construction of virtuality performed by Case in Gibson's *Neuromancer* when he delights in the "bodiless exultation of cyberspace" and fears above all dropping back into the "meat" of the body.[21] By contrast, in the model Hutchins presents and the posthuman helps to authorize, human functionality expands because the parameters of the cognitive system it inhabits expands. In this model, it is not a question of leaving the body behind but rather of extending embodied awareness in highly specific, local, and material ways that would be impossible without electronic prosthesis.

Cybernetics was born in a froth of noise when Norbert Wiener first conceived of it as a way to maximize human potential in a world that is in essence chaotic and unpredictable. Like many pioneers, Wiener helped to initiate a journey that would prove to have consequences more far-reaching and subversive than even his formidable powers of imagination could conceive. As Bateson, Varela and others would later argue, the noise crashes within as well as without. The chaotic, unpredictable nature of complex dynamics implies that subjectivity is emergent rather than given, distributed rather than located solely in consciousness, emerging from and integrated into a chaotic world rather than occupying a position of mastery and control removed from it. Bruno Latour has argued that we have never been modern; the seriated history of cybernetics, emerging from networks at once materially real, socially regulated and discursively constructed, suggests for similar reasons that we have always been posthuman.[22] If the three stories told in *How We Became Posthuman*--how information lost its body, how the cyborg was constructed in the postwar years as technological artifact and cultural icon, and how the human became the posthuman--have at times seemed to present the posthuman as a transformation to be feared and abhorred rather than welcomed and embraced, that reaction has everything to do with how the posthuman is constructed and understood. The present moment is the best possible time to contest for what the posthuman means, before the trains of thought it embodies have been laid down so firmly that it would take dynamite to change them.[23] Although some versions of the posthuman circulating within the culture point toward the anti-human and the apocalyptic, it is possible to craft others that will be conducive to the long-range survival of humans and the other life forms, biological and artificial, with whom we share the planet and ourselves.

Endnotes

[1] I am grateful to Marjorie Luesebrink for conversations that stimulated me to think further about the ideas in this conclusion.

[2]Warren McCulloch, quoted in Mary Catherine Bateson, *Our Own Metaphor: A Personal Account of a Conference on the Effects of Conscious Purpose on Human Adaptation* (Washington DC: The Smithsonian, 1991), p. 226.

[3]Hans Moravec, *Mind Children: The Future of Robot and Human Intelligence* (Cambridge: Harvard University Press, 1990).

[4]Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (New York: Norton, 1997); *Why Sex Is Fun: The Evolution of Human Sexuality* (New York: Basic Books, 1997).

[5]Jerome H. Barkow, Leda Cosmides, and John Tooby, eds., *The Adapted Mind : Evolutionary Psychology and the Generation of Culture* (Oxford: Oxford University Press, 1995).

[6]Jacques Derrida, *Of Grammatology*, translated by Gayatri Spivak (Baltimore: Johns Hopkins University Press, 1977).

[7]'Eric A. Havelock, *Preface to Plato* (Cambridge: Harvard University Press, 1982).

[8] Chris G. Langton, "Computation at the Edge of Chaos: Phase Transition and Emergent Computation," *Physica D* 42 (1990): 12-37; Stuart A. Kauffman*, The Origins of Order: Self-Organization and Selection in Evolution* (Oxford: Oxford University Press, 1993).

[9]Francisco J. Varela, "Making It Concrete: Before, During and After Breakdowns," in *Revisioning Philosophy*, edited by James Ogilvy (Albany NY: State University of New York Press, 1992), pp. 97-109.

[10]Henri Atlan, "On a Formal Definition of Organization," *Journal of Theoretical Biology* 45 (1974): 295-304. Michel Serres has a provocative interpretation of how this

noise can give rise to human language in "The Origin of Language: Biology, Information Theory and Thermodynamics," *Hermes: Literature, Science, Philosophy*, edited by Josué Harari and David F. Bell (Baltimore: Johns Hopkins University Press, 1982), pp. 71-83. See N. Katherine Hayles, *Chaos Bound: Orderly Disorder in Contemporary Literature and Science* (Ithaca: Cornell University Press, 1990), pp. 56, 204-06 for a discussion of Atlan and Serres.

[11] Gregory Bateson, quoted in "Prologue," C. Bateson, *Our Own Metaphor*, pp. 13-16.

[12]Francisco J. Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge: MIT Press, 1991).

[13]In Neal Stephenson's *Snow Crash* (New York: Bantam, 1992), his young white heroine Y.T. has an insight into what a small fraction of the world's population ever believed it had a liberal humanist self when she is kidnapped, dumped aboard the Raft, and assigned to mess detail. "Once she gets over the shock of it and settles into a routine, she starts looking around her, watching the other fish-cutting dames, and realizes that this is just like life must be for about 99 percent of all the people in the world. You're in this place. There's other people all around you, but they don't understand you and you don't understand them, but people do a lot of meaningless babble anyway. In order to stay alive, you have to spend all day every day doing stupid meaningless work. And the only way to get out of it is to quit, cut loose, take a flyer, and go off into the wicked world, where you will be swallowed up and never heard from again" (pp. 303-04).

[14]Richard Lanham, *The Electronic Word: Democracy, Technology and the Arts* (Chicago: University of Chicago Press, 1994).

[15] Charles Ostman, "Synthetic Sentience: An Interview with Charles Ostman," Galen Brandt, *Mondo 2000*, No. 16 (Winter 1996/97): 25-36. See also Charles Ostman, "Synthetic Sentience as Entertainment," *Midnight Engineering* 8, no. 2 (March/April 1997): 68-77.

[16]Joseph Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation* (New York: W. H. Freeman, 1976).

[17] Gilles Delueze and Felix Guattari of course celebrate this very alienness in their vision of the a phylum and "body without organs" in *Anti-Oedipus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1983). For an ecstatic interpretation of the posthuman, see Judith Halberstam and Ira Livingston, *Posthuman Bodies* (Bloomington, IN: Indiana University Press, 1995).

[18] Donna J. Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Simians, Cyborgs and Women* (London: Free Association Books, 1991), pp. 183-202; Evelyn Fox Keller, "Baconian Science: The Arts of Mastery and Obedience*," Reflections on Gender and Science* (New York: Yale University Press, 1995), pp. 33-42; Sandra Harding*, The Science Question in Feminism* (Ithaca: Cornell University Press, 1986); and Carolyn Merchant*, The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper, 1982).

[19]Edwin Hutchins*, Cognition in the Wild* (Cambridge: MIT Press, 1995).

[20]John R. Searle, "Is the Brain's Mind a Computer Program?", *Scientific American* 262, no. 1 (1990): 26-31; see also *Minds, Brains and Science* (Cambridge: Harvard University Press, 1986.

[21]William Gibson, Neuromancer (New York: Ace Books, 1984). The narrator, after relating how Case has been exiled from cyberspace, comments, "For Case, who'd lived in the bodiless exultation of cyberspace, it was the Fall. . . The body was meat. Case fell into the prison of his own flesh" (p. 6).

[22] Bruno Latour, *We Have Never Been Modern*, translated by Catherine Porter (Cambridge: Harvard University Press, 1993). Latour's important argument is that quasi-objects operate within networks that are at once in material real, socially regulated, and discursively constructed. Using different contexts, I have argued for a very similar view in this book with regard to the history of cybernetics.

[23] Dynamiting the system here alludes to Bill Nichols seminal article on cybernetics, "The Work of Culture in the Age of Cybernetics," in *Electronic Culture: Technology and Visual Representation*, edited by Timothy Druckrey (New York: Aperture, 1996), pp. 121-144.