Unfinished Work : From Cyborg to Cognisphere

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DONNA HARAWAY'S 'A Manifesto for Cyborgs' (1985) has become a legend of late 20th-century scholarship. Cited thousands of times and translated into a dozen languages, it has achieved monumental status, especially when juxtaposed against statistics from *Citation Index* indicating that well over 90 percent of articles in the humanities are not cited even once. While Haraway's own interests in the last few years have turned away from the cyborg and toward companion species, the project she outlined in 'A Manifesto for Cyborgs' remains vitally important, perhaps even more so than in 1985, the original publication date. The issues have morphed in significant ways, but the ethical drive and social commitment that galvanized readers then were never more necessary. With the hindsight of 20 years later, the wonder is not that the article appears dated but rather that it remains remarkably prescient in many of its concerns.

Written in the last years of the Cold War, the article was in part a provocation to feminists who wanted to position women in alliance with nature and against technology. As Haraway says in her interview in this issue, 'My feminist friends and others in 1980 thought the cyborg was all bad.' Deeply connected to the military, bound to high technology for its very existence and a virtual icon for capitalism, the cyborg was contaminated to the core, making it exquisitely appropriate as a provocation. In the years since, new technologies have sprung up from the same nexus of forces that gave birth to the cyborg, most notably the Internet and the world-wide web, along with a host of networked information devices, including cell phones, sensor networks (including 'smart dust') yielding real-time data flows, RFID (Radio Frequency Identification) tags, GPS networks and nanotechnology. For those interested in exploring the implications of these developments, the cyborg no longer offers the same heady brew of resistance and co-option. Quite simply, it is not *networked* enough. Although Haraway associated it

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with the 'informatics of domination', the cyborg's shock value came mostly from the implication that the human body would be modified with cybermechanical devices. Although research on implants continues, contemporary formations are at once more subtle and more far-reaching than the figure of the cyborg allows.

At the center of these formations, transforming the conditions of life for millions of people, are networked and programmable media, and they are impacting everything from sensorimotor functions and non-conscious cognitive processing to national political discourse and transnational economies. Given the complexities of these dynamics, the individual person – or for that matter, the individual cyborg – is no longer the appropriate unit of analysis, if indeed it ever was. At issue now (and in the past) are distributed cultural cognitions embodied both in people and their technologies. As Haraway reminds us, the smallest unit of analysis is the relation. With this I wholeheartedly agree, but I would go on to ask, 'What relations should be foregrounded?'

In her recent work, Haraway has chosen to emphasize companion species, in relation to which she locates the cyborg as a 'junior sibling'. The technoscientific networks that succeed the cyborg may be 'junior' to nonhuman animals in historical progression, but not necessarily when viewed in terms of contemporary global impact on the people who live enmeshed in the networks. Moreover, if the focus expands to technology, the coevolutionary spiral between the *Homo* genus and technology may well have preceded and enabled the co-evolutionary dynamic between humans and companion species. Since the Paleolithic era, tool-making has been an essential component of human evolution. In the contemporary moment, this dynamic is intensified as the time required to effect significant change compresses and technologies become more pervasive and interconnected. Clearly a full exploration of contemporary dynamics requires attention to technoscientific networks as well as to biological organisms. Now, as in the past, the human, the animal and the technological are joined in shifting configurations of value. In her companion species work, Haraway interrogates those relations in part through the concept of 'species', which, as she convincingly shows, is less an inevitable taxonomy than a series of contingent categories whose boundaries are in flux and whose substance is not essence but dynamic relationality.

My own work has a similar intent but a different focus. In *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (1999), I argued that a shift was under way from the human to the posthuman. I regard the posthuman, like the 'human', as a historically specific and contingent term rather than a stable ontology. Whereas the 'human' has since the Enlightenment been associated with rationality, free will, autonomy and a celebration of consciousness as the seat of identity, the posthuman in its more nefarious forms is construed as an informational pattern that happens to be instantiated in a biological substrate. There are, however, more benign forms of the posthuman that can serve as effective

counterbalances to the liberal humanist subject, transforming untrammeled free will into a recognition that agency is always relational and distributed, and correcting an over-emphasis on consciousness to a more accurate view of cognition as embodied throughout human flesh and extended into the social and technological environment.

The three historical formations that I discussed, marked by first-order cybernetics from 1945 to 1960, autopoiesis or second-order cybernetics from 1960 to 1985, and virtuality or third-order cybernetics from 1985 to 1995, have now progressed to a fourth stage that, in my recent book *My Mother Was a Computer: Digital Subjects and Literary Texts* (2005), I call the Regime of Computation. The characteristic dynamic of this formation is the penetration of computational processes not only into every aspect of biological, social, economic and political realms but also into the construction of reality itself, where 'reality' should be understood, as Haraway says in a different context, as 'made' but not necessarily 'made up'.

The claim that reality is fundamentally computational is for me like the posthuman in that I regard it as a formation to be interrogated rather than something simply to be believed or disbelieved, accepted or rejected. Like the posthuman, the Regime of Computation has aspects that I think we should resist; like the posthuman, it also offers opportunities to re-think and re-position traditional concepts that, as Marx poignantly put it, lie like a nightmare on the minds of the living. In highly developed and networked societies such as the US, human awareness comprises the tip of a huge pyramid of data flows, most of which occur between machines. Emphasizing the dynamic and interactive nature of these exchanges, Thomas Whalen (2000) has called this global phenomenon the cognisphere. Expanded to include not only the Internet but also networked and programmable systems that feed into it, including wired and wireless data flows across the electromagnetic spectrum, the cognisphere gives a name and shape to the globally interconnected cognitive systems in which humans are increasingly embedded. As the name implies, humans are not the only actors within this system; machine cognizers are crucial players as well. If our machines are 'lively' (as Haraway provocatively characterized them in the 'Manifesto'), they are also more intensely cognitive than ever before in human history.

The shifting boundaries between human and machine cognition and the increasing roles that machines play in cognitive constructions are illustrated by the details now emerging about the surveillance programs that the Bush administration has authorized to spy on US citizens. James Bamford, author of two books on the National Security Agency (1983, 2002), estimates that the NSA's computer takes in 2 million pieces of communication *per hour*, sifting through them for names, numbers and words previously identified as suspicious. Most of this data is not seen by humans; only when patterns reach a certain level of perceived threat do they come under human scrutiny. The automated nature of the searches has raised questions about whether computer surveillance is covered under the Fourth Amendment prohibiting unlawful search and seizure. According to an article in the

Boston Globe, Alane Kochems, a national security analyst at the conservative Heritage Foundation, said, 'I don't think your privacy is violated when you have a computer doing it as opposed to a human. It isn't a sentient being. It's a machine running a program' (Savage, 2005). But this reasoning is surely specious, since in the first place it was humans who designed the machine. Moreover, if the material is on file, it is always available for human scrutiny. Human and machine cognitions have now become so intertwined that distinguishing between the two in the context of surveillance makes no sense. The *Boston Globe* quotes Yale Law School Professor Jack Balkin making precisely this point when he notes that if a legal distinction between human and computer surveillance was allowed to stand, the police 'could simply use robots to do their dirty work' (Savage, 2005).

Scary as NSA's surveillance program is, the cognisphere has had many positive effects as well. Increased communication, access to databases around the world, communal knowledge-building through wikipedias and other data collection projects, and the ability to find and form networks with like-minded people in the US and abroad are only some of the forms of collective action and democratic potential made possible by the world-wide web. More subtle are the changes in subjectivity that the cognisphere is bringing about. Shifts in reading practices suggest a movement from deep attention to hyperattention; incorporation of intelligent machines into everyday practices creates distributed cognitive systems that include human and non-human actors; distributed cognition in turn is linked to a dispersed sense of self, with human awareness acting as the limited resource that artificial cognitive systems help to preserve and extend.

As intelligent machines become more important in the cognisphere, the resulting re-evaluations of human agency, rationality, and affective capacities catalyze re-evaluations of human–animal relations as well, to which Haraway's (2003) work on companion species makes a valuable contribution.[1] Understanding that humans and animals have co-evolved together is entirely consistent with the contemporary but nevertheless potent phenomenon of humans and machines co-evolving together. Indeed, given the technologies of genetic engineering, implants and bio-silicon hybrids created from a variety of life forms ranging from cockroaches to lampreys, it is clear that humans, animals and intelligent machines are more tightly bound together than ever in their cultural, social, biological and technological evolutions.

At the same time, advances in cognitive science, neurology and related fields of brain science are clarifying the neurological basis for human perception and subjectivity, leading to the possibility, articulated by Evan Thompson and Francisco J. Varela in their forthcoming book *Why the Mind Isn't in the Head: The Lived Body in Biology, Cognitive Science and Human Experience*, that the subject–object split institutionalized by the birth of modern science can at last be addressed by a cognitive science powerful enough to begin to explain the physical and psychological bases for human constructions of reality. These results validate Haraway's (1988) call for

'situated knowledges', demonstrating that there is no way to know the world except through the subjectivity that precedes and grounds our objective accounts. We are at home in the world, as Haraway's work throughout her career has implied in generous and life-enhancing ways, because the world we understand is also the world we make, in both literal and figurative senses. As she has repeatedly pointed out, such world-making practices imply responsibility for their construction.

The conclusion that came out of my work on the Regime of Computation points in a similar direction. Computation, in this sense, is not restricted to any given medium. It is a relational process that can run in the brain, with gears, disks, balls, cylinders and levers, in electro-mechanical and silicon devices, as well as other media not yet discovered or in nascent developments such as quantum computers. Imagining the world as the result of massive, interlocking and continuing computations, researchers such as Stephen Wolfram (2002) and Ed Fredkin (2001) see computation as the means by which physical reality is produced. For those who champion computational models, this is a ground-breaking insight that promises to revolutionize a wide range of fields, from the study of complex systems to particle physics. To the cultural critic, by contrast, the Regime of Computation is apt to appear as an over-determined metaphor. Much as the 18th century saw the world as a clockwork mechanism, so our computationally intensive culture would naturally be inclined to envision the universe as a giant computer.

Parsing the situation as a conflict between means and metaphor might suggest that we should cast our votes with one side or the other, as if *choosing* were the issue.[2] However, this binary division between means and metaphor misses something crucially important: that means and metaphor are dynamically interacting with each other. The computational metaphor is potent because networked and programmable devices are so fast, powerful and interconnected; if the technology did not exist, the metaphor would not have the traction it does. For its part, the belief that the universe is fundamentally computational feeds back into the development of the technology, pursued among other reasons because it is perceived to mirror nature's own methods.

One of the important insights that has emerged in science studies in the last 20 years is the realization that scientific models are underdetermined with respect to empirical evidence (or, to put it another way, that multiple models may be consistent with prevailing knowledge). Cultural beliefs, or more accurately cultural presuppositions, play important roles in determining which models will be proposed and which will succeed. In *How We Became Posthuman* (1999) I demonstrated this dynamic at work through my analysis of information-theoretic models. The Shannon–Weaver version of information theory triumphed over Donald MacKay's conceptually richer embodied version for practical reasons (largely because it could be reliably quantified). However, the Shannon–Weaver model then rapidly traveled to other fields where quantification was impossible (such as semiotics and communication theory) because of its 'scientific' cachet, whereas MacKay's

model would have been more appropriate. The adaptation of a disembodied view of information spread so pervasively, I argued, because it fitted well with existing preconceptions about a separation between a material body and an immaterial essence, which of course was a subtext for a disembodied view of information in the first place. (For a full discussion of Shannon and Weaver's information theory and the competing embodied theory of Donald MacKay, see Hayles, 1999: 50–112.)

To sum up these complex interactions between means and metaphor, I offer in *My Mother Was a Computer* (2005) the following formulation, which has become central for me in understanding the contemporary situation as well as historical precedents: 'What we make and what (we think) we are co-evolve together.' If we leave aside for the moment the parenthetical 'we think', the statement would find enthusiastic agreement among anthropologists, who have long accepted, for example, that tool use and bipedalism co-evolved together. Bipedalism facilitated the use and especially the transport of tools; tool use in turn bestowed such decisive fitness advantage that it had the effect of accelerating bipedalism. This co-evolutionary spiral involved both cultural and biological changes, including for example the opposable thumb and the skeletal transformations that bipedalism brought about. Stanley Ambrose (2001), an anthropologist at the University of Illinois, has demonstrated a similar dynamic at work in the practice of fashioning compound tools (tools with more than one part that have to be assembled in sequential order, such as a stone ax with a handle, bindings and a stone insert). Evidence indicates that compound tools were contemporaneous with the accelerated development of Broca's area in the frontal cortex, the part of the brain involved in language use. Ambrose speculates that the sequential and hierarchical ordering required in the fashioning of compound tools co-evolved with language because language, like compound tools, requires the sequential ordering of reproducible and discrete units. In this scenario, the trait often identified with the essence of the human – our ability to use complex languages – was bound up at the dawn of *Homo sapiens* with the emergence of a relatively sophisticated technology (i.e. compound versus simple tools), initiating a co-evolutionary spiral in which what we made and what we became co-evolved together.

How does that formulation change if the parenthetical 'we think' is put back into the picture? Cultural beliefs and practices are part of this co-evolutionary dynamic because they influence what tools are made and how those tools are used, which in turn affects who we are as biological organisms, which then feeds back into the co-evolutionary spiral. Haraway's insistence that the world is 'relationality all the way down' applies as much to technology as to companion species. In the contemporary period, computation emerges as a crucial aspect of the entwined dynamical hierarchies that structure and energize relational dynamics. As inhabitants of globally interconnected networks, we are joined in a dynamic co-evolutionary spiral with intelligent machines as well as with the other biological species with whom we share the planet.

That the cyborg is no longer the most compelling metaphor through which to understand our contemporary situation should not blind us to the fact that much urgent and pressing work remains to be done. The cognisphere takes up where the cyborg left off. No longer bound in a binary with the goddess but rather emblem and instantiation of dynamic cognitive flows between human, animal and machine, the cognisphere, like the world itself, is not binary but multiple, not a split creature but a co-evolving and densely interconnected complex system.

Notes

1. Writing about why she has moved away from the figure of the cyborg, Haraway observes that:

> . . . the cyborg and companion species are hardly polar opposites. Cyborgs and companion species each bring together the human and non-human, the organic and technological, carbon and silicon, freedom and structure, history and myth, the rich and the poor, the state and the subject, diversity and depletion, modernity and postmodernity, and nature and culture in unexpected ways. (2003: 4)

Nevertheless, she asserts that the cyborg can no longer do meaningful work at the present moment and has accordingly turned to companion species.

2. In her interview (this issue) Haraway comments, 'It's not so much about choice. I don't think we sit down and decide what's important very much. I think we somehow come to terms with what's going on, and the method of working is relentlessly collaborationist.'

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N. Katherine Hayles, Hillis Professor of Literature in the English Department at the University of California, Los Angeles, writes and teaches on relations of literature, science and technology in the 20th and 21st centuries. Her book *How We Became Posthuman* won the René Wellek Prize for the Best Book in Literary Theory for 1998–9, and her book *Writing Machines* won the Susanne Langer Award for Outstanding Scholarship. Her latest book, *My Mother Was a Computer: Digital Subjects and Literary Texts*, was published by the University of Chicago Press in September 2005. She is currently at work on a study of the interrelation of narrative and database.