At the end of Nature: cyborgs, ‘humachines’, and environments in postmodernity†

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Received 2 February 1995; in revised form 3 June 1996

Abstract. In this paper I rethink some of the premises in industrial-era social ontologies by rethinking how hybridized agencies, like cyborgs, actor networks, or humachines, decenter anthropocentric modernist conceptions of ‘man and the environment’. By using postmodernist claims that we now operate after ‘the end of Nature’ or ‘the death of Nature’, I build this paper from such conceptual hyperbole to explore how cyborg life-forms or humachinic social formations are reshaping the natural and social environments of contemporary fast capitalism on a global scale. These terms of analysis, in turn, could improve our understandings of the built and yet to be built environments in advanced technological economies and societies.

At the close of the Cold War, and even perhaps in some places before, many of our ontologies ruptured. Some see the end of Nature (McKibben, 1989). Others see the end of History (Fukuyama, 1992). One must, therefore, depart from both Marx and Weber as their Victorian life world slips further and further away. Instead, to appeal to one new global mythology with growing canonical legitimacy, the Star Trek prologue tells us plainly that we now are amidst strange new worlds and new civilizations where no one has gone before. Consequently, at this conjuncture, I begin to rethink the nature of society and space at ‘the end of Nature’ by rereading Haraway’s analysis of cyborgs and Mumford’s account of technics as part of a critical exploration of ‘the environment’ under the conditions of postmodernity. Haraway observes “the boundary between science fiction and social reality” has become, in many ways, “an optical illusion” (1991, page 148). So, as boundaries of fact and fiction warp within these optical illusions, we should recognize that new life-forms—cyborgs, or cybernetic organisms, which hybridize machine and organism, animal and apparatus, physical matter and nonphysical information in unusual new living aggregates—now occupy our time and space.

Cyborg life-forms are materialized inside and outside of us and in our things through both planning and accident. They emerge as hybridized activators or activations of elaborate actor networks (Law, 1992). They generate, and are, in turn, generated, within new environments, or maybe a ‘cyborganized’ order, that makes “thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines” (Haraway, 1991, page 152). Modernity maybe was the mythic time of man [sic] and culture acting on society and nature in projects of rationalizing progress before those stable realities ruptured; postmodernity perhaps is what follows, and few of these modernist tropes fit together in the same ways they once did for Marx or Weber (Toulmin, 1990). Despite the difficulties involved, this chaos in society and space, as Jameson notes, must be confronted “since the modernization process is complete and Nature is gone for good?” (1992, page ix).

† Humachine: a conceptual construct produced by colliding the categories of agency and structure used conventionally in most modern social ontologies, which begins to capture traces of quasified subjects/objects or hybrid boundary creatures existing as social aggregates or collectives in synthetic environmental settings.
In the vast expanses of postmodernity, as Jameson argues, radical changes “can be translated or transcoded into a narrative account in which agents of all sizes and dimensions are at work” (1992, page 408). This observation is important, because Haraway’s “situated knowledges” tell us that they are being inhabited by new cyborg agencies of all sizes and dimensions (1991, pages 183–201). Many of them, as Callon (1986), Law (1986), and Latour (1987) assert, are hybrid agencies, tracings of actor networks in which all of the action is not performed by human beings. Cyborganizing forces are warping space into these new shapes or bending time back onto itself by promoting the acceptance of speeds, powers, and materials suitable for hybrid life-forms.

We could map postmodernity (Harvey, 1989; Luke, 1989), but a complete survey would take more time and energy than can be expended here and now. Latour (1993, pages 89–90) argues that postmodernity is a highly problematic category, because we never even have been modern. Instead, ‘amodernity’ best defines the current condition inasmuch as the substances of what are discretely defined in terms of Nature, Discourse, Society, and Being infinitely surpass us in the quasi-objectivity of Nature and Society. To comprehend these spaces, he argues, we need to amend the discursive assumptions of our “modern constitution”, or that set of principles which “defines humans and nonhumans, their properties and their relations, their abilities and their groupings” (1993, page 15). As we do, one sees such spaces as the range of new hybrids: quasi-objects and quasi-subjects that amalgamate elements of Nature, Discourse, Society, and Being more indiscriminately. Nonetheless, one special quality of this amodernity—nonmodernity—postmodernity might be addressed, namely, its spatial characteristics as human societies and technologies transform ‘the natural’ into ‘the environmental’ (Smith, 1996, pages 22–54).

Partly mythic, partly realistic, Haraway’s inventive tropes for disclosing cyborg life provide an extraordinary ‘science fiction’ to problematize ordinary ‘science fact’. Factualized science fictions provide, at the same time, a basis for this new social regime’s unstable economy and political instability in which ‘Nature is gone for good’. Even if it is not true that cyborgs exist, they do provide a useful analytical fiction. One can invoke an ‘as if’ clause in the standard methodological contract, allowing us to reread human behavior as if it is cyborg behavior. The use of such insurgent narratives from science fiction allows one to reappraise the grids of established science facts embedded in the technoscience formations, operating for and against us as life-world-generating machineries of power, light, and speed (Thrift, 1996). The organization of everyday life around science and technology in the late 20th century is widely accepted as a fact—a thing done, an actual occurrence, one truth of existence (Lytotard, 1984). The unproblematized acceptance of such science factualization invites subversive countercodings of these naively legitimated factualities, to illustrate why the science factual thing was done, what actually occurs in science fact, or how this technoscientific existence is made factually true. Cyborg rhetorics might well be the best metaphor for reimagining the societies and spaces generated by contemporary global capitalism (Anderson, 1991).

Science fictions, then, like cyborg beings, are (ab)useful illusions for (re)inventing our imagination of power, economy, and culture in an environment materially built into and out of scientific facts. Haraway argues, “we are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs. The cyborg is our ontology; it gives us our politics” (1991, page 150). Though noting that Haraway has both detractors (Spring, 1996) and celebrants (Plant, 1996), in the following discussion I explore some implications for a cyborg politics in those new environments being (un)covered in contemporary postmodern spaces.
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New life-forms? Cyborgs and ‘humachines’
Haraway’s celebration of cyborg consciousness and agency sets a new heading for the investigation of Nature–Society connections. If, as she maintains, “a cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality” in which social realities must be seen as “lived social relations, our most important political construction, a world changing fiction” (1991, page 149), then one must carefully reexamine where and how cyborgs, as those “creatures simultaneously animal and machine, who populate worlds ambiguously natural and crafted (page 149), might actually live. The acceptance of Haraway’s world-changing cyborg fiction signals the necessity of searching for some facts of this world change. The science fiction of cyborg subjectivity illuminates the science fact of cyborganizing environmental sites and structures, giving both a form to the cyborg and a range for it to roam. This move substantially amends the ‘modern constitution’ identified by Latour as those precepts that we use to evaluate what separates humans from nonhumans, the temporal and the transcent, subjectivity from objectivity (1993, pages 13–15) in our social ontologies.

Cyborg beings and ‘humachine’ becomings
Cyborgs are not creatures of pristine nature; they are the planned and unplanned offspring of manufactured environments, fusing together as new organic compounds of naturalized matter and artificialized antimatter. Haraway sights them at key breaches in the categorical containments demarcating the boundaries between humans and animals, organisms and machines, or physical and nonphysical realms. In the swirl of postmodernity, little now separates human beings from other animal beings, especially now as all life-forms are being reinterpreted as simply one variant sequence of genes amidst the diverse iterations of shared genetic code. In practice, “language, tool use, social behavior, mental events” (Haraway, 1991, pages 151–152) all fail to distinguish human beings as definitive distinctions of the ‘humane’. At the same time, the intelligence and autonomy of many contemporary machines confuse the differences between organisms and machines. Actually, “our machines are disturbingly lively, and we ourselves frighteningly inert” (Haraway, 1991, page 152), because, at this juncture, “the boundary between the physical and non-physical is very imprecise for us ... modern machines are quintessentially microelectronic devices; they are everywhere and they are invisible ... they are about consciousness—or its simulation” page 153). An inevitable result of these ambiguities has been, as Latour asserts, the subjectification of objects, and the objectification of subjects, transforming much of the living and dead world into ‘quasi-objects’, which are neither entirely alive nor merely dead as they increasingly come to be treated as ‘quasi-subjects’. Haraway’s deployment of science fiction is aimed at illuminating these science facts. That is, “a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints” (1991, page 154).

Cyborganizing processes, then, are integrating humans and machines into new syncretic totalities of synergistic behavior so thoroughly that the once obvious borders between human and machine, human and animal, physical and nonphysical blur away. Out of the blur, Haraway draws out her figurations of the cyborg, but does she miss other life-forms also out there in these spaces? This may happen because maybe her conceptual arrays, strangely enough, privilege naturalized biomorphic presences over and against engineered ‘mechanomorphic’ activities as she approaches new life-forms. Of course, “the cyborg is a creature in a post-gender world; it has no truck with bisexuality, pre-oedipal symbiosis, unalienated labor, or other seductions to organic wholeness through a final appropriation of the powers of the parts into a higher unity”
(1991, page 150). Even though cyborgs should not be identified with nature and organic wholeness, they are still, in Haraway’s imagination of them, particular biomorphic figures—individual subjectivities, discrete bundles of being, or personal agents. Here, however, we must ask if this biocentric reading of cyborg life-forms might marginalize the equally significant machinic lineages in the cyborg family? For example, in her own science fiction terms, could cyborgs also be more machinic presences, encompassing lively mechanomorphic subjectivities not unlike those postulated by a Robocop (1986) subjectivity or a Terminator (1984) civilization? Do fusions of animal and apparatus, organism and mechanism, physical and nonphysical also transform machinic realms, which are the other pole anchoring another hemisphere in the life worlds of cyborg becoming?

For nearly a century now, advanced industrial societies have set themselves—with all of their human and nonhuman inhabitants—apart from Nature’s organic economies in new urbanized habitats, which are artificially powered, mechanically maintained, and scientifically constructed. In resisting anthropocentric readings of (wo)man and nature with her discovery of cyborgs, has Haraway possibly ignored other new life-forms by advancing her analysis of quasi-objects in biocentering cyborg life on the human—animal—physical lineage in cyborg descent? If cyborgs are the individualized biomorphs formed along blurred borders, then what are the collectivized mechanomorphs fabricated from the fusion of machine and human, animal and human, nonphysical and physical regions? Without being ‘machinocentric’, why not trace these cyborgized subjectivities back down their machinic, humane, and nonphysical lineages as well?

New worlds and new civilizations may well take more than one major life-form. Some quasi-objective fusions of (wo)man and machine, blending of human and animal with blurrings of physical and nonphysical, can be identified as cyborgs; yet, at the same time, there are grounds for redifferentiating others as ‘humachines’. If our theoretical scan sticks with cyborgs as particular biomorphic figures, the presencing of cyborgs as syncretic organisms could be balanced science fictionally by representing other mechanomorphic presences as humachines, which may be another form of Latour’s quasified subject/object emerging out of the technics structure of synthetic environments. That is, humachines could be seen as machinic ensembles of power, space, production, energy, reproduction, matter, organization, and information with their own intelligence and agency that coconstitute the operational settings and sustainable life worlds of cyborg life-forms.

Haraway may ignore humachines, because of her deep suspicions about all high-technology machineries imposing grids of control over the entire planet in Star Wars apocalypse systems in order to create ‘national security’. In amending the modern constitution, she tends to find kinship with animals, not machines, as well as lodge identity in creatures, not in apparatuses. Thus, the partial identities of machinic entities, or the contradictory standpoints of mechanomorphic beings coexisting as disturbingly lively life-forms with cyborgs, are largely neglected by Haraway.

Basically, Haraway’s organismic analysis of cyborgs again reveals, as Deleuze and Guattari (1987, pages 39–74) would observe, how binary oppositions can be blinding identifications. Haraway challenges binary oppositions, like male and female, nature and culture, man and machine, physical and nonphysical, by speaking through or for what is conventionally regarded as the weaker/outsider/subservient pole as part and parcel of her assault on feminist essentialism. There are events in the world that display general patterns of consistent variation, but always specifically valuing one event over another in either/or judgments usually is a very forced intervention made more significant in its enforcement by its inventors. Haraway’s particularistic biocentrism potentially prejudices humans against accepting more general mechanomorphic
subjectivities. She tends to see machines as the threatening otherness of *Terminator 1* (1984), ignoring the real possibility that *Terminator 2* (1991), or mechanomorph as sensitive cybernetic guardian, may also exist in the humachinic matrix as either individual actors or collective networks. Cyborgs and humachines must be studied as complex double articulations, each presuming the other, rather than as simple binary oppositions where a biocentric vision of cyborgs only reduces machines to dangerous others with no shared commonalities.

There are other anticipations of humachines as hybrid fusions of quasi-objects and quasi-subjects (DeLanda, 1991; Fuller, 1962; Giedion, 1948). Rabinbach, for example, explores the mixing of humans and machines in the ideologies of modern labor power. This fixation upon the apparently endless outputs of Nature gained expression as “modern *productivism*—the belief that human society and nature are linked by the primacy and identity of all productive activity, whether of laborers, machines, or natural forces” (1990, page 3). In constructing the vast productive machineries of the Second Industrial Revolution, labor purposely was treated as a quasi-object in management’s statistical controls, whereas technology is intentionally mobilized by technoscientific engineering as a quasi-subject. This humachinic shift follows from the ‘governmentalization’ of population/territory/nature, beginning in the 18th century (Foucault, 1991, pages 94–107). Seltzer also discusses the machine culture that arose from (wo)man–machine interfaces, reexamining the discovery in the 19th and 20th centuries “that bodies and persons are things that can be made” as well as “the remaking of nature in terms of the *naturalist machine* and the remaking of individuals as *statistical persons*” (1992, page 3, original emphasis).

Even earlier, one might argue that Weber already detected these roots of humachinic evolution in volatile tracings of primitive quasi-objects. In his theoretical enterprise, he records some humachinic speculations about the modern era’s means of embody-ing or personal-izing monastic asceticism in everyday life. Once the fusion of spiritual antimatter and profane matter occurs within urban–industrial economies, “it did its part in building the tremendous cosmos of the modern economic order. This order is now bound to the technical and economic conditions of machine production which to-day determine the lives of all individuals who are born into this mechanism, not only those directly concerned with economic acquisition, with irresistible force. Perhaps it will so determine them until the last ton of fossil-ized coal is burnt” (1958, page 181). Without saying so, Weber asks us to accept a cyborgized variant of the Gaia hypothesis in *all* of its implications. Not only are the Earth and its living organic systems ‘alive’ as a planetary life-form, but so too perhaps are many diverse networks of machinic systems ‘alive’ within human economies and societies. Moreover, these new machinic life-forms increasingly will determine the ecological fate of all other life-forms until their last reserves of consumable fuel are ingested, metabolised, and excreted in the humachinic infrastructures of cities, economies, industries. Humachines, as DeLanda notes, can be found in almost “any process in which order emerges spontaneously out of chaos: the non-organic life represented by the machinic phylum” (1991, page 10).

Another elaborate analysis of machinic relations in organic activity can be found in Deleuze’s and Guattari’s semiotic interpretations of capitalism and psychic life. In their anthropological, but still quite abstract, accounts of social metabolisms, Deleuze and Guattari approach the phenomena of machines as abstract transformers, operating continuously as meaning makers, energy concentrators, matter formers, and energy directors free from the purifying implications of subjectivity. The abstract machine in their analyses becomes all elements of assemblage capable of accounting simultaneously for *forms of expression*, or regimes of signs (semiotic systems), and
for *forms of content*, or regimes of bodies (physical systems), without distinguishing necessarily as such between the planes of expression and content (1987, page 141). Abstract machines, then, are not exclusively in themselves physical or nonphysical, corporeal or incorporeal. They are schematic diagrams “at which nothing but functions and matters remain” (page 141). Hence, they construct “a real that is yet to come, a new type of reality” (page 142) in doubled articulations that constantly formalize expression and context, transforming matter into physical and/or semiotic substance and functions into forms of expression and/or content. Diagrams open lines of energy flow, conjoining traits of material significance. Thus, machinic assemblages effectuate abstract machines by semiographing matters of expression and physiographing matters of content (pages 145–146). Most importantly for amending the constitution, however, these diagrams do not distinguish between the natural and the artificial, allowing the abstract machine to become concrete machines, like the action networks of humachines, in blended natural–artificial, organism–mechanism, physical–nonphysical formations.

However, the most historically suggestive consideration of humachines can be found in Mumford’s musings about megatechnics, which he imagined in abstract machinic terms:

“a uniform, all-enveloping, super-planetary structure, designed for automatic operation. Instead of functioning actively as an autonomous personality, man will become a passive, purposeless, machine-conditioned animal whose proper functions, as technicians now interpret man’s role, will either be fed into the machine or strictly limited and controlled for the benefit of depersonalized, collective organizations” (1986, page 304).

Though Mumford, at times, overdoes the theme of passive submission to mindless domination, this construction of megatechnics on an all-enveloping, superplanetary scale does depict new articles in the ‘modern constitution’, deriving new modes of collectivized (wo)man–machine interface. Mumford concludes “our age is passing from the primeval state of man, marked by his invention of tools and weapons for the purpose of achieving mastery over the forces of nature, to a radically different condition, in which he will have not only conquered nature, but detached himself as far as possible from the organic habitat” (1986, page 304). Unlike Haraway, Mumford is quite anxious about so many mechanisms providing new contradictory standpoints to human beings with their identities partially, or even now largely, pegged to machinic formations. Without explicitly saying it, Mumford is telling everyone that modernization has left completely behind the natural practices of gemeinschaft, but it also has climbed totally beyond the institutional constraints of gesellschaft. At this juncture, (wo)man–machine interfaces are creating their own intelligent reflexivities in *Maschinenschaft*. Still, “one must do more than center attention upon the point where it materializes ... in order to put together a collective machine composed solely of human parts, one needed a complex transmission mechanism ... so that the parts would interlock to form a single operating whole” (Mumford, 1986, page 319).

In stark contrast to Haraway’s contemporaneousness, Mumford’s elaborate genealogy of the megamachine traces its origins back to the fourth millenium BC, rooting its actor networks in the complex state formations of Egypt, Mesopotamia, China, India and then later of Cambodia, Mexico, Peru, and Guatemala. Where Haraway finds cyborgs arising with the space race in the nuclear revolution, Mumford locates humachines coevolving with the human race in the neolithic revolution. Whether he calls it the megamachine, the human machine, or state machine, it soon “commanded power and performed labor on a scale that was never even conceivable before” (1986, page 315). Humachines depend upon “two collective devices [which] were
essential to make the machine work: a reliable organization of knowledge, natural and supernatural: and an elaborate structure forgiving and carrying out orders. The first was incorporated in the priesthood, without whose active and divine kingship could not have come into existence: the second in a bureaucracy: both hierarchical organizations at whose apex stood the temple and the palace. Without them the power complex could not operate” (page 319). Obviously, Mumford’s genealogy stresses the lineages of informational and institutional actor networks of the humachine. Even with his fixation upon the technical, when he speaks of “power complexes” or where he speaks of “automation”, it still coevolves with human agency: “this condition remains true today, even though the existence of automated factories and computer-regulated units conceals the human components essential even to automation” (page 319).

Mumford’s more machinic family tree of (wo)man–machine hybrids, then, ought not to occlude the equally vital organismic genealogy of these beings. Instead of calling these collective (con)fusions of animal and apparatus a ‘power complex’ or a ‘collective machine’, they might also be seen as a kind of humachine. They are, on one level, social ensembles in which “a machine [is] composed of [a] multitude of uniform, specialized, interchangeable, but functionally differentiated parts, rigorously marshaled together and coordinated in a process centrally organized and centrally directed: each part behaving as a mechanical component of the mechanized whole: unmoved by an internal impulse that would interfere with the working of the mechanism” (Mumford, 1986, page 318). On another level, humachines also are a cybernetic organism aggregated out of large populations of diverse, generalized, unique, but substantively identical wholes, loosely working apart and uncoordinated in structures that simultaneously are peripherally (dis)organized and centrally (mis)directed—each mechanical part operating as an integral piece of an organic whole—moved by external impulses that enhance the living of this mechanomorphic actor.

Machinic ensembles, in the last analysis, can be seen refunctioning human forms and rematerializing nonhuman substances in new environmentalized concretions of animal and apparatus. As Callon and Law (1989) observe, we live in hybrid times amidst actor networks in which all of the actors are not human. Machines embody factitious forms of becoming within, but also against the substances of autochthonous being. Mumford captures some of this hybridizing drift in his reading of machine technologies as quasi-objects. That is,

“In back of the development of tools and machines lies the attempt to modify the environment in such a way as to fortify and sustain the human organism: the effort to extend the powers of the otherwise unarmed organism, or to manufacture outside of the body a set of conditions more favorable toward maintaining its equilibrium and ensuring its survival. Instead of a physiological adaptation to the cold, like the growth of hair or the habit of hibernation, there is an environmental adaptation, such as that made possible by the use of clothes and the erection of shelters” (1963, page 10).

By fixating on comparatively low-tech innovations, such as clothing or dwellings, Mumford perhaps overlooks how environmental adaptation, at the rates or on the scales of megamachineries, are: (a) so completely technically remanufacturing the bodies of human organisms; and (b) so totally readapting physiologically the tools of human machines that environment and organism become one. Artificializing habitat–naturalizing techniques compound the identities of nature and culture, (con)fusing many of the differences of animal and apparatus. So, living among actor networks of (wo)men and machines does not mean the only significant actors are machines. No longer wholly nature, but not yet totally artifice, these technoscientific environments are a primal soup brimming with new metamorphic life-forms, hybridizing animals
and apparatuses, humans and machines, physical and nonphysical entities in new humachinic constellations.

**Methodological collectivism**

Existing conventions for the scientific analysis of social facts, according to most disciplinary regulations, dictate that a *methodological individualism* be used to explain individual or collective behavior in society. Allegedly, only individuals can act, have values, or exhibit consciousness. Hence, one must not attribute the characteristics of single actors to multiple actors, such as groups or patterns of group behavior. Networks never act, only people do. Proper modes of explanation must reduce connections of cause and effect, therefore, to observations about individuals to interpret who does what, how, when, and why. This stance, however, is much too simple. The science fictions of cyborg beings and humachinic ensembles problematize this factualizing discursive stricture. Who or what is this ‘individual’ that one must methodologically extract from reality? Quasi-objects render precyborg con-figurations or im-personations of the individual very contestable; their stability may indeed be an analytical artifact of the modern constitution that now must be jettisoned in traversing amodern or postmodern realms of space. If cyborganized formations are collective compositions of the human and machine, animal and apparatus, organized and organizer, organic and inorganic, then such quasified objective and subjective elements only operate together. And, these collective fusions apparently do act, express values, and exhibit consciousness in complex actor networks as humachines and cyborgs, which impel us to adopt protocols of a *methodological collectivism* to trace the living patterns exhibited by such activators in environmentalized spaces.

Unless these connections are made, humachinic ensembles will be hidden in the artificial ellipses of dis-figured postindividual acts enmeshed in other falsely im-personated extraindividualized behaviors. Methodological collectivism, on the other hand, can attune analysis to large ensembles that act, material formations with value agendas, and elaborate systems with consciousnesses. No longer merely abstract, these concrete machines are intentional concretions of matter embedded in fusions of animal and apparatus found in technical interfaces, built environmental urbanisms, socio-economic production cycles, or ethicopolitical administrative systems. They have existed for a long while, but we ignore them in our categories, because, as Giedion notes, cyborgs and humachines coevolve quasi-subjectively within an “anonymous history” (1948, pages 2–11) inside of quasi-objective collectivities beyond the conceptual reach of individualistic methodologies.

Cyborg life-forms, as Haraway constructs them, are found living in essentially organic, and not mechanical, terms. However, if cyborgs are remarkable inasmuch as they fuse animals with apparatuses or organisms with mechanisms, which transform the animal organisms through their mechanical apparatuses, then so too might humachines be remarkable in the animalizing of apparatuses and the organicizing of mechanisms. Even though cyborgorganic beings may not be organized through codes of protoplasmic autopoiesis carried through cells, tissues, organs, can they still be seen as ‘alive’? In partial identity with human being, are cyborgs fusions of (wo)man and machine, or the hybridized subjectivities that Latour sees as zoomorphisms or technomorphisms (1993, page 137)? And, though it too is a contradictory standpoint, can machinic beings display the seven characteristics of life? That is, do they display different indicators in their own ways: (1) of motion; (2) of responsiveness to stimuli; (3) of reproduction; (4) of nutrition; (5) of growth; (6) of respiration; and (7) of excretion? Humachines move, respond to stimuli, respire, and even metabolize energy sources, leaving behind excretions. Humachines grow in size, in number, and in power
as their nutritive needs for energy, resources, and information are met. Humachines also reproduce artificially, mechanically, systematically. Whereas humans can reproduce artificially through *in vitro* fertilization and gestation by design in cyborg birthing alternatives, the machinic ensembles of humachines may reproduce naturally through human copying, organizational replication, and functional fission. Last, if all of this happens autochthonously on the Earth by virtue of seemingly constant cosmic processes, then are humachinic beings inescapably as ‘natural’ as they are ‘artificial’?

Here McLuhan (1964) can be stood on his head inasmuch as artificial media or technologies may not be extensions of (wo)man/woman, but rather the terms of (wo)man/woman serve as an extension of technologies or artificial media. Human organisms extend the mechanical powers, intentions, and operations of machines, acting as mediations of machine respiration, growth, nutrition, reproduction, motion, and responsiveness. And, these humachinic beings are part of all cyborg becomings. Without the humachines refashioning the world as planned environments to suit their common needs, cyborg life could not exist. As DeLanda’s robot historian would confirm for us (1991, pages 1–10), many humachines, like Haraway’s cyborgs, ranging from state bureaucracies to industrial cities, are hybridized, quasi-objective life-forms—they struggle to reproduce, go through successive generations, consume energy, transform matter, produce waste, display consciousness, enact intentions, and develop into various coexisting, but distinct, communities.

At the end of Nature: ‘denature’

Perhaps what Haraway’s cyborg manifesto and Mumford’s megatechnics polemic are struggling to express in comprehensible terms are these two thinkers’ awe and amazement at seeing ‘the end of Nature’. Certainly, Nature is a construct; it never has been pristine or worked upon de novo, because its apprehension always is the consequence of cultural relations in society and technology (Evernden, 1991; Smith, 1984). Nonetheless, the actual eclipse of pure wildness in the natural environment or the apparent end of sublime depth in nature’s vastness are scientific facts in an era that inventories every square meter of ground with satellite mapping technologies, catalogues the molecular codes of the human genome, or zones land masses for bureaucratically defined ‘wilderness use’. After two centuries of industrial revolution and three decades of informational revolution, Nature no longer can be assumed to be either God-created (theogenic) or self-creating (autogenic). Mumford recognized this shift in his megatechnics trope, and Haraway knows this through her metaphorical allusion to cyborgs. What now is taken to be ‘nature’ is largely human created (anthropogenic), not only in theory but also in practice. One need not wait for the science fiction of advanced space travel technologies to contact other ‘extraterrestrial life forms’, the science facts of altered atmospheric chemistry, rampant genetic engineering, and unchecked species extinctions suggest that urban industrial humanity already behaves like an invading race of extraterrestrial beings intent upon imperializing the Earth with cyborg colonies relying upon humachinic ecologies.

To return to the science fiction of *Star Trek*, two of the *Trek* feature films center their plot upon how entire planets might be ‘terraformed’ with genetically encoding, meteorologically programmable, and geophysically stabilizing extraterrestrial probes to simulate Earth ecologies on other worlds in biotronic genesis events, rendering new planetary surfaces hospitable to ‘terran’ life-forms of the M Class. Accepting Mumford’s megatechnics or Haraway’s cyborgs shifts our conceptual register, allowing us to recognize how the Earth itself already has been submitted in science fact to the terraforming of multinational capital formations. Latour’s ‘modern constitution’, then, has already been amended radically by new agencies. Are not the cyborgnic beings
of humachinic ensembles, like transnational fast capitalist markets, an extraterrestrial intelligence working at the level of loosely coupled collectives of machinic production, consumption, and administration, but also reconfiguring all that is terrestrial as quasi-objective—quasi-subjective hybrids to fit their basic codes of operation?

Nature is no longer the vast realm of autonomous, unmanageable, or nonhuman wild activity; in being enmeshed in networks of cyborg scientific rationalization and commercial commodification, Nature becomes Denature(d). Nature is terraformed, or Denatured, to embed humachines into cycles of denatural reproduction as well as to establish artificialized ranges for cyborg life-forms, who never can be (as such) wholly natural. The activities of entities, like the World Watch Institute with its annual report on the denature(d) Earth's 'vital signs', illustrate how thoroughly the entire planet now is increasingly a 'built environment' or 'planned habitat' (Brown et al, 1991). Pollution modifies atmospheric chemistry, urbanization restructures weather events, biochemistry redesigns the genetics of existing biomass, architecture accretes new biotic habitats inside of sprawling megacities, internet worldwide webs spawn new artificial life-forms on a silicon base. The informational revolution with its denaturing administration of production on a global scale and cyborganizing management of consumption at a local level is a rolling constitutional convention, amending all of our existing covenants between the organic and inorganic. Informationalization also might be regarded as the biotronic genesis of transnational capitalism's terraforming of the Earth (Luke, 1996a, pages 1–30). This anthropogenic (De)Nature, then, proliferates spaces and networks in extraterrestrialized regions where contemporary cyborgs can live only through and within humachinic environments.

Virginia Woolf pretended to witness a decisive break in human history during the early 20th century when she asserted, "on or about December 1910 human nature changed" (cited in Kern, 1983, page 183). This observation, if Woolf is correct, dates a decisive turn in human history, machine history, and natural history. 'Human Nature' changed on or about this time, because 'Nature for Humans' also changed at or around this date. At this moment, as Weber also records, "the technical and economic conditions of machine production" began determining "the lives of all individuals who are born into this mechanism" (1958, page 181). Although it began earlier in some places, later in other places, and has yet to happen in many more places, Nature slipped into Denature as cyborgs and humachines began occupying the forbidden zones dividing Nature and Culture in the (con)fusions of (wo)man–machine environments.

Machines are not merely individual units of dead labor, inert objectivity, or inanimate tools; machines are also collective networks of labor living beyond death, objectivity activated, and animated tools through which human beings embody their living practices in matter and informationally encode energy with techniques. Quasi-objectivity also suggests quasi-subjectivity. Smartness, intelligence, sensitivity, reflexiveness, and consciousness are to be found in machinic beings—as are, of course, dumbness, stupidity, insensitivity, nonreflexiveness, and unconsciousness. Machinic ensembles evolve by forming their own environments in Denature, or anthropogenic Nature, whereas cyborg life-forms occupy their appropriate ecological niches in these Denature(d) settings, bringing the two new life-forms into symbiotic continuity. Cyborgs are, as Haraway concludes, "a hybrid of machine and organism, a creature of social reality as well as a creature of fiction" (1991, page 149). They begin in anthropogenic Denature; they cannot exist prior to the pluralization of Nature in warp-driven technological series. Lacking a Nature fetish, cyborgs exist as such whenever and wherever they are born(e) by the coalescence of machine ensembles with human and/or animal populations. Cyborg beings do not emerge from Edenic
At the end of Nature

beginnings; they fall more fully formed from the technoscientific minds of corporations and governments, assembling human producers and consumers just in time out of megamechanical complexes as biopowered populations, hardbodied technical systems, and cyberminded social organizations. Internet hives, local access network pods, electronic villagers, virtual-reality principles, and ethernet rhizomes hatch out in all of their quasi-objective–quasi-subjective hybrid diversity. Industrial metabolisms sustain them, drawing matter and energy into urban–industrial humachines to produce work, information, waste, and order inside complex mechanisms of power, speed, and light.

Denature is Nature, deformed and reformed simultaneously by anthropogenic transformations. Yet, for all intents and purposes, large expanses of Denature continue to be (mis)taken as those old-time natural realms in “Sierra Club(bed)” representations of pristine natural sites at the periphery of manufactured denatural cores (Luke, 1996b, forthcoming). These naturalist fantasies mystify denaturalized realities, which are not so easily marketed. Once one escapes the intimidation of such Sierra Clubbing, however, Denature's realities, like the Aral Sea, Chernobyl, or the Boswash Corridor, can exert their communicative authenticity. Whatever Nature once was cannot be regained, because it existed as a set of forces, settings, or conditions when the human, or, more pertinently, the humachinic, influences upon planetary ecologies were very low impact. Its 'original condition', therefore, cannot be gauged apart from these human-and-environment interactions. Take, for example, a stunning image of the Great Smokie Mountains in a contemporary ‘nature photograph’. The blue sky framing such Sierra Club ideographs of Nature on a sunny day has holes in its ozone, the clouds carry acidic stack residues, the rock cliffs are dissolving away in acid rains, the forest is disappearing in timber clear-cuts, and the soils are contaminated with heavy-metal poisons. It looks 'natural', but it is being denaturalized by vast industrial metabolisms even as environmental pressure groups cling to such photographic myths as Utopian images of a place and a moment outside of our cyborganic–humachinic history.

Strange new worlds and new civilizations

The old (modern) 'constitution' does not apply here: Denature usually is now known as “the environment” in deliberations by “the parliament of things” (Latour, 1993, pages 142–145). Environments are not nature as such, but rather the biophysical contours of those denatured planetary conditions constructed by machinic ensembles. After Nature is reconstituted by the terraforming probes of fishing machines, farming machines, mining machines, timbering machines, ranching machines, its matter and energy flow through transport machines and communication machines to manufacturing machines, managing machines, military machines as well as living machines, leisure machines, labor machines. Their growth, reproduction, excretion, respiration constitute ‘the environmental’ spaces of transnational capitalist exchange where cyborg beings are cyborganizing/ed inside and outside of the ecological carrying capacities of the systems of these machinic ensembles. These beings, as the Star Trek prologue foretells, populate the strange new worlds and civilizations where no one has gone before.

The range where cyborgs roam is not purely Nature or exclusively Culture, but rather it is inside of their hybrid denaturalized byproducts: the environment. There are disturbing patterns here: what 'the environment' means now to many people is colored excessively by Sierra Clubbed images of mediagenic ecotopes. Perhaps a more fundamentalistic reading is needed to clarify another more apt reading of 'the environment'. The 'environment' as a concept first enters English usage from Old French, and originally it was a term related to strategic action. An environment was the state of being produced by a verb: 'to environ'. And, environing as a verb means to encircle, encompass, envelope, or enclose. It suggests the physical activity of surrounding,
circumscribing, or ringing around something. Its various uses even indicate stationing guards around, thronging with hostile intent, or standing watch over some person or place. To environ a place or a person is to beset, beleaguer, or besiege it.

Given this understanding of 'the environment', the Denature of humachines can now be read in a far more suggestive manner. An environmental act, in a sense, is already an instrumentally rational maneuver, aimed at delimiting some expanse in nature—a locale, a biome, a planet as biospherical space or some city, any region, the global economy in technospherical territory—in a policing envelope of denaturing control. Within these rings, in turn, administrative, engineering, or scientific expertise then can arm well-intentioned environmentalists, who stand watch over such surroundings in stationary sieges of domination (Luke, 1994, pages 43–63). Enveloped within these theoretical frameworks, environed spaces can be moved forcibly by technoscientific design to meet new administrative targets laid out in economic plans, managerial directives, and professional agendas. Simply in being recoded as 'the environment', Nature already is transformed into Denature, or 'natural resources', for humachinic exploitation. Once the natural complexities of 'the environment' are so reduced, the intellectual apparatus behind their reduction also can legitimate many kinds of new social agendas, ranging today from cyborg nurturance to humachinic sustainability in, for example, Brundtland's 'common future' (World Commission, 1987) as we accept Kennedy's call to 'prepare' for the 21st century (1992).

The cyborg myth does engage the present in "transgressed boundaries, potent fusions, and dangerous possibilities" in which "cyborg unities are monstrous and illegitimate" (Haraway, 1991, page 154). And, by both accepting monstrosity and embracing illegitimacy, cyborg mythologies provide tremendously potent possibilities for both resisting and recoupling with today's terraforming systems of machinic power. Only if we resort to science fictions can the full impact of the world's extraterrestrialization by science fact be brought to our conscious awareness. The 'modern constitution' has changed; cyborgs must face its machinic amendments honestly. Quasified objects or subjects, like humachines and cyborgs, both coevolve in their denaturalizing effects, warping all organic drives as physical matter runs (con)fused with mental antimatter. Once we are aware of these changes in them/us, however, it seems unlikely that anyone/everything can consciously pretend to remain the same as they/it ever were/was. Even though corporate capital has been conscious of its terraforming transformative powers since at least the 1920s—after all a major theme of the 1939 New York World's Fair was, "It's a Man Made World", as its Trialons and Perispheres reconfigured Long Island—very few social theorists have been willing to face this evidence forthrightly. Indeed, as this preliminary exploration indicates, such science facts even now might only be glimpsed through refraction of these science fictions.

Once science fictions bracket the terraforming impact of science facts, however, the extraterrestrial origins of denatured second and third nature appear more clearly. And, though some small isolated groups of human beings may still live premachinically, like the iKung of the Kalahari, Haitian fishermen on Hispanola, Mongol herdsmen in Siberia, or even the House Amish of Pennsylvania, many more human beings live highly cyborganized lives, totally dependent upon the Denature of machinic ensembles anchoring the elaborate extraterrestrial ecologies of megatechnical economics. This is as true for the Rwandans in the refugee camps of Zaire as it is for the Manhattanites in luxury co-ops of New York City. Without the agriculture machine, the housing machine, the oil machine, the water machine, the electrical machine, the media machine, or the clothing machine, most cyborganized human beings cannot survive or thrive, because these concretions of machinic ensembles generate their basic environment. Hence, cyborgs, like us, are endlessly fascinated by machinic breakdowns, which would
cause disruptions in, or denials of access to, their megatechnical sources of being. Beirut in the fifteen-year civil war, Sarajevo in its two-year long siege, or the Road-warrior’s travels in postmegamachinic Australia are all dark revelations—in fact and in fiction—of what once were highly evolved cyborg beings, struggling to survive decyborganized societies without all of the life-support systems of humachinic megatechnics—oil machines, light machines, water machines, food machines, clothing machines, transport machines, or medical machines. These societies and spaces reveal something far worse than ‘the end of Nature’. They display the ‘death of Denature’ without whose bounty cyborgs lose both their identities with humachines and their differences from ordinary terrestrial life-forms.

Cyborg politics is worth considering. As Haraway (1991, page 151) argues, “the cyborg is resolutely committed to partiality, irony, intimacy, and perversity. It is oppositional, utopian, and completely without innocence”. Consequently, in contemplating any strategies of political change today, all myths of redemption through returning to some pristine Nature or recapturing a now lost organic wholeness by destroying mechanisms of alienation are rendered moot by constitutional changes (Latour, 1993, pages 138–145). “No longer structured”, Haraway continues, “by the polarity of public and private, the cyborg defines a technological polis based on a revolution of social relations in the oíkos, the household. Nature and culture are reworked; the one can no longer be the resource for the appropriation or incorporation by the other” (1991, page 151). The recognition of cyborg evolution confuses all existing boundaries. While seeking those responsible for their construction, however, one must remember that most existing boundaries, as defined in the old ‘modern constitution’, no longer divide what we think they do. A new constitution is being ratified: Nature is Denature, Society is humachinic ensembles, and Culture is cyborganizing.

Rules of environmental sustainability rather than territorial sovereignty, therefore, are being advanced more frequently and intently by cyborg authorities in the terraforming capitalist core with each passing year. Rich, powerful nations, like the humachinic system sustaining ‘we, the cyborgs of the United States’, now see ‘the earth in the balance’, caught between excessive territorial sovereignty and insufficient environmental sustainability (O’Tuathail and Luke, 1994). Hence, their ruling agendas favor a new worldwatch that might rerationalize the agricultural–industrial–informational metabolisms of their anthropogenic Denature by establishing the viability of new low-tech alternative technics or high-efficiency appropriate technologies for protocyborgs in Second, Third, or Fourth World settings as ‘sustainable development’. Within these new environmentalized ensembles, the developmentalized sustainability of Denature might be maintained, postponing the death of Denature for all. Otherwise, the prospect of everyone living in Beirut, Sarajevo, or, much worse, beyond the Thunderdome in new local nightmares, ranging from Grozny to Kigali, becomes a much more real possibility with each passing year.

Acknowledgements. A preliminary version of this paper was presented at the International Studies Association, 28 March–1 April 1994. Gary Downey, Paul Knox, Gearóid O’Tuathail, and Stephen K White all provided helpful comments on the initial drafts.

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