REVIEW-ESSAYS

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Till We Have Interfaces

N. Katherine Hayles. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* U Chicago P (fax: 773-702-9756), 1999. xiv + 336 pp. $49 cloth; $18 paper.

In my more feckless days, I just didn't get the term "postmodern." Coming to literature from history as I had, "postmodern" seemed plainly redundant; *modern* already said it was post-everything—post-ancient, post-classical, post-traditional, post-sacred, post-past. That is what the term modern *means* (so I thought). Might as well say "neo-new" or "hip chic." What would be next, "post-contemporary"? It is a postmodern truth universally acknowledged that today's parody is tomorrow's reality. Duke University Press currently features a publishing line called "Post-Contemporary Interventions" edited by Fredric Jameson, so this penny has finally dropped. The post-prefix is a joke on me and my kind, pedantic historical categorizers who need to name a current to tame it. Post-whatever is the bourgeois-baiting of the bohemian intelligentsia, letting us know that whatever hand-holds we rely on to balance ourselves are hopelessly passé. Yet what began as provocation ended as anxiety—anxiety that the critical language used to deconstruct any given concept will be revealed to be empty also. It is indiscriminate, this Concept-Killer. A double-edged chainsaw.

Post, as it turned out, was not necessarily intended to be a chronological marker.[1] In a Moebius-strip twist of logic, post-modern, post-contemporary, post-gendered, post-democratic, etc., don't refer to historical facts-on-the-ground, but to the concepts used to make them seem timeless and pure. Most post-structuralist theorists share a relentless ironic nominalism. Their basic move is to demonstrate the sleight-of-hand by which the putative real is emptied of its variety and richness by its general concepts, and then to show that these normalizing, usurping abstractions are empty also. Where the naive humanist might consider general concepts to be heuristic models for managing the chaos of empiria, postmodernist theory shows that they are merely powerful consciousness-altering names that can inspire consensual hallucinations passing for the Real.

It will be up to future historians to tally how many of these generalizing concepts so dear to humanistic thinking will have been posted in the end. From our present vantage, there's no reason why the ostensibly most solid categories should not melt into the post-past. Most of the non-materialist categories were posted long ago, when Darwin, Nietzsche, Marx, and Freud invented the

future. The fin-de-millénium's job has been the posting of science and materialism. In a while, matter, body, animal, gene, force, number, life, pattern, death, randomness—we'll probably see them all exposed as partisan ideologies.

The most topical of these postings in recent years, for theory in general and sf studies in particular, has been the post-human. It has developed out of the loose intersection of several distinct iconoclastic projects: deconstruction, cyborg feminism, research in Artificial Intelligence, Virtual Reality and Artificial Life, queer studies, evolutionary epistemology, nanotechnology, complexity theory, and sf. Posthumanism targets the classical humanistic paradigm in which an ideal human Self/Subject stands at the center of creation and commands all that is not made in Its image. Make that "His," of course, since this Subject/Self is the dynamo fueling every form of subjugation of a periphery by a center; hence the Self's complements are the Male, the Caucasian, the European and Euro-American, the Bourgeois, the Christian, the Heterosexual, the Able-Bodied, the Young, the Living, the Real, etc.—i.e., all the putatively ideological subject-positions of historical domination. Where posthumanism differs from most other postmodernist currents is the central role played by technology in its vision. More strictly discursive critiques have relied on rhetorical and political analyses of bourgeois humanism's claims. Posthumanism looks to the ways in which breakthroughs in information-technologies radically transform humans' ideas about their very physical being. Most varieties of posthumanism share with Harawayan cyborg theory an enthusiasm for dissolving boundaries once believed to be ontologically binding (especially between the organic and inorganic), and for alliances of human beings with nonhumans. But posthumanism is ultimately less concerned with politics, or even ethics, than with the transformation of reality when informatics is fed back into human social life at every level.

N. Katherine Hayles's *How We Became Posthuman* is a complex and immensely rich historical meditation on this intellectual development from its origins in the first rigorous formalization of information by Shannon and Wiener to the full-fledged posthumanism of Artificial-Life research. In many respects, Hayles's project is the same as Donna Haraway's. Both view the posthuman linking of human bodies with intelligent machines as a potentially liberating advance over humanistic ideologies of exclusion and domination, especially for women; and both view the posthumanization process as inexorable. But unlike Haraway, whose subject is the global network of techno-scientific institutions of meaning, Hayles is interested in the explicit arguments and philosophical ideas cybernetic researchers use to underpin their work. She concentrates particularly on the debates between two powerful schools of thought in the history of this research: the abstractionists, for whom information (and thus the "stuff" of intelligence, life, and consciousness) is independent of its particular manifestation in matter, and the theorists of embodiment, for whom information must be conceived in its particular incarnations, its "instantiations." Hayles is openly of the body's party, and the body in question is, for her, always, implicitly, human. Consequently *How We Became*

Posthuman confronts some of the nagging problems of cyborg theory: how to preserve the putatively liberal conceptions of agency and choice in a posthumanist world, and how to develop an ethics that will bind the cyborg to the human good.

In *How We Became Posthuman* Hayles perfects the method she developed in her previous books. She links the cultures of twentieth-century science and literature through a driving idea that appears in scientific research as a paradigmatic model, and in literature as a cultural metaphor. In earlier works these were field theory (*The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century* [Cornell UP, 1984]) and chaos theory (*Chaos Bound: Orderly Disorder in Contemporary Literature and Science* [Cornell UP, 1990]). Hayles characteristically discusses the history of the scientific development of her presiding model and punctuates it with subtle readings of the fiction of writers for whom the models worked as shaping principles. This method has produced some of the finest analyses in sf studies of Borges, Pynchon, Lem, and Nabokov's *Ada* (1969), as well as of important writings not related to sf by Lawrence, Henry Adams, Pirsig, and Doris Lessing. In *How We Became Posthuman*, Hayles braids the story of the evolution of information theory with brilliant discussions of Bernard Wolfe's *Limbo* (1952), Philip K. Dick's major novels of the late 1960s, and William S. Burroughs's *The Ticket that Exploded* (1962); in a metacritical finale she orchestrates readings of Greg Bear's *Blood Music* (1985), Neal Stephenson's *Snow Crash* (1992), Cole Perriman's *Terminal Games* (1994), and Richard Powers' *Galatea 2.2* (1995).

In Hayles's version, the posthuman condition is inextricable from the simultaneous desacralization of the human body and consciousness (desacralization is not Hayles's word, but it is useful). In the opening pages, Hayles offers the following attributes of posthumanism: 1) it privileges informational pattern over material instantiation, viewing the biological substrate as an accident of history rather than an inevitability of life; 2) it considers consciousness, traditionally regarded in Western thought as the seat of human identity, as an epiphenomenon, "a minor evolutionary sideshow" (2); 3) it considers the body to be a prosthesis, only the first in a potential series of material prostheses; 4) it configures the human body so that it can be seamlessly articulated with intelligent machines. In sum, "In the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals" (3).

Hayles is ambivalent about all this. On the one hand, the seamless suture of human being with intelligent machines liberates humans from liberal subjectivity's fantasies of control and makes them aware of their interdependence with other parts of the world. On the other hand, it fosters the illusion that the body is an insignificant appendage of human existence, and extinguishes the basis for personal agency. Without such agency and some provision for judgment, interdependence is indistinguishable from totalizing domination. Just as for Haraway, these sutures demand contestation. But for Hayles, unlike

Haraway, the problem of agency and choice cannot be dissolved into a network of multiply-coded significations, perpetually mutating and recombining, since this ignores the concrete material situation of particular human beings in space and time. For most posthumanists, Hayles argues, the notion that knowledge must be embodied knowledge has been displaced by the general idea adopted by postmodern culture "that information can circulate unchanged among different material substrates" (1). Rather than accepting increasingly dehumanizing fantasies that denigrate actual physical existence, Hayles offers her book as an intervention at "a critical juncture when interventions might be made to keep disembodiment from being rewritten, once again, into prevailing concepts of subjectivity" (5).

In Hayles's history, the problem of disembodiment begins with the first great *novum* of cybernetics, the Turing test. By positing that the representation of personal identity could be convincingly manipulated by machines, the test offered a way to redefine subjectivity in purely informational terms. This view was strengthened at every step in the career of cybernetics. *How We Became Posthuman* recounts that career in three stories: "how *information lost its body,*" "how *the cyborg was created as a technological artifact and cultural icon,*" and "how a historically specific construction called *the human being is giving way to a different construct called the posthuman*" (2; italics in original). These stories correspond to Hayles's three phases of cybernetics research: (1) the formalization of information as context-independent, without regard for the status of the observer (formalized in Claude Shannon's mathematization of information, the concept of homeostasis, and Norbert Wiener's linking of information with probability theory); (2) the introduction of reflexivity through the inclusion of the observer in the informational circuit (beginning with the systems-ecology of Gregory Bateson and culminating in Humberto Maturana and Francisco Varela's concept of autopoiesis); and (3) the transfer of emphasis from self-organizing information-systems as observable objects to their ability to "evolve" as self-transforming dynamic virtual systems in global programs such as Artificial Life (the open-ended simulation of organic evolution in computers).

Underlying this history of the cybernetic research-program is the gradual substitution in Western epistemology of a polarity based on presence and absence with another polarity based on pattern and randomness. Information theorists made information—which lacks physical presence and exists entirely in relations—seem essential and physical existence epiphenomenal. Consciousness, moreover, proved to be an unnecessary hypothesis for even the most humanistic cyberneticists.[2] Hayles is not interested in restoring the body and consciousness to sacred status. But she argues that in order to restore agency and history, concrete, situational embodiment is of pivotal significance—not for humans acting in a vacuum, but for their relations with the different technological media they interact with to create meaning. Hayles thus also writes a second, parallel history, accounting for the postmodern changes in technologies of inscription, from tape-recording to word-processing to virtual reality.

Being of the body's party, Hayles approaches her histories, to use an

unfashionable word, dialectically. Instead of a heroic (or tragic) account of the linear advance of cybernetics into posthumanism, Hayles concentrates on the debates in each phase between the ostensibly victorious abstractionists, on the one hand, and their critics who insisted that thought depends on the embodied form enacting it, on the other. These refuseniks, as in all dialectics, provided many of the ideas that propelled each successive wave of theory. Bateson, who came at the end of the first wave and built an epistemology out of the inclusion of observer into the informational circuit, has a pivotal role. (His role in the book is larger than Hayles acknowledges, as we shall see.) Francisco Varela, following his break with Maturana, is the theoretical spur to the third wave. But the most interesting figure in Hayles's telling, and the most carefully described, is Norbert Wiener. In a tour-de-force analysis of Wiener's language, Hayles shows how deeply divided he was between preserving certain cherished aspects of liberal subjectivity and following his own theoretical conclusions into models of dehumanization and disembodiment.

The implicit heart of Hayles's history is the story of the interface, a central concept adapted from physics by cybernetics and now shared by all sciences concerned with the mysteries of information-transfer across boundaries. The conquest of scientific and technological culture by information goes hand in hand with the extension of the metaphor of the interface to more and more aspects of culture. The continual reframing of the interface reflects the ways in which cybernetic scientists include increasingly comprehensive contexts in their theories of information flow. Beginning with the extremely narrow homeostatic mechanism of the first phase, reductive models like the McCullough-Pitts neuron (a "neuron" so simple and formalized that it cannot stand for the real neural body) won the day. This model was contested by its antagonists until it was, as Hayles describes it, turned "inside out" (160). By granting a role in the flow to the observer, second-wave cyberneticists like Bateson, Maturana, and Varela expanded the interface to include the entire physical-informational structure of the self-constructing system, on the one side, and the entire context of the environment, on the other. This model itself mutated topologically in the third phase, that of virtuality, when the interface is distributed as it were throughout "the world." In virtuality, according to Hayles, material reality is saturated at every level by information. In the third phase the hypothesis of the observer disappears, as action and emergence replace response and observation as defining characteristics of systems.

Dialectical this inner history may be, but Hayles also makes clear that the topological mutations of the interface are spurred by changes in technologies of human self-representation. When aspects of human communication are made manifest to the communicators, their immanence vanishes; they cease to flow (or be blocked) unconsciously, and they become problems for consciousness. Hayles shows how this problematic linking of machines that track and simulate human behavior—from the anti-aircraft gun to the tape-recorder to the computer—work symbiotically (cyborganically?) with human consciousness to create new questions about what is "naturally" human. She elaborates on this in a brilliant chapter on the way the audio tape-recorder radically undermines

the naturalness of human speech, even of semi-conscious subvocalizations. The tape recorder makes the natural flow of language into a problem of the interface between the human subject and a mechanical system capable of reproducing *and* radically manipulating it—erasing, splicing, dubbing, overlaying, etc. This problematization inspired the experiments of Burroughs, carefully analyzed by Hayles in a reading of *The Ticket That Exploded*. As technologies of inscription proliferate, so do human-machine interfaces, and by extension so do the "internal" human interfaces between the psychological observer and "inner" communications now refashioned in the image of the information-processing machine.

For many posthumanists, and not only the AI researchers, the human body becomes de-realized the more it is revealed to be a site for a variety of social inscriptions. As gender, organic physiology, life span and other "natural" givens are deconstructed, very little of bodily experience remains intact. For Hayles, by contrast, embodiment represents the particularity of existence, the point at which something like a responsible self interfaces with the world. Dominant notions of the self change with technological innovations in communications and with the location of the informational interface between systems. The subject/world interface changes as well. Emphasis on pattern and randomness as opposed to presence and absence resolves some difficulties. When, in virtuality, the interface between the human and the non-human is distributed throughout the world, the human can no longer even pretend to distinguish itself by its physical difference from the rest of creation. And yet for Hayles that embodied information-pattern capable of judging and acting for the good in its particular situation—whether it is called a self or something else—must survive or emerge. But what is it that can be preserved of the liberal human subject that is worth preserving? Given Hayles's respect for science and for ideas clear and distinct, she does hold some things worthy.

Respect for embodied knowledge is what makes literature vitally important for Hayles. It is, in a sense, the worldly counterpart of the constantly changing and yet mysteriously invariant problem of self/world interface. Fictional narratives are texts (abstract information, in a sense) and yet also self-realizing, engaged in a complex feedback/feed-forward circuit when they are read. In cybernetic terms, fictional narratives involve a very complex system of inter-inclusive analogical relations, among material texts, semiotic systems, readers, writers, the "culture-at-large," etc. They can also, once they are "decoded," generate reflections on these relations at a meta-level, creating a spiraling circuit of recodings. Hayles is especially interested in texts concerned with changes in the sense of the embodiment of the interface. Exemplary sf and slipstream novels show different ways that novelists try to make sense of the displacements of the classical liberal subject when it no longer can find itself in the interfaces with the fine dust of the information-world.

Hayles's discussion of Bernard Wolfe's famously bizarre *Limbo* forms one part of a diptych with her analysis of Wiener. She detects in Wiener's *The Human Use of Human Beings* (2nd ed. 1954) a language of equivocation so erotically charged that it calls out for psychosexual analysis. She continues this

analogy of cybernetics and sexual pathology into *Limbo*, where it is obvious at the surface level. (It seems likely that the psychoanalytic reading of Wiener was influenced by Hayles's reading of Wolfe, who was outspoken about his fascination both with Freud and Wiener.) A phantasmagoria of (barely) displaced castration-anxiety projected onto the entire male species, *Limbo*'s action is driven by a relentless process of splitting and tenuous prosthetic repair. Hayles suggestively claims that the novel's anxiety about bodily boundaries emerged from the early 50s culture of social paranoia. The fear of fusion that inspires the prosthetic and amputational grotesques in the novel reflects Wiener's similar anxiety about abandoning the untenable balance of the machine-human for the degendered cyborg. Throughout, Hayles demonstrates that Wolfe's highly original novelistic approach embodies in the text (the *body* of the text) a linking of prosthesis with writing that reflects the themes of the action.

The most impressive critical performance is a long analysis of Dick's major novels of the 1960s. There has been no lack of critical writing on Dick, and it has been the most varied in all sf studies. Critics tend to take one or another approach. We have Dick the Multiple Personality, Dick the Gnostic, Dick the Psychopomp, Dick the Cultural Critic, Dick the Visionary, Dick the Psychedelic. Much to her credit, Hayles's chapter titled "Turning Reality Inside-Out: Boundary Work in the Mid-Sixties Novels of Philip K. Dick" combines psychoanalytic, religious, political, and even (essentially for the first time) feminist interpretations of Dick's oeuvre through the mediation of cybernetics theory. In its second phase, cybernetics (of which Dick clearly had a rudimentary knowledge, shown by all those homeostatic rats and taxicabs) had posed the relationship of autonomous systems to each other in a drastic way. With the introduction of the observer into the communicational circuit, Maturana and Varela proposed the concept of the self-organizing system, which creates its own, self-isolated image of the world through analogy, never direct apprehension and connection with its environment or other systems. For Maturana, the relationships between self-creating (autopoetic) systems are stabilized by an inferred natural harmony that holds all systems in a certain balance. Dick intuitively took the relations among self-organizing systems as his main theme in the 1960s. His "observers," however, are not Maturana's stable systems; they are analogous to autonomous human subjects, interested not in structural balance, but in power. Instead of Maturana's stable harmony, Dick envisaged the possibility of infinite regress among systems perpetually striving to enclose others within themselves.

The chapter demonstrates Hayles's method at its best. Different aspects and levels of reading feed back and feed forward to create a dynamic and constantly self-developing sense of meaning. It is a concrete demonstration of her thesis that narratives localize and embody theory by binding the theory to the actual condition of embodied human beings. Beginning with Dick's obsession with his twin sister, Jane, who died in infancy, Hayles traces the course of his complex sense of lack into his omnivorous fear of incorporation by women and the market world. Hayles psychoanalyzes Dick deftly, without heavy-handedness,

because the psychoanalytic framework is "included" among other approaches. In fact all the "levels" of meaning ultimately inter-enclose each other in her reading. In this way, Hayles reads in Dick's career—from *We Can Build You* (wr. 1962; pub. 1972) to *Do Androids Dream of Electric Sheep?* (wr. 1966; pub.1968) and *Ubik* (wr. 1966; pub. 1969) on—a trajectory leading from the malevolent weakening of boundaries associated with the effect of the schizoid "dark-haired girl" on the weak schizophrenic protagonist unable to defend his self-domain, to the modest resolutions of the later novels, in which some autonomy, however meager, is attained in a system of equally autonomous beings. The overpowering sense of boundary dissolutions and ambivalence created by Dick's novels reflects the difficulty of having to live in relationships without being able to define a stable self.

At the end of *How We Became Posthuman*, Hayles applies a self-adapted version of the Greimasian semantic rectangle to four novels, "tutor texts" that she believes represent the main possible combinations for imagining narratives of virtuality. In each, the border contest between human embodiment and computer inscription is played out differently. In Bear's *Blood Music*, nanotechnological noocytes absorb and then discard the human body, ostensibly in an evolutionary leap forward. Set across the diagram is Perriman's *Terminal Games,* in which an AI program treats human embodiment as part of its VR program. At the poles of the intersecting axis, Hayles locates Stephenson's *Snow Crash* and Powers's *Galatea 2.2.* In a subtle reading of Powers's oversubtle novel, Hayles's identifies the view that even artificial intelligence must acquire a sense of embodiment. At the other end of the line, Hayles offers a graceful reading of a novel that I had previously treated only as a parody of Gibson. For Stephenson, humans and computers already are equivalent, shown by the virus of the title which crosses from computers to the human brain. In the novel's vision, human rationality, so much a part of the liberal subject, acts as a higher level coding allowing humanity to escape from the ultimate dehumanization that the identification of machine and computer presages.

I wrote earlier that Hayles does not wish to revive the body's or consciousness's sacredness. She never deviates from the discourse of materialism into religious or spiritualistic language. Nowhere in *How We Became Posthuman* does she openly reject posthumanist assumptions. It is striking, nonetheless, how deeply Hayles's version of the critique of posthumanism emphasizes the value of limitation and finitude—i.e., mortality and *boundedness*. She writes:

> If my nightmare is a culture inhabited by posthumans who regard their bodies as fashion accessories rather than the ground of being, my dream is a version of the posthuman that embraces the possibilities of information-technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude as a condition of human being, and that understands human life as embedded in a material world of great complexity, one on which we depend for our continued survival. (5)

Now, mortality and boundedness are not posthumanists' favorite concepts; in fact antagonism to them might be considered the *raison d'être* of posthumanism. They smack of the need for transcendence. Cyborg theory

associates transcendence with ideological boundaries: the cyborg's transgression of boundaries and rejection of essences is above all a refusal to believe in the givenness of things, in necessity. Brian McHale treats postmodernism as a cultural obsession with ontology, a suspicion of the putative boundaries of being and life. Every posthumanist writer must needs reflect on the questions of mortality, if only because technology comes closer and closer to promising extraordinary longevity, and even deathlessness.[3] Hayles, however, implies that boundaries, even if they are not essential, should be treated with respect. Without boundaries, there are no patterns, there are no interfaces.

It is remarkable and refreshing to read a book about the embodiment problem in posthumanist culture whose tutelary genius is not Foucault, Deleuze, Baudrillard, Haraway, or the other demi-oracles of postmodernism. Hayles's inspiration comes rather from Bateson, a profoundly original thinker inexplicably neglected by postmodernist writers. It's not clear, in fact, whether Hayles is aware how much she shares with Bateson. *How We Became Posthuman* cites only two of Bateson's own writings—one essay from *Steps to an Ecology of Mind* (1972) and another from *A Sacred Unity* (1991); Hayles relies instead on accounts by his daughter, Mary Catherine, of her father's views in *Our Own Metaphor* (1972). I find this tactic odd, since Hayles carefully reads the original works of Wiener, Maturana, and Varela. It may, however, only be a tactic, since often in the book she approaches her subjects from the flank, through the points of view of surprising observers. The first cyberneticists, for example, take the stage via a close reading of the transcripts of the Macy Conferences, a series of elite gatherings of the illuminati of cybernetics research held in the early 1950s. Approached in this way, cybernetics is seen, not as a pure emergence, but as a contest between different voices—including even the "silent voice" of the only woman involved in the conference, the recording secretary Jane Freed. So perhaps there's method in recounting Bateson's notion of analogy as the basis for a system's self-construction through his daughter's reflections.

Yet I can't help but think Hayles loses something by neglecting to elaborate on Bateson's writings. Her reading of Dick, for example, rich as it is, misses an important opportunity by not seeing the link between Bateson's theory of the double-bind and Dick's worldview. That theory, which was well-known in the San Francisco Bay Area culture in the 1960s, when Dick lived in Marin County, deeply influenced contemporary discourse about schizophrenia, drug-addiction therapy, and the popular notions of mental illness as an alternate reality proposed by Bateson's friend R.D. Laing. In several essays, Bateson and his associates proposed that schizophrenia was a communicational pathology, caused by a pattern of double-binding in a family system. A child would be given direct messages that would be routinely contradicted by the contexts (often non-verbal meta-messages) in which they were emplaced. The child would have to cope with the contradiction; sometimes it would choose to ignore the context, sometimes the message, but in any case he or she would have to deny some key knowledge about the communication. Since these double-binds always involved deep affectional relationships, the child was

placed in a damned-if-you-do/damned-if-you-don't situation that he or she would be utterly unable to resolve. Bateson considered the double-bind theory to be the cornerstone of a new epistemology which was based on the relationships of different levels of communication. He perceived them not only in human relationships, but in living nature as a whole, linking ecology with human communication.[4] Most human problems could be seen as pathologies of co-ordinating messages and contexts, albeit terrifically charged with emotion and need.

The significance of this theory for Dick cannot be underestimated, in my view, for Dick considered both his own personal existence and the historical condition of the human species as a double-bind on such a grand scale that the very substance of reality was deranged by it. This is not the place to elaborate on the point, but it does call into question what Hayles perceives as a resolution of the autonomy/containment problem in Dick's novels. While it is true that the late 60s novels strive for a modest balance among autonomous systems, we have only to look at *A Scanner Darkly*, published in 1977, for proof that Dick believed his resolutions would always fail, precisely because human truths are embedded in hostile cosmic contexts. In *Do Androids Dream*, the Mercer-surrogate tells Deckard:

> "You will be required to do wrong no matter where you go. It is the basic condition of life, to be required to violate your own identity. At some time, every creature which lives must do so. It is the ultimate shadow, the defeat of creation; this is the curse at work, the curse that feeds on all life. Everywhere in the universe." (§15:156)

Nine years later, in *Scanner*, Donna, the undercover narcotics agent who is on her way to deliver the degenerated Bob Arctor to the New-Path rehab center, thinks similar thoughts:

> It requires the greatest kind of wisdom, she thought, to know when to apply injustice. How can justice fall victim, ever, to what is right? How can this happen? She thought, Because there is a curse on this world, and all this proves it; this is the proof right here. Somewhere, at the deepest level possible, the mechanism, the construction of things, fell apart, and up from what remained swam the need to do all the various sort of unclear wrongs the wisest choice has made us act out. It must have started thousands of years ago. By now it's infiltrated into the nature of everything. (§13:236)

Dick's Manichean anguish projects Bateson's double bind into the universe. Not even the messages of *VALIS* can contain the antagonistic context.

In more general terms, it is a discussion of *Mind and Nature* (1979) that I miss most. In that work Bateson articulates the philosophy that lies closest to Hayles's own purposes—though it is clear that Bateson makes a fundamental, essential distinction between the world of the living and the nonliving that Hayles is no longer willing to make, adopting Jung's Gnostic vocabulary for them, *creatura* and *pleroma* (terms very familiar to Dick). It is there that Bateson develops the notion that morphological development and narrative are cognate, i.e., that physical embodiment and narrative follow the same

constraints (as do also play, humor, and learning). It is there that he describes the universe as a stochastic process, a dialectic of pattern and randomness. It is there that Bateson fully describes his axiom of double descriptions, i.e., that all learning is a product of relationships between two creatures, and "a relationship is always a product of double descriptions."[5] I believe this tenet is what inspires Hayles throughout *How We Became Posthuman*, and indeed her career as a whole. To capture the peculiar knowledge of posthumanism, Hayles combines the very different patterns of scientific understanding and fictional narrative. Double descriptions are required because they are in the nature of the subject: technology and emotion, inscription and embodiment, pattern and randomness, presence and absence. They are all "doubly fractionated" (another of Bateson's terms) simply because they are context-creating relationships of our culture.

How We Became Posthuman is a brilliant book. But like most books engaged in the posthumanist project, it seems to end in anxiety. That we have had good riddance of the liberal subject of possessive individualism is one thing; what will replace "man" is another, and the brilliance of deconstructive analysis does not leave much behind to rely upon. The dissemination of virtualizing technologies, the gist of the third phase of information theory, makes the human-machine interface appear to posthumanists to be the only game in town. In this implosion of attention to the relationship between human beings and their own constructs, the relationships between humans and any other domain appear to be subsumed. It may be naive to wish for a return to Bateson's distinction between the *pleroma* and *creatura*. Yet the inability to see any fundamental distinctions in nature, an inevitable result of the ideology of information-theory and de-essentializing cultural criticism, appears so far to have led to little thinking about the place of human activity in an already complex and barely explored given world. There are other stories. Perhaps mortality itself, the great enemy of many posthumanist technophiles, may not be such a great evil, and worldviews in which human death has a significant role in the nature of things may not be useless atavisms. I can't help but hope that *How We Became Posthuman* presages a new, fourth phase of cybernetics, in which virtuality will have to relate to a sophisticated acceptance of natural creation. Without a renewed respect—and responsibility—for what VR engineers used to disparage as "vanilla reality," Hayles's desire for an embodied but distributed subjectivity seems doomed to failure, with posthuman simulations extending into every important aspect of human life. The naturalist's world is completely absent from Hayles's story. Until we have interfaces with that world and the sense of aesthetic pattern it inspires, there seems to be no reason why the virtual body will not consume as much of the natural as it is able, leaving us not only post-gendered and post-contemporary, but post-alive, post-here, and post-now.

NOTES

1. Brian McHale, *Postmodernist Fiction* (New York: Metheun, 1987), 5.
2. One need only look to Hans Moravec's notion, in *Mind Children: The Future of*

Robot and Human Intelligence (Cambridge: Harvard UP, 1988), of consciousness as a database downloadable to a disk, like the Dixie Flatline in William Gibson's *Neuromancer* (1984), to the prophetic projections of Ray Kurzweil's *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (New York: Viking, 1999), or to the various cyborg constructions in Bruce Sterling's *Holy Fire* (1996), Greg Egan's *Permutation City* (1994), all three of Gibson's cyberspace trilogy, etc.—not to mention the extravagant promises of nanotechnology. I am grateful to Ross Farnell's doctoral dissertation for a synthetic discussion of these posthumanist visions.

3. McHale, 10-11.

4. The basic texts are "Towards a Theory of Schizophrenia" and "The Group Dynamics of Schizophrenia," in *Steps to an Ecology of Mind* (New York: Ballantine, 1972) 201-227, 228-270; and "The Birth of a Matrix or Double Bind and Epistemology," in *Beyond the Double Bind*, ed. Milton M. Berger (New York: Brunner/Mazel, 1978), 41-64.

5. *Mind and Nature: A Necessary Unity* (New York: Dutton, 1979), 147.