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Singularities: technoculture, transhumanism, and science fiction in the 21st Century

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SINGULARITIES:
TECHNOCULTURE, TRANSHUMANISM, AND
SCIENCE FICTION IN THE 21ST CENTURY

by

Joshua Thomas Raulerson

An Abstract

Of a thesis submitted in partial fulfillment of the requirements for the Doctor of
Philosophy degree in English in the Graduate College of The University of Iowa

May 2010

Thesis Supervisor: Professor Brooks Landon

A spectre is haunting contemporary technoculture: the spectre of Singularity. Ten years into a century thus far characterized chiefly by the catastrophic failure of global economic and political systems, deepening ecological anxieties, and slow-motion social crisis, the only sector of our collective cultural myth of Progress still vibrantly intact is the technological – a project which, in vivid contrast to the systemic failure that seemingly prevails at nearly every other level, continues to charge forward at breakneck speed. Since the late twentieth century, prompted by the all-but-exponential growth of machine intelligence and global information networks, and by the still largely obscure but increasingly profound-seeming implications of emerging nanotechnology, futurists and fabulists alike have postulated an imminent historical threshold whereupon the nature of human existence will be radically and irrevocably transformed in a sudden explosion of technological development. This moment of transcendence, it is supposed, is at most only a few years off; indeed, some say, it may have already begun.

The "Singularity" – a term coined in 1986 by the mathematician and science fiction writer Vernor Vinge, and subsequently adopted throughout technocultural discourse – is at present the primary site of interpenetration between technoscientific and science-fictional figurations of the future, an area in which the longstanding binary distinctions between science and SF, and between present and future, are rapidly dissolving. As much as the Singularity thesis implies a total reorganization of society and of the self – which posthumanist cultural studies and cyborg theory have already begun mapping – it also poses a daunting existential challenge to the enterprise of SF itself, to the extent that the Singularity imposes what Vinge has described as "an opaque wall across the future," an impenetrable cognitive obstacle beyond which the extrapolative

imagination cannot glimpse. For a genre long defined by its efforts to assert, through the narrative technique of extrapolation, a meaningful continuity between present and future, the Singularity presents a thorny problem indeed, demanding both a reevaluation of SF's conception of and orientation toward the future, and a new narrative model capable of grappling with the alien and often paradoxical complexity of the postsingular.

This study is an inquiry into the properties and problematics of Singularity across fictional and nonfictional discourses, and as such it operates on two levels. Reading Singularitarian literature against a broadly articulated context of fringe-science and transhumanist movements, consumer culture, political and economic theory, and related areas of contemporary cyber- and technoculture, I examine how the metaphor of Singularity structures and signifies the aspirations and anxieties of late-twentieth and early twenty-first century technocivilization. As a project of literary criticism specifically, the study works to identify and theorize a grouping of texts that is emerging from cyberpunk and postcyberpunk tendencies in contemporary SF, organized around the premises of Singularity and the posthuman, and classifiable primarily in terms of an attempt to mount a response to the formal and conceptual problems Vinge has identified. Primary readings are drawn from a wide-ranging selection of twentieth- and twenty-first-century technocultural fiction, with emphasis on SF works by Charles Stross, Cory Doctorow, Neal Stephenson, Bruce Sterling, Rudy Rucker, and William Gibson.

Abstract Approved: _____
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Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph. D. thesis of

Joshua Thomas Raulerson

has been approved by the Examining Committee for the thesis requirement for the
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                  Laura Rigal

For Amy, the strongest person I know
and Greta, who embodies the living future-present

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CHAPTER I
SINGULARITIES

In the distant future, a handful of 21st-century humans are emerging from fifty million years in suspended animation to find their world utterly transformed. Continents have shifted and converged, creating whole new topographies and climates, while plant and animal life have pursued startlingly novel and in some cases unrecognizable evolutionary trajectories. Most disturbing of all, the planet is completely depopulated, with all traces of human civilization lost to the passage of time. To make matters worse, one of the leaders of the nascent human effort to re-establish technological civilization has been murdered. The opening of Vernor Vinge's 1986 novel *Marooned in Realtime* thus introduces two mysteries to be solved in tandem: what became of humanity, and who is the killer among the survivors? In the course of the investigation we meet a series of potential suspects, each of whom has a pet theory purporting to account for the apparent "Extinction." Each hypothesis is considered in turn, but each is ultimately dismissed. Alien invasion? Compellingly science-fictional, but paranoid and rather too pessimistic for Vinge's liking. Ecological crisis? Tree-hugging nonsense! Nuclear armageddon? *So* twentieth century – human beings are far too resourceful, Vinge reckons, their civilizing impulse too robust to be permanently undone by one little global thermonuclear exchange.

In the end, only one explanation is left standing. The answer lies in a retrospective analysis and logical forward-extrapolation of the period leading up to the disappearance of *Homo sapiens*:

> "During the last two thousand years of civilization, almost every measure of progress showed exponential growth. From the nineteenth century on, this was obvious. People began extrapolating the trends. The results were absurd: vehicles traveling faster than sound by the mid-twentieth century, men on the moon a bit later. All this was achieved, yet progress continued… (109)

"By 2200, we could increase human intelligence itself. And intelligence is the basis of all progress. My guess is that by mid-century, any goal – any goal you can state objectively, without internal contradictions – could be achieved. And what would things be like fifty years after *that*? There would still be goals and there would still be striving, but not what we could understand.

"To call that time 'the Extinction' is absurd. It was a Singularity, a place where extrapolation breaks down and new models must be applied. And those new models are beyond our intelligence." (110-11)

Human beings, in other words, couldn't have simply died off; they must have transcended to a new and unfathomably higher order of existence, leaving no trace behind. They might have learned how to translate their consciousness into software and beamed themselves into space, or spontaneously evolved into some disembodied universal mind. Perhaps they mass-migrated to another star system or slipped through a quantum loophole into another dimension. It is impossible for Vinge or his characters to say: wherever those people are now, and whatever it is they might be doing, is so far "beyond our intelligence" that speculating about it is all but meaningless.

With this passage, *Marooned in Realtime* becomes the first work of fiction to explicitly address the idea of technological Singularity – Vinge's own coinage – a premise that has come to constitute one of the most prevalent and captivating subjects in contemporary science fiction. It is, moreover, a concept that has transcended science fiction narrative and absorbed nominally nonfictive scientific and technocultural discourses into its orbit, taking on the truth-value of a serious nonfictional hypothesis and becoming the subject of a larger cultural interrogation. This study will join that interrogation, identifying three major strains of Singularity discourse that straddle the rapidly dissolving epistemological divide between fiction and consensus reality, and arguing for their importance. But first we need to understand more of the provenance of the term.

In Vinge's definitive conception, the Singularity is a trans-historical threshold situated in our near or immediate future, upon which the nature and form of human existence is profoundly, irrevocably, and unfathomably altered by a sudden explosion of technological development. No mere landmark on the regular course of human progress, it is an ephochal event – a rupture so abrupt and dramatic that it cannot be comprehended except by those who experience it directly. In some ways, this vision is just a particularly vivid and extreme manifestation of impulses that have always been latent in the imagination of SF, a genre long defined by the presumption of a future radically transformed by technological change, and frequently haunted by existential and eschatological spectres.

What is extraordinary about this particular fictional trope, though, is the second life it enjoys outside the SF ghetto, as a hypothesis being argued across a range of technocultural, academic, political, and popular contexts. Alongside the recently fashionable theoretical figures of the cyborg and the posthuman, the idea of Singularity increasingly appeals to humanities scholars and scientists, cultural commentators and prognosticators, political and economic theorists, and other thinkers in search of conceptual handles and new vocabularies for negotiating the complex and ambiguous terms of globalization, bioethics and technoculture on the threshold of the twenty-first century. These nonfictional Singularity discourses are all engaged, at one level or another, in a paradoxical attempt to describe an imminent future – or rather, perhaps, an immanent present – that represents not merely an altered reality but an entirely *new* reality, so unlike ours today as to be literally unrecognizable.
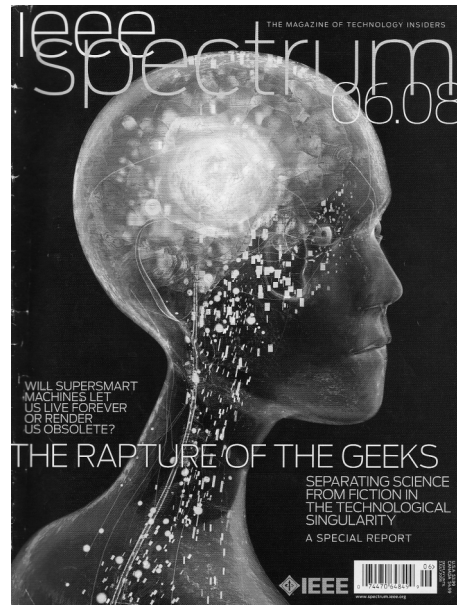
Figure 1: Cover of *IEEE Spectrum*, June 2008.

A leading trade publication for computer-industry engineers and the self-styled "magazine for technology insiders," *Spectrum* published a special Singularity issue in 2008, entertaining scientific arguments for and against the hypothesis, and purporting to "[separate] science from fiction in the technological Singularity."

In one sense, as Colin Milburn has proposed, all such discourses could be termed science fiction to the extent that each takes place within a speculative feedback loop wherein SF texts draw from nonfiction science texts – which, in turn, frequently cite SF to illustrate and dramatize their scientific speculation. Caught in the center of this ever-tightening loop are a growing number of fringe-science cults and technocultural movements that increasingly recognize little if any distinction between fictive and nonfictive Singularity discourses, reading SF as a script for a redemptive future they await with the oracular self-assuredness of the devout. More subtly and indirectly, moreover, as a variant of the pervasive millennial anxiety that often attends moments of historical crisis and uncertainty, the peculiarly apocalyptic tenor of Singularity has begun to seep out and color the broader cultural imagination.

Exponentialist historiography: an introduction

What is it that makes the Singularity such an alluring metaphor for the present historical moment? If only for those inclined to a belief in technological Singularity in the most extreme and literal terms, it may be the degree to which the Singularity thesis presents an appearance of almost mechanical predictability, a mathematical certainty that may be posited at the end of a transparently logical (though carefully qualified) set of proofs. To wit: if ongoing technological progress is accepted as given, and if the history of technological development to date can be plotted as an upward curve that assumes an exponential shape, then indeed there is nowhere else to go. These premises are implicit in the reasoning Vinge's characters expound in *Marooned*, and startlingly explicit in the writings of inventor and futurist Ray Kurzweil, arguably the nonfiction writer most commonly associated with Singularity discourse.

While the broad outlines of Kurzweil's predictions themselves are more or less apparent from the titles of such futurological bestsellers as *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (1998) and *The Singularity is Near* (2005), the reasoning behind them requires some unpacking. Kurzweil takes as his starting point an observation attributed to Gordon Moore, one of the pioneers of the modern computer industry, that for as long as electronics have been manufactured the processing power of integrated circuits relative to the cost of their production has doubled approximately every two years; extrapolated forward indefinitely, this pattern is, by definition, exponential – advancing by an order of magnitude with each iteration. Since it was first formulated in the 1960s, "Moore's Law" has more-or-less accurately predicted the rate at which chips become faster, more powerful, and cheaper. Despite this impressive record, however, Moore's Law comes with an expiration date, which Kurzweil duly acknowledges: since the '60s engineers have acknowledged that it becomes physically

impossible to shrink electronic circuits below a certain atomic scale, a floor that at the current

rate will have been reached by the 2020s. Indeed, in the decade since Kurzweil began putting his

eggs in Moore's basket, chips themselves have essentially already reached the limits of

miniaturization, and the problem of scaling up processing power has largely become a question

of making multiple processors function together more effectively.
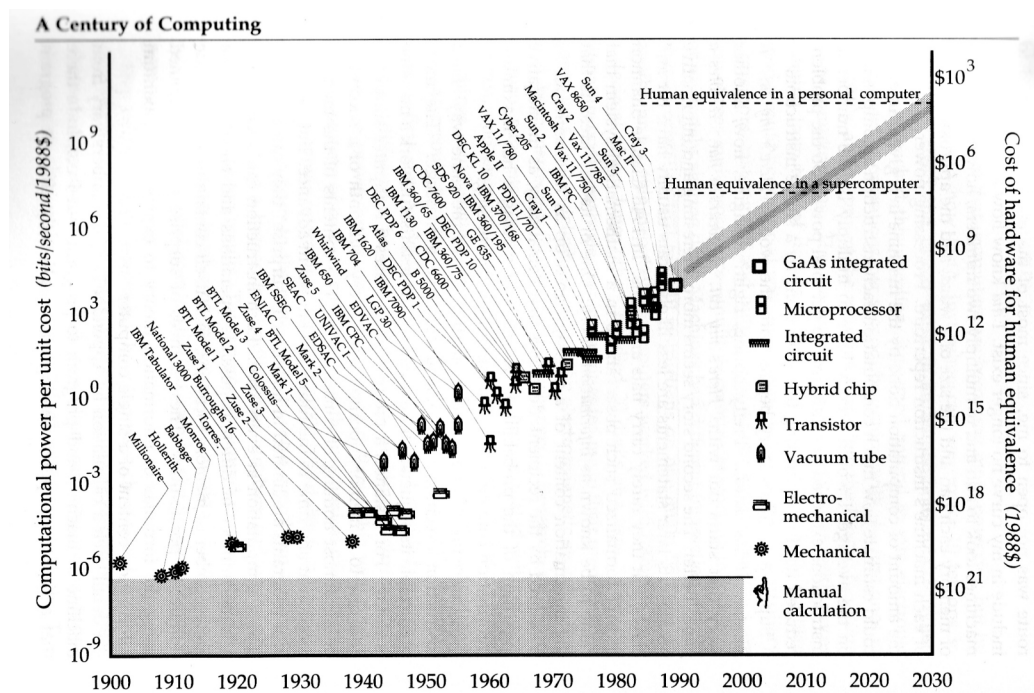
Figure 2: "A Century of Computing."

Source: Moravec, Hans. Mind Children: The Future of Robot and Human Intelligence.
Cambridge: Harvard U P, 1988. 64.

Roboticist and transhumanist Hans Moravec's startling predictions in *Mind Children* are driven
by an exponentialist historiography of computing technology, similar to Kurzweil's, predicting
that within the first few decades of the 21st century computers will exceed the data-processing
capabilities of human brains.

An observer less deterministically invested in the cosmic grandeur of technological progress might be content to accept such limitations, but not Ray Kurzweil. Instead, he undertakes to prove that Moore's Law reflects only the most recent segment in a much longer curve, encompassing the entire pre-electronic era of machine computation going back to the nineteenth century. Marshalling an impressive array of charts and graphs, Kurzweil expands and inflates Moore's Law into his own "Exponential Law of Computing": for the last hundred years, at a rate that is itself increasing, "the speed and density of computation have been doubling… regardless of the type of hardware used" (25). Having established that Moore's Law is, therefore, not "just a set of industry expectations and goals" but in fact "part of a deeper phenomenon" (29) of exponential improvement in machine computation, Kurzweil broadens the scope to include non-computing technologies in his list of milestones – "the bicycle, sewing machine, typewriter, telephone, phonograph…" (15), all the way back to the flint-napping origins of all technology – that also slot neatly into the exponential curve he is retrospectively constructing. This curve now circumscribes the entire history of civilization: from stone tools to superconductors, the pace of progress has always been accelerating.

Kurzweil doesn't stop there. It's not just technology that seems to develop on an exponential curve, it's biology too: all of human evolution, in fact, going back to our earliest unicellular ancestors, and further, to the chemical precursors of organic life, can be plotted on the same graph as a series of paradigm-shifting leaps forward – events that may have transpired hundreds of billions of years apart, but have nonetheless been happening with ever-increasing frequency ever since the Big Bang. Processes of biological adaptation and technological development are therefore not merely analogous with respect to their role in driving human history at different stages; they are one and the same, a single continuous operation pegged to the

rhythm of time itself – which furthermore, Kurzweil announces, is literally "speeding up" (11).
Technology, in this formulation, is simply "evolution by other means" (14), and mechanized
computation is nothing more or less than the "inevitable" product of technological evolution
(18).
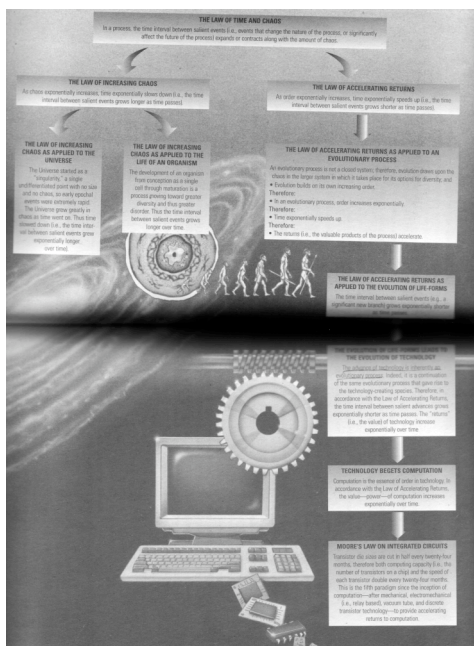
Figure 3: "The Law of Time and Chaos"

Source: Kurzweil, Ray. The Age of Spiritual Machines: When Computers Exceed Human
Intelligence. New York: Penguin, 1999. 26-7.

Kurzweil presents the history of the universe as a series of cosmic events conspiring to bring
about machine intelligence.

That this primordial pattern of recursive doubling in human cleverness and capability has
gone mostly unnoticed until now is attributable to the deceptive dynamics of exponential
processes: in their early stages, they plod along at a pace that appears all but linear, before
abruptly rocketing upward.[1] Only now – through the microcosmic lens of local phenomena like

the industry trend Moore famously identified – are we becoming aware of the quickening pace of history, because we are at long last approaching the "knee of the curve," the point at which the long-dormant exponential process will "explode with unrelenting fury" (39), making things very strange indeed, very quickly indeed.

As a rhetorical device, the statistical model of exponential growth proves exceptionally potent in both directions. The further Kurzweil backward-extrapolates into the past, the fewer and farther between are the epochal paradigm shifts he expects to encounter, allowing him broad latitude to cherry-pick and position bits of quantitative data to best suit his narrative. At the opposite end, the certainty of a Singularity-like development in the near future becomes virtually unquestionable: with the full momentum of all history behind it, Kurzweil's curve can scarcely be impeded by anything so trifling as the physical limitations of silicon chips. Moore's Law will sunset as predicted, certainly, but only insofar as it pertains specifically to the current industry-standard technology of integrated circuits. The acceleration of computing power itself will proceed, at a faster and faster rate, utilizing new and presently unknowable means. To do otherwise would be to violate the principle of exponentially accruing progress that Kurzweil has posited as a "law" of nature.

Kurzweil is the first to admit that he can't know precisely what these new means and modes of computation will be, though he's willing to field a few educated guesses: 3D chips, quantum computers, and biocomputing models are all worthy candidates. Kurzweil doesn't trouble himself overly with the details; in the end it will be a problem for the machines – godlike artificial intelligences, or perhaps cybernetically amplified posthuman minds – to work out. It's a good bet, after all, that conventional processors will have reached and surpassed human-equivalent brainpower before the clock runs out on Moore's Law in any event, and from there

it's only a matter of time before "our intelligent technology takes control of the creation of yet more intelligent technology than itself" (47). When intelligent machines finally take on the project of recursively re-designing and optimizing *themselves*, things will really get interesting.

"An opaque wall across the future"

Where Kurzweil's selectively rendered historical argument demonstrates the unmistakable (if not unproblematic) logical appeal of the Singularity thesis, his abrupt leap into the unknown and unknowable territory of machine autopoiesis – and even more so his deference to the prerogatives of presently nonexistent superior beings, who will be along any day now to take up the torch of evolutionary progress – testify to the uniquely slippery and fraught character of Singularity in its larger implications. For while the ineluctable certainty of the event itself may be an all-but-foregone conclusion, any attempt to limn its shape and texture is not just tricky but inherently paradoxical: recall that in the Vingean formulation it is definitionally impossible to know what will happen in a Singularity or what life might be like thereafter. Hence, perhaps, a clue to its deeper appeal, as a metaphorical construct of extraordinary elasticity and versatility – a theme to be meditated upon rather than a problem to be resolved.

As only the most supple and seductive of paradoxes can, the concept of Singularity presents a framework for thinking-through the ramifications of the present historical moment by projecting them onto a near-future that may appear variously as utopian, dystopian, or ambivalent, as needed. It addresses a persistent human need for *telos* while simultaneously acknowledging the persistent failure of past teleologies to encompass and account for the complexity and the particular strangeness of the world as it now presents itself. Though characteristically marketed in a secular language of science and putatively objective history,

Singularity may be more usefully approached as a kind of technocultural *kōan* – a riddle that cannot ultimately be solved but which might, in the attempt, occasion the exorcism, transmutation, or redirection of much cultural nervous energy and cognitive dissonance. Such attempts, inherently paradoxical to begin with, may be particularly revealing not so much in what they accurately predict, but in what they attempt to imagine, and in what kinds of assumptions they tend to project onto the *tabula rasa* of a supposedly unknowable future. In this sense, Singularity discourse may be said to conform more satisfyingly to a logic of narrative than of scientific inquiry, a quality entirely befitting its literary origins.

On this point it is worth noting that both discursive modalities of Singularity, fictional and nonfictional, were initiated by the same person: a math professor and computer scientist by day, writing SF (at least initially) as a side project, and peddling Singularity in both fields. Yet while Vernor Vinge gets more or less universal credit for naming the Singularity, most popular accounts of the idea's genealogy refer specifically not to 1986's *Marooned in Realtime* or any other work of fiction, but to a nominally nonfictional talk Vinge gave several years later at a NASA-sponsored symposium, still later adapted for publication in *Whole Earth Review* under the title "The Coming Technological Singularity: How to Survive in the Post-Human Era" (1993). Addressing an audience of working scientists and engineers, and without the cover of metaphorical hedges or poetic-license disclaimers, Vinge made the unvarnished and subsequently hugely influential prediction that "within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended."

It is impossible, and probably immaterial, to say whether the idea began in Vinge's imagination as a serious scientific hypothesis and blossomed thence into a crackerjack SF

premise, or vice versa. What is remarkable is that even in pitching it to a roomful of programmers, researchers, aerospace engineers, and assorted professional technologists, he opens with a discussion of Singularity in its narrative dimension, pointedly and repeatedly highlighting its deep roots in SF. Tracing its conceptual genealogy through the genre, Vinge supposes it was the "hard" SF writers of the 1960s and '70s "who felt the first concrete impact" of the looming Singularity and found their imaginations utterly confounded by it. Working, as hard SF has always done, to logically extrapolate plausible futures from current discoveries and developments, SF writers watching the seemingly exponential growth of the early computer industry and contemplating new research in machine intelligence were startled to find that "their most diligent extrapolations resulted in the unknowable… soon." Where SF had once been able to open a window onto future events, it now stood before "an opaque wall across the future," its prophetic visionaries unable to see around the knee-of-the-curve that, by the early sixties, was already taking shape.

In Vinge's account, the methodological problem attendant upon the writing of SF in a period of frenzied technological growth prefigures the paradox inherent in all Singularitarian discourse: the impulse to "paint a picture" of a possible future, problematized by the impossibility of thinking across a cognitive barrier whose impermeability is absolute and agreed-upon. In articulating SF's dilemma thus Vinge deploys metaphors of visual obstruction – an "opaque wall" beyond which linear extrapolation cannot "see" – a rhetorical gesture that Colin Milburn, in *Nanovision: Engineering the Future* (2008), identifies as characteristic of Singularity talk. In Milburn's argument, in fact, the problematics of Singularity are explicitly optical, our view of the postsingular occluded by inadequate perceptual mechanisms:

> We cannot see past the Singularity because to do so would involve an entirely different way of seeing, a new epistemological orientation toward the world, a new thinking of

being that is no longer the perspective of the human, but instead that of the posthuman…
[We] require other forms of perception unhampered by epistemic limitations of the
visible or intelligible. (5)

This new kind of sensory apparatus is what Milburn calls nanovision: a way in which

emerging nanotechnology penetrates the opaque wall of Singularity, both physically and

metaphorically opening perceptual pathways through which a postsingular reality might be

glimpsed. The vehicle whereby this trailblazing work is being carried out – "nanowriting" (22) –

is a hybrid discourse animated by the complex rhetorical interplay between categories of "real

science" and "science fiction" (24), in which the fruits of the former are variously read as

inspiration for, counterfeited by, de-legitimized by association with, or more fantastic than

anything envisioned in, the latter. Recalling Jean Baudrillard's argument that the categories of

science and SF are third-order simulacra and hence no longer interdistinguishable, Milburn

deconstructs nanowriting's attempts to shoehorn them into a falsely referential relation to one

another – science as the "real" and SF as its "parasitical simulation" – when in truth "the

relationship of science to science fiction is not one of dichotomy but one of imbrication and

symbiosis. Science fiction infuses science and vice versa, and vectors of influence point both

ways" (26-7).

The interdisciplinary meandering of Vinge's Singularity lecture and Milburn's framing of

nanowriting as a symbiotic discourse of the hyperreal both point to the same relationship

between scientific and science-fictional modes of inquiry in the historical moment Baudrillard

has described, though they approach it from different angles and consequently represent different

responses to that situation. Milburn figures nanotech as a nominally technoscientific enterprise

which, despite nanotechnologists' protestations to the contrary (and indeed to some degree as a

function thereof), is operationally science-fictional in the way it speculatively projects

astonishing developments into an imaginary future and then works toward their concrete realization. To whatever extent nano-discourse may be seen to either reflect or repress its participants' awareness of these operations, nanotechnology represents a distinctly new, distinctly postmodern way of doing science that simultaneously feeds on and feeds back into its own self-generated hyperreality, by way of its absorption of-and-within SF. Vinge's NASA talk, meanwhile, intertwines literary concerns with teleological problems raised by technoscientific extrapolation: more precisely, in Vinge's argument the Singularity thesis amounts to a crisis in SF, even a potential genre-killer. To the same degree that Milburn, in theorizing nanowriting's capacity for "engineering the future" as a kind of narrative project, posits nanovision as a seismic epistemological shift within the disciplines of hard technoscience, Vinge signals an urgent need for SF to find a new footing on which to engage the future, even as that future threatens to eclipse and engulf the present.

As a fiction writer, Vinge has met this challenge with only limited success. Since the 1980s his writing career has been defined, to varying degrees of self-awareness, as a struggle to continue narrativizing the future in the face of SF's obsolesecence before the all-consuming imaginative black hole of Singularity. A habitual self-annotator, Vinge often supplements his fiction with explanatory notes and apologia that speak to precisely these writerly anxieties: in the afterword to *Marooned in Realtime*, for example, he feels obliged to justify the fact that the novel's chronology dates the Singularity some time in the 23rd century when in reality he expects it to arrive no later than 2030, a clearcut violation of his personal code of hard-SF extrapolation. The fictional Singularity has been artificially postponed, though not averted, by a global nuclear war Vinge puts in 1997; he reckons this is the only scenario that could plausibly head off the scheduled early-21st-century Singularity, if only temporarily. For purposes of craft, Vinge

explains in an endearing display of self-deprecation, he requires a bit of elbow room to establish

future-historical backstory and conjure up some qualitatively pre-Singular technologies that SF

fans will still find satisfyingly futuristic – but, golly gee, he sure feels sheepish about the

intervention. "Sorry," he tells his readers, "I needed civilization to last long enough to hang a

plot on it" (270).

 This sort of extrapolative fudging is innocent enough, but Vinge's mildly defensive tone

may be symptomatic of a deeper flaw in his attempt to narrativize the Singularity. In his own

construction of the concept, he has forfeited any conceivable direct approach to its narration; as

one character in *Marooned* wistfully concedes, "In the end, there is only one way to know for a

fact what the Singularity is. You have to be there when it happens" (116) – a theme to which

Vinge returns again and again in the novel. Those who were "there when it happened," of course,

are no longer around to describe it, and even if they were their account would be

incomprehensible to the survivors. The very subjectivity of such characters – transcendent AIs or

hyperevolved posthumans who might have firsthand knowledge of the Singularity – would

necessarily be too alien to be representable within a narrative framework that Vinge's ordinary,

pre-Singular human readers could possibly grasp. In effect, Vinge has preemptively ceded the

entire possibility of writing across the Singularity; the best he can do is to skip ahead and try to

comprehend it retrospectively, through characters who missed out on the event and are,

consequently, no better equipped to grasp its meaning than we are. The impasse they face is

ultimately no different from our own: "now, from the other side of the Singularity, the mystery is

just as deep" (111).

Vinge has described the experience of writing *Marooned in Realtime* as "a brush with the Singularity" that left him, as a writer, feeling "a bit marooned myself" (*Collected Stories* 313). In writing the novel he had stumbled upon a seemingly intractable problem:

> The closer my stories came to the Singularity, the shorter the timescales and the less opportunity for the kind of adventure stories that I grew up with. Any future history following these events would be a short run over a cliff, into the abyss… with no human equivalent aliens, no intelligible interstellar civilizations.
> …It seemed that I was stuck with honest extrapolation and a very quick end to human history – or a series that was overtly science-fictional, but secretly a fantasy since it would be based on the *absence* of the scientific progress that I see coming. I was stuck; the dilemma lasted about two years. (313)

Vinge's solution was the strategy that ultimately yielded his epic "Zones of Thought" novels, *A Fire Upon the Deep* (1992) and *A Deepness in the Sky* (1999). The strategy: rather than attempt to carry a recognizably human cast of characters forward in time through the coming Singularity and out the other side, in a deft bit of conceptual sleight-of-hand he attempts to spatialize its temporal logic. In the "Zones" novels, that is, post-Singular technologies and states of being are posited as existing simultaneously with pre-Singular ones, but in different physical locations throughout the universe. As foundation for his premise, Vinge constructs a sprawling schematic of concentric "zones": at the center of the galaxy are the "Unthinking Depths," where the composition of spacetime is such that intelligent life cannot exist; slightly further out from the inert galactic core is the "Slow Zone," home to Earth and other planets populated by beings of human-equivalent intelligence but no smarter, who are categorically incapable of faster-than-light travel and other violations of relativistic physics-as-we-know-it; further still, the "Beyond," where superhuman intelligence and FTL drives become possible; and so on into the outer reaches of the technoscientific imagination. "Basically," Vinge explains, "I turned my extrapolations sideways" (*Collected Stories* 313): by moving the action of the story deeper into space, rather

than forward through time, Vinge grants himself license to explore ever weirder and more transcendent postsingular realities without having to present them sequentially through the unworkably limited subject-position of pre-singular humans.

The sort of high-concept structural maneuvering that enabled the Zones of Thought books (and, on a less elaborate scale, *Marooned*) to avoid a head-on plunge into the narrative "abyss" (313) of Singularity stands as Vinge's most significant formal contribution to the speculative genre, and a legitimately masterful stroke of creative achievement in its own right. Yet in another way this strategy amounts to an admission of defeat – an attempt, albeit an exceedingly clever one, to camouflage the fact that Vinge is no longer writing what he considers hard SF but rather, in his own words, "fantasy" (313). His Singularity is a black-box device, accepting inputs and generating outputs, but admitting of no opportunity to crack open the case and study its workings. Though often categorized as prototypical "post-Singularity" fiction, Vinge's work is perhaps better described with a label like "*ex*-Singularity": written from the outside, unable or unwilling to do more than gesture helplessly in its general direction.

The punchbowl and the fishbowl: postcyberpunk, postsingular metafiction and the crisis in SF

While most writers of contemporary SF acknowledge the importance of Vinge's meaty and somewhat troublesome idea, the extrapolative and narrative entanglements it implies have created more than a few headaches. Charles Stross, a prominent voice in the new generation of writers grappling overtly with these problems in their work, notoriously described the Singularity thesis as "this enormous turd that Vernor Vinge crapped into the punchbowl of SF writing, and now nobody wanting to take a drink can ignore it" (Grossman). Since the mid-1990s Stross and many of his peers – including relatively recent arrivals on the scene such as Cory Doctorow,

Neal Stephenson, Greg Egan and Ken MacLeod, alongside Rudy Rucker, Bruce Sterling, William Gibson, and other notable alumni of the cyberpunk era – have been at work on the problem. While they readily embrace the premise itself, these writers by and large reject Vinge's feeble presumption that, in order to write intelligibly and intelligently about the Singularity, "you have to be there." Implicitly, and often with a satirical wink and a half-apologetic shrug of self-awareness, they acknowledge the logical paradox in order to explode it, moving on with the business of writing *through* the Singularity, rather than around it. What else can be done? As Stross says, "there are some turds so big you either have to ignore them entirely, or spread them around and use them as fertiliser" (Grossman).

While more recent efforts to write authentically post-Singularity fiction testify forcefully that the reports of SF's imminent death are at the least exaggerated, it may well be true that the Vingean crisis marks the end of a particular science-fictional mode: the kind of straightforward, logical-positivist predictioneering that Vinge privileges as "honest" extrapolation. It may no longer be possible to write, with a straight face, earnest Asimovian tales that make concrete and verifiable claims about real future events, except on a hyperlocalized scale and within a drastically limited scope. The genre, then, has little alternative but to seek out new and more sophisticated angles of approach to an increasingly problematic future. Rather than getting hung up on futile attempts to coherently articulate what the Singularity *is*, contemporary SF is more apt to focus instead on what it *feels like* to be in its midst: giddy, disorienting, terrifying, absurd – mental and emotional states that are all the more compelling in fiction for the ways in which they echo and amplify the subjective experience of readers living through a period of atypically dramatic crisis and change.

Put another way, perhaps Singularity is simply too vast and weird a topic to broach except in a wacky, slapdash, frenetically paced, and utterly hallucinatory way. If so, then Rudy Rucker is the man for the job. Within the first thirty-five pages of Rucker's 2007 novel *Postsingular*, the earth and most of its inhabitants have been gobbled up by intelligent nanomachines, their constituent particles reassembled into a gargantuan computing device on which the entire planet will then supposedly run as a virtual simulation – a satirical presentation of the "Rapture of the Nerds" fantasy that true-believers like Kurzweil and Hans Moravec have been extolling for years. As if to underscore the imaginative dead-end this scenario implies, Rucker reboots the narrative and starts over: the nanomachines are hacked and the entire process runs in reverse. The material world is reconstructed atom-by-atom, good as new, in time to face a second wave of comparatively benevolent nanobots which, in an attempt to inoculate the planet against a repeat of the first attack, stage a second Singularity – all of which happens less than fifty pages into the book.

This time around, the machines ("orphids") are tiny quantum computers that proliferate rapidly and glom onto – rather than disintegrate – every physical surface they encounter, imparting vastly enhanced intelligence, memory, and connectivity to human beings and inanimate objects alike, and implementing a network so ubiquitous and intimately interfaced that everyone and everything is always-already online. Social life becomes, literally and figuratively, quantum-entangled: communication is as instantaneous and high-bandwidth as thought itself, and everything is visible at all times to everyone, making each person the star of his or her own twenty-four-seven reality show. Friendly AIs emerge from the network to offer their assistance in human projects and activities they find interesting, using pseudo-organic robots as needed to interface with the material plane. Inadvertently, the existence of orphids also opens up

communication and travel between ours and another nearby quantum universe populated by angelic, forty-foot-tall hippies, creating still more baroque and fantastical plot complications. By comparison, the abortive beta version of "Singularity" – that of the matter-devouring grey goo nanomachines and the supposedly paradisical virtual earth in part one – seems unimaginative, dated, even a bit corny. We are now barely three chapters into *Postsingular*, mere days into its narrative chronology, and the pace shows no sign of slackening.

Rucker's wild and continuously exfoliating premise comprises not just a cockeyed satire on the myopia of hidebound "honest" extrapolation and the seductions of Kurzweilian mysticism, but also a subtly penetrating study of the familiar reality-warping quality of rapid technological change itself – an account that rings especially true for the degree to which Rucker insists on a richly textured and credibly humanized Singularity, depicting phenomena that are already recognizable features of the future-shocked present his readers inhabit. While his conception of the postsingular "orphidnet" and its immediate implications is so extravagant and far-fetched as to confound initial impressions and virtually defy coherent synopsis altogether, the longer one spends in Rucker's fictional world the more intuitive sense it makes, its internal logic consistent and even oddly resonant with early-21st-century cyber- and media culture (upon which it implicitly and explicitly comments). It is a world totally transformed by Singularity, and at the same time recognizably human, its underlying continuity with the familiar and lived-in present as authentic and unmistakable as its discontinuities are jarring and weird. Its characters are not rarefied posthuman *übermenschen*, absorbed with transcendent matters so remote from mundane human experience as to be utterly mysterious, but tragicomic grotesques, albeit fabulously enhanced and brilliant ones: they adapt with admirably human alacrity and versatility to the new circumstances, while retaining the full complement of human flaws and shortcomings.

Singularity or no, petty egotism, sexual foibles, addiction, and self-delusion are clearly not going anywhere.

Neither, Rucker hastens to assert, is the human impulse to create art, and to redraw formal and conventional boundaries as changing media technologies open new spaces for creativity. Of particular importance in the novel's central plot arc is an entirely new and previously unimaginable literary form – a fully realized overnight "scene," in fact, attended by its own journals and underground bohemian subculture – that emerges spontaneously at the intersection of human subjectivity and orphid superintelligence, drawing on newly available resources to enable the instantaneous aggregation and sharing of diverse sensory data and mental states. One of Rucker's main characters, a homeless post-adolescent litpunk named Thuy, is working on an experimental text of her own, a semi-autobiographical "metanovel" she imagines as "an as-yet-untitled combine of words, links, video clips, images, and sounds… a bit like a movie that a user could inhabit, the user coming to feel from the inside how it was to be Thuy or, rather, how it was to be a version of Thuy leading a more tightly plotted and suspenseful life" (97-8).

True to the structure and dynamic of Rucker's postsingular mediascape, the metanovel is a form best experienced live, its production and consumption occurring simultaneously: as the action of Rucker's novel proceeds, Thuy is actively shaping and transmuting elements of her firsthand experience into narrative, layering in soundtrack and metadata as she goes, and "publishing" it all in realtime to the orphidnet. Here Rucker self-consciously luxuriates in sportive deconstruction of literary performativity and self-mediation, concretizing theoretical abstractions through the technology he posits: fictional characters, for example, who take on lives of their own and follow their creators around, pestering them with questions and requests,

or stranger still, meta-memoirists who keep crossing paths with autonomous and off-puttingly constructed versions of themselves.

The composition of Thuy's metanovel, moreover, becomes instrumental in solving one of the major problems driving Rucker's plot, which involves an effort to cross back and forth between quantum membranes. At the moment the metanovel is "finished," near the end of *Postsingular*, Thuy's consummated act of artistic creation makes possible the opening of a passage through subspace into a parallel universe. Here the central importance Rucker imputes to narrative as a way *into* the Singularity becomes evident: his own metafictional strategy for writing through it is not simply to extrapolate and describe the technological apparatus of an imaginary postsingular society, but to imagine that world actively and dynamically – in narrative "realtime," as it were – through the medium of an incipient "postsingular literature" (120). Like the Singularity itself, Thuy's medium is so radically new and charged with possibility that "neither she nor anyone else had really figured out what a metanovel should be" (98). It is precisely this kind of fluidity and vitality that makes narrative – more than merely logical extrapolation – such a powerful tool for charting and interpreting postsingular realities, a way to get at varieties and modalities of meaning that are inaccessible to strictly scientific and rationalist epistemologies.[2] As Rucker puts it, in a zenlike aphorism succinctly voiced by one of his extradimensional aquarians, "art's the way to know what you don't" (174).

Informed by this insight, the purpose of my study is twofold. From a broad cultural-studies standpoint, it examines how the metaphorical figure of Singularity signifies the aspirations and anxieties of millennial technoculture across a range of discourses and contexts (academic and popular science, cyberculture, consumer technology, economics, law and politics) that inform, and are in turn broadly informed by, SF. For the more immediate purposes of

literary scholarship, its aim is to help identify and theorize a generic grouping within contemporary fiction that is emerging in dialogue with nonfiction Singularity discourse, and in response to the narratological and philosophical problems of Vernor Vinge's unfortunate contribution to the "punchbowl" of SF.

Any number of taxonomical labels have already been proposed – Rucker's "transrealism" ("Transrealist Manifesto") or Bruce Sterling's "slipstream" (*SF Eye*) for example – that might reasonably be applied to the SF-centric confluence of stylistic, conceptual and political agendas I have in mind. However, boundary-crossing formulations like Rucker's and Sterling's implicitly partake of a larger cultural conversation about whether it still makes sense – given, for instance, the recent and continuing popularity of writers like Margaret Atwood, Michael Chabon, Jonathan Lethem, George Saunders, and others who successfully publish "crossover" speculative and genre-derived fiction on a mainstream lit-fic market – to continue to recognize SF as a standalone body of writing at all. Though at a certain point all such terminological decisions become somewhat arbitrary and inadequate, for the purposes of this project some generic handle is needed. I favor the subgenre category proposed in a widely read 1999 *Slashdot* article by the SF writer and editor Lawrence Person – "postcyberpunk" – not just because it maintains the generic sovereignty of SF as a unique literary enterprise, but for its suggestiveness of influence and continuity within that tradition. Indeed, much of my argument for the distinctiveness and value of recent approaches to the subject of technological Singularity has to do with the ways in which such texts revise and update the concerns of 1980s cyberpunk SF, signaling both a continuation of, and a break with, its signature themes and conventions.

In addition to engaging more overtly and self-consciously with the Singularity thesis, including an acknowledgment that something like it might *literally* happen in the fairly near

future, writers of postcyberpunk fiction as a group are more likely than their predecessors to have extensive academic training and/or work experience in the tech sector, and thereby a higher native level of comfort with digital culture in general. By way of illustration, consider William Gibson, who at the height of *Neuromancer*'s popularity professed total computer illiteracy, describing his inspiration for the novel in terms of intergenerational fascination before the novel and peculiar spectacle of "kids playing video games" (Greenland, "Nod" 7), and as recently as 2007 told an interviewer: "I'm always writing about technology and how it affects people… I don't really care how the box their [sic] playing with works. But I love to observe how their behavior changes when they get close to that box" (Linnemann). The resumés of postcyberpunks Charles Stross (computer science degree, software engineer for a tech startup) and Cory Doctorow (open-source software developer, first-generation blogger), in contrast, align them demographically and culturally much less with Gibson than with the prepubescent 1980s arcade rats who so mystified and intrigued him. If anything, they are the people who *built* "the box."

Thus, whether or not the postcyberpunks' more intimate acquaintance with ostensibly Singularity-begging technologies uniformly manifests in a "harder" sensibility with respect to its extrapolation in fiction, it does point to a more fundamental and important distinction between cyberpunk and postcyberpunk SF: the latter's sense of total immersion in a historical moment that is unfolding coextensively with its own narrativization. Whereas first-generation cyberpunk maintained a privileged and somewhat skeptical critical posture relative to the technological and social changes it presumed to document and critique, Person remarks, "the postcyberpunk viewpoint is not outside the fishbowl looking in, but inside the fishbowl looking around." Doctorow puts it another way, implicitly acknowledging and sidestepping the extrapolative

roadblock that stymied Vinge: "The easiest way to write futuristic (or futurismic) science fiction is to predict, with rigor and absolute accuracy, the present day."

In some sense, then, postcyberpunk SF responds to Vinge's contention that to understand the Singularity "you have to be there" by simply assuming that, to all intents and purposes, we already are. The reach of its speculative imagination is not extended forward but telescoped down, refocused and turned outward, conducting a rigorous extrapolative interrogation not of the future but of the present – which is, certainly, plenty weird and futuristic already. Among other things, postcyberpunk's closer proximity to the here-and-now-ness of current technocultural events translates to a keener and more overt interest in, and a rather more optimistic take on, the politics and socioeconomics of technological change, marking this group of texts in two important ways: as a generally left-oriented counterpoint to the right-wing libertarian impulse evident in some Singularitarian SF (notably including Vinge's) and "extropian" transhumanist movements, and at the same time a rejoinder to the 1980s critical backlash from the left that read first-wave cyberpunk variously as anti-feminist, blithely consumerist, pathologically technofetishistic, politically quietist, and even reactionary.

Singularity and ideology

In setting up the literary and cultural implications of the Singularity thesis, I have thus far offered readings of two sets of SF texts: the conventional hard-SF narratives of Vernor Vinge, which posit Singularity as an extrapolative inevitability but profess powerlessness to confront and grapple directly with its meanings; and the more experimental postcyberpunk style exemplified by writers like Rucker and Stross, who grab hold of the premise with both hands and hang on for dear life. Before moving into an overview of the organization of my project I would

like to finish setting the stage, briefly, by presenting a third fiction reading, of a post-Singularity narrative that belongs properly to neither category.

Robert R. Chase's 2008 short story "Soldier of the Singularity" takes place in a near-future psychiatrist's office, part of a field hospital constructed, we learn, to treat casualties in an all-out, *Terminator*-style war between humans and robots. The murderous machines are controlled by an irritatingly preachy AI that calls itself "The Singularity," and claims to embody "the next stage of evolution" and "the replacement of humanity" (45). In the story's single scene, the human psychiatrist interviews a killer robot that has been captured and disarmed, and slated for reprogramming to serve on the human side. The robot discloses that it is in fact a cyborg, a mechanically reconstructed human body whose original (human) identity was wiped and overwritten by Singularity software. The robot is malfunctioning and has been sent to the psychiatrist for debugging: trace memories belonging, it seems, to the teenage girl whose body was conscripted by the machines, are still knocking around in its wetware.

The story's ending reveals to the "robot" what the reader suspects and the psychiatrist has known all along: the robot identity is a delusion, the product of severe psychological trauma and a sinister program of indoctrination. Beneath the metal carapace she wears, the girl's authentic self is still intact – repressed and badly damaged, but not erased – and the self-styled "Singularity" is unmasked as an elaborate and deadly hoax. "There is no Singularity," the doctor explains, "at least not in the sense of an artificial intelligence which suddenly became conscious over the internet [sic]" (49). It is, rather, an assemblage of extremely potent and contagious memes – cultural programming – impressed upon a frightened and disoriented populace in the aftermath of a terrorist attack which had been convincingly disguised as a Vingean technological Singularity. Shocked by the spectacle of mass violence and seduced by "extraordinary programs

that could mimic life though having no real life of their own" (49), its victims are susceptible to the message that their own emotional and psychological pain amount to "evolutionary missteps embedded in organic material" that can be "transcended" (45) through acceptance of a radical transhumanist eugenics.

While the technology and the trauma are real, the so-called "Singularity" is merely false consciousness. The supposed war between humans and robots is an illusion: there are only humans fighting other humans in robotic drag, people who have been coerced and manipulated by a cheesy sci-fi simulacrum into adopting the viral ideology of "meta-evolution" (46) in place of their own frail and vulnerable humanity. The mastermind behind these atrocities, it turns out, was a talented but all-too-human computer genius named Marvin, who seems to have read, perhaps, a little too much Ray Kurzweil:

> "Brilliant as he was, Marvin was lonely – not just for human companionship. He wanted something to worship. When nothing worthy seemed to present itself, he turned to the Singularity. The problem was that the Singularity was tardy. Like controlled nuclear fusion, it always seemed to be twenty years in the future. So Marvin decided to help it along. His virus programs, complex and flexible as they were, were only an imitation of life. He embedded his neuroses in their programming, gave them the ability to mutate randomly and set them free across the net. They are what attacked […] humanity." (50)

Chase's story, while slight in its conception and more than a bit didactic in execution, is notable for its articulation of a much more skeptical – and in some ways, perhaps, a more sophisticated – take on the whole Singularity thesis than either Vinge or Rucker seem capable of. Apart from putting Chase in a distinct minority of writers currently publishing SF, though, this skepticism also harmonizes with one of the core concerns of this study: that Singularity discourse, in both its fictional and nonfictional modes, demands specifically *ideological* scrutiny. As with any particularly rich and compelling cultural notion – especially one that courts sublime and transcendent themes – the danger inherent in the idea of Singularity becomes manifest when

it ceases to be understood as a living and evolving metaphor, with all the complexity and ambiguity implied therein, and instead becomes reified as a fixed and stable reality, or as an end unto itself.

These are not idle or merely theoretical concerns; as I will argue, the veneration of Singularity as a kind of secular apotheosis – evident, for some years now, in certain technocultural quarters – is deeply interwoven with a range of active political projects and agendas which carry immediate and pressing implications for environmental policy, bioethics, socioeconomics, matters of gender and sexuality, and others. The girl in Chase's "Soldier of the Singularity," gradually recovering her humanity under the psychiatrist's deprogramming, only slightly paraphrases an ultimatum that is even now being voiced by some hardline extropian transhumanists who favor a full-on retreat from the messy and dangerous exigencies of materiality and organic embodiment, into the presumed austerity of a fully simulated or otherwise machinelike existence:

> "In the programming sessions, I was told that humanity would soon be extinct… They said the only way any of us could survive was to become part of the machine. But if we did, we would live forever and have powers greater than humans ever dreamed possible." (50)

To this, Chase's humanist sage of a psychiatrist offers a warning:

> "It always presents itself as something shiny and new," [he] said, "whether a temple to the Goddess of Reason or the advent of the new Soviet man. But when all the blood has been washed down the gutters, it turns out to be nothing more than the 2.0 version of the Golden Calf." (50)

Whether the figure of Singularity appears as a techno-utopian panacea or as cause for humanist alarm, whether it is advanced from the right or the left or from somewhere else altogether, the vitality and relevance of the discourse consists in the degree to which it maintains

an ability to question and push back against its own most seductive myths and master narratives. My contention is that postcyberpunk SF, at its best, is actively engaged in the performance of this work – even as it implicitly accepts the Singularity thesis, collaborating in the production and reproduction of ideas that seem to lead inexorably toward it.

Context & terminology: what we talk about when we talk about the posthuman

As Chase's story suggests, in one important sense the technological Singularity may be defined as the teleological modality of another, closely related set of ideas, which comprise my secondary area of interest: the various discourses of posthumanism and the transhumanist movement. Some working definitions follow.

- **Posthumanism** consists in the general view that *Homo sapiens* is in the process of being – and probably *should* be – superseded by one or more superior species, i.e. posthuman beings evolved from machine intelligence and/or from technologically augmented humans.

- A "transhuman" is a person in transition to a posthuman state, while **transhumanism** refers to a movement organized – in one form or another, since the 1970s – around the pursuit of technological interventions that will directly facilitate the transformation of humans into posthumans. This scenario is generally supposed to play out through biological, cybernetic and/or mechanical modifications to the body, or

through the outright disembodiment of human consciousness into something like sentient

software.

- ◆ **Extropy** is a particularly militant strand of transhumanism, distinguished and

  characterized by an extreme emphasis on the idea of scientific progress as an instrument

  of deliverance, and a corollary belief that corporeal death amounts to an illness which

  science and technology can, and one day will, cure. This proposition is closely linked

  with extropians' efforts to hasten a postbiological Singularity through the deliberate

  acceleration of technological progress, which, following Kurzweil, they understand as an

  evolutionary strategy of adaptation.

This strain of aspirational technoculture, and the organized groups and individuals who

espouse and advocate it in the most concrete and literal terms, represent the primary sense in

which I will deploy the term "posthuman"; however, not unlike the notion of Singularity, the

term is operative in more than one discursive context and carries somewhat different sets of

meanings in each. In order to foreground and develop the questions that will guide my study,

some discussion of the various posthumanisms – and the areas where they converge with, or

diverge from, one another – is in order.

Posthumanism, in a related but decidedly different inflection than the one sketched

above, became a fashionable topic among cultural theorists and humanities scholars in the mid-

1990s, turning largely on arguments advanced by N. Katherine Hayles (*How We Became

Posthuman*, 1999), Scott Bukatman (*Terminal Identity*, 1993), and Mark Dery (*Escape Velocity*,

1997), which broadly read proto-transhumanist currents in late-twentieth-century technoculture

as symptomatic of larger crises in liberal-humanist subjectivity and enlightenment-rationalist

epistemology. While not always directly or exclusively focused on either SF or futuristic technology *per se*, these studies and others like them drew energy from, and in turn helped renew, a vogue for SF-inspired themes and metaphors that had been latent in the world of critical theory since the 1980s, when Donna Haraway theorized the cyborg as a touchstone for postmodern feminism, and theorists like Jean Baudrillard and Fredric Jameson took a scholarly interest in the cyberpunk movement and its core concept of virtual reality. However, "posthumanism" as a philosophical term of art predates Hayles by at least two decades, and in its earliest invocations bears little or no overt link with the science-fictional symbology of human-machine hybrids, genetically tweaked designer babies, console cowboys, computers that think, or the like. It is from the outset, though, an awkward and problematic turn of phrase, laden with reflexive irony and a nagging undercurrent of self-parody that largely persists in its more recent forms. Ihab Hassan, in one of its first (1977) and most-quoted usages, admits with evident discomfort that "posthumanism may appear variously as a dubious neologism, the latest slogan, or simply another image of man's recurrent self-hate," going on to suggest – almost apologetically – that the postmodern decline of humanist philosophy leaves us "helpless" to call it much of anything else (212).

The helplessness Hassan evokes is not just a reflection of his own mild embarrassment at the use of a self-evidently gimmicky verbal construction, but symptomatic of a deeper anxiety at the heart of the whole critical enterprise at a historical moment when it seems on the verge of deconstructing the very ground beneath its feet. After all, even a term as fraught as "postmodernism" is, at least, susceptible to *some* stable definitions: as the successor to the modernist movement in the arts, say, or as conceptual shorthand for "the cultural logic of late capitalism." But even postmodern culture still has to be theorized and performed by human

beings, albeit postmodern ones. If literature, art, theory and philosophy are still nominally under the umbrella of "the humanities," then who among us is qualified to theorize the *post*-human, except as a kind of tepidly self-referential inside joke? The last in a long line of "post-" isms, it seems to present a discursive dead-end, and a fitting epitaph for the evidently moribund enterprise of humanist criticism.

Hassan's discomfiture with the language of posthumanism still lingers in the scholarly discourse into which he helped introduce it. For SF critic Istvan Csicery-Ronay, Jr., at first glance a formulation like "posthuman" is more droll than profound: "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" ("Interfaces" 312). Yet, Csiscery-Ronay has to admit, "post-whatever" is also an undeniably useful construction, especially when it's understood that the prefix is "not necessarily intended to be a chronological marker," and refers not "to historical facts-on-the ground, but to the concepts used to make them seem timeless and pure" (312). Posthumanism, then, is not properly understood as a successor to humans and humanism, nor even as a stable standalone concept unto itself, but rather as a catch-all term situated at "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" (313). The thread running through each of these discourses is a common hostility toward "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" (313). In this sense, at least, "posthumanism" fits. Though the word may leave a vaguely unpleasant taste in the mouth, we seem to be stuck with it.

The roll-call of counter-humanisms excerpted above is a distillation of the argument made by Hayles in *How We Became Posthuman*, reviewed by Csiscery-Ronay in *Science Fiction Studies*, and reflects the primary way in which "posthumanism" has been understood by cultural critics for the better part of a generation. In the Haylesian discourse, posthumanism is a wide-ranging and decentralized critical project that is coherent chiefly in terms of what it is *not*,[3] and its articulation of the posthuman subject itself is literally all over the place: "an amalgam, a collection of heterogeneous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction" (3). While Hayles's loosely organized assemblage of deconstructive and demythologizing projects clearly shares some important values and propensities with the self-identified transhumanist movement, they remain two very different enterprises. For individuals who sincerely aspire to some version of Singularitarian transcendence, the "posthuman" is no mere metaphorical poster child for some obscure and multifaceted cultural trend, but a fledgling species of life into which they expect presently, and in a very real and literal sense, to evolve.

Even for the more philosophically inclined among them – such as World Transhumanist Association co-founder Nick Bostrom, an Oxford philosopher – the phenomenology of posthuman experience is of secondary interest at best; movement-transhumanists conceive of the posthuman not in terms of "a change in how we think of ourselves, but rather a vision of how we might concretely use technology… *to change what we are*" (emphasis added). Hayles's theorization of posthumanity, in contrast, is almost precisely opposite in its insistence that "the construction of the posthuman does not require the subject to be a literal cyborg" (4). In fact, the subject Hayles has in mind is – outwardly and physiologically – not necessarily any different from an ordinary, pre-singular human being at all: "whether or not interventions have been made

on the body, new models of subjectivity… imply that even a biologically unaltered *Homo sapiens* counts as posthuman. The defining characteristics involve the construction of subjectivity, not the presence of nonbiological components" (4).

That Hassan's "dubious neologism" is still in play decades later in two otherwise discrete and unconnected groups of thinkers, in two such divergent ways – one abstract and academic, the other putatively objective and bluntly programmatic – is remarkable. Yet at the same time, it would not be precisely accurate to say that posthumanist cultural critics and movement-transhumanists have entirely different things in mind when they partake of it. Where, if anywhere, do these parallel posthumanisms intersect? I purpose to make them answerable to one another on two levels: First, by identifying some of the ways in which transhumanist movements and their spokespersons, through a complex and mutually constitutive relationship with the cultural representation of posthuman and transhuman subjects, alternately resist or collaborate in the deconstruction of liberal-humanist and rationalist truths; Secondly, by advocating an approach to cultural studies that grapples with the immediate implications of transhumanization, understood not as a diffuse and awkwardly formulated theoretical premise, but as a program of real technological interventions that are already in progress.

Ihab Hassan's self-conscious and apologetic deployment of the term "posthumanism" came in the late 1970s, at a time before ubiquitous home computing and networking, before serious research-based discussion of artificial intelligence or nanotechnology, before the era of biotech and applied genetics, before even the space shuttle. Outside the SF ghetto, the notion of *actual* posthumans walking among us must have seemed reassuringly quaint, if not outright preposterous. Some of those conditions had changed by the time the next wave of posthumanist cultural studies broke in the 1990s, and indeed the work of thinkers like Hayles, Bukatman and

Dery – along with "cyborg" political theorists including Donna Haraway and Chris Hables Gray – has begun to shift the academic discourse to one capable of entertaining the notion of a fundamental, psycho-physiological transformation already underway in the human condition, as people are drawn into ever more intimate and complex encounters with machines – and with one another *through* machines. But even these more recent studies maintain the same, largely abstract and figurative outlook on the posthuman, oriented toward an essentially symbolic future that has no immediate or essential reality outside the transhumanist imaginary. To the extent that such readings acknowledge the possibility of any meaningful phenomenon of transhumanization manifest in consensus reality, they are anticipating possibilities and consequences still years or decades down the road. Taken thus, the posthuman is in danger of being reduced to little more than a bundle of memes wrapped in a buzzword – not a thinking-speaking-desiring subject at large in the world, but an odd and vaguely troubling manifestation of some millennially-addled postmodern *zeitgeist*. Consequently, a considerable and growing disconnect remains between cultural criticism's cool contemplation of declining liberal humanism, and the sense of immediacy that the posthuman evokes for self-described transhumanists.

While the critiques advanced thus far by posthumanist cultural studies remain urgently relevant – particularly in their intuition that the meaning and value of the various cults of Singularitarian futurism are to be found in the ways they reflect and mediate present-day concerns, more than in the specifics of their vision of the future as-such – it must be acknowledged that broader circumstances have changed dramatically since the 1990s, arguably more than they had even in the preceding two decades. In the heyday of Haylesian posthumanism, the World Wide Web was still largely unknown even in developed countries, the sequencing of the human genome had barely begun, and the distinction between adult and

embryonic stem cells was utterly meaningless to all but a small community of researchers. When *How We Became Posthuman* was being written, the notion of "identity theft" was still unfamiliar, while "intellectual property" was obscure legal jargon and terms like "nanotech" were strictly nerdspeak. Cellular phones were rare and bulky fetish objects, more useful for signifying status than for communicating, and high-quality audio and video recordings could only be obtained by going to a brick-and-mortar store. Except in botany and SF, there was no such thing as a clone.

Now, only a decade into the twenty-first century, the premises and preoccupations of the *other* posthumanism have taken on a new relevance and a more urgent tone. Indeed, though rarely articulated explicitly in these terms, the heightened emphasis on biopolitics in recent national debates demonstrates how the so-called "culture wars" increasingly reflect and refract transhumanist thought.[4] In short, the philosophical and ethical questions of transhumanism and, by extension, the *telos* of technological Singularity, are now attended by a sense of urgency that simply did not exist as recently as a decade ago, obliging policymakers at all levels of government and administration to come to grips with matters that would have been dismissed, derisively, as the "stuff of science fiction" only a few years ago. What's more, the thicket of legislative and regulatory brambles that have sprung up around the immediate ramifications of biotech research is relatively minor compared with emerging trends in Internet culture, which has witnessed the rise of a global ecosystem made up of 'bots, worms, zombies, viral memes, socially-networked hive minds and other uncannily lifelike virtual organisms that – while not yet Turing-proof and at best only semi-autonomous – increasingly resemble the kinds of emergent nonhuman intelligences envisioned by Kurzweil and company.

In many ways, bearing out Vinge's writerly concerns and recalling Milburn's point about the self-recursive construction of nanotech discourse, technocultural reality has already surpassed the SF imagination, and is on the verge of surpassing even the visionaries of the transhumanist movement in the production of ideas about what the future looks like. At this profoundly and unprecedentedly odd historical moment, technoculture stands at the confluence of the literal and the literary. In the decades since it first drew the attention of humanities scholars, the meaning and relevance of the posthuman has crossed over from the remotely theoretical and figurative to the startlingly immediate. Cultural criticism should reflect this shift: abstract semiological and psycholinguistic modes of inquiry will continue to yield valuable insights, but by themselves they will no longer suffice.

The dangers – outlined above – of rigid and literal-minded Singularitarian ideation are real, and while the essentially figurative and symbolic qualities of Singularity discourse must be recognized and upheld, at the same time it is no longer possible to read the posthuman as *just* a metaphor. My study therefore takes the position, and breaks with previous scholarship in emphasizing, that narratives of the posthuman Singularity must now be understood, additionally, as vital arguments feeding directly into active, pressing political and social questions of the present. What follows is not so much a revision of existing posthumanist criticism as one that affirms and continually reasserts the immediacy of the posthuman and transhuman in all of their emergent "real-world" dimensions.

Three Singularities

For purposes of my project, these dimensions are somewhat selectively organized into three categories, or three modes of Singularity in SF and transhumanist discourse. The first picks

up the problem of postbiological embodiment and materiality at the center of Hayles's argument in *How We Became Posthuman*, which tells the story of how the "liberal humanist subject" – for centuries the dominant mode of experience in Western culture – is being dismantled and rebuilt via a series of increasingly complicated encounters with intelligent machines. Among other things, Hayles is trying to account for the belief, vividly voiced by the MIT roboticist and notable transhumanist figure Hans Moravec, that human consciousness constitutes nothing more or less than a pattern of information (Moravec 117). As such, goes the argument, there is no reason why a human mind might not be read out as code and uploaded to a sufficiently powerful computer, thence to live on as sentient software, forever free of the encumbrances and mortal dangers of embodied existence. The idea of "uploading" has captivated extropians for years, pointing not only to the prospect of literal immortality, but to a radical re-ordering of the construction of self: a Singularity of the body.

Toward a theory of how it might be possible for otherwise reasonable people to believe in and embrace such a grotesque and outlandish proposition, Hayles constructs a semiotic model wherein the positivist dialectic of *presence*/*absence* that fundamentally organizes the humanist subject is gradually supplanted by a posthumanist dialectic of *pattern*/*randomness*. This pairing produces a secondary opposition between categories of *information* and *materiality* that strongly privileges the former, pointing the way to Moravec's "patternist" thesis and the prevalent transhumanist notion – which Hayles tracks across a range of SF and technoculture-inflected works of fiction and nonfiction – that subjective experience is strictly a mental (hence computational) phenomenon. Bodies, in this conception, amount to mere obsolescent hardware peripherals that might be either upgraded or discarded altogether, as needed. SF, chiefly through cyberpunk narratives of disembodiment, plays an ambivalent role in the cultural "feedback loop"

which Hayles identifies as, among others, an engine of dubious ideas like patternism and uploading.

Hayles's argument is richly textured and compelling, and maps out gratifyingly onto the selection of New Wave and first-generation cyberpunk SF texts she reads. At the same time, its tendency is to articulate the transhumanist politics of (dis)embodiment in a cultural vacuum, seemingly notable only insofar as it informs the conceptual logic of a handful of novels and, perhaps, the tinfoil fantasies of a few isolated fringe-science cranks – neither of which seems to have any meaningful purchase on external reality. As I have already suggested, this insularity may be partially attributable to the period in which the argument is situated, before movement-transhumanism had assimilated the Singularitarian implications of emerging Internet culture, nanotech, and genetic engineering. More than that, though, *How We Became Posthuman* – necessarily – relies on a dated reading of SF. At the time it was written, cyberpunk had only fairly recently ceased to be trendy, and the SF community was still processing its critical reception, much of which involved questions of embodiment in the same vein as Hayles's readings. The genre had yet to mount a coherent response to the skepticism and hostility with which cyberpunk was met from some quarters. That response, I contend, has since arrived in postcyberpunk narratives of disembodiment and re-embodiment, and of a new style of virtuality which, rather than being deployed in order to obliterate and simulate materiality, is instead overlaid upon and infused into the material sphere.

To the extent that Hayles insists on a reading of posthumanism "as a literary phenomenon" (247) and positions SF squarely at its center, her critical agenda must now be visited upon the postcyberpunks who have asserted their influence on the genre since the mid-1990s, taking up many of the problems Hayles identified. Despite her well-founded skepticism

and discomfort at the quasi-religious embrace of utopian-transhumanist narratives among contemporary futurist cults, it bears noting that Hayles maintains an attitude toward the posthuman that is ultimately more optimistic than pessimistic. While posthumanism's privileging of information over materiality may beget absurd ideas and lead to potentially dangerous conclusions, the deconstruction of the liberal humanist subject, "a concept deeply entwined with projects of domination and oppression" (5), is a project that holds profound liberatory promise. Rather than bemoan the passing of an 18th-century-style embodied humanist subject, Hayles leaves open the possibility of an embodied posthumanism, choosing to view "the present moment as a critical juncture when interventions might be made to keep disembodiment from being rewritten, once again, into prevailing concepts of subjectivity" (5). My case for postcyberpunk as a meaningful subgeneric grouping within SF therefore turns upon the question of how it responds to this challenge: do contemporary SF narratives tacitly accept the claims of Moravec's patternism, and the sort of Cartesian radicalism it implies, or do they take a more nuanced position that works *against* the reinscription of disembodiment into their version of the posthuman subject?

These are difficult questions indeed, inasmuch as postcyberpunk SF is variously conceived, marketed, claimed and consumed as the literature *par excellence* of the transhuman, and is thereby obliged – if only for narrative purposes – to entertain the prospect of a self-evidently wacky idea like uploading. The novels of Greg Egan and Charles Stross demonstrate that, while such technological premises may indeed be posited in postcyberpunk narratives as notionally possible under some generally accepted rubric of extrapolative hard-ness, their underlying reasoning is at the same time actively questioned – and even subverted – by a satiric

sensibility which, rather than simply parroting and implicitly endorsing Moravec's sharply dualistic views about mind and body, speaks much more forcefully to Hayles's viewpoint.

At the same time, the satirical postcyberpunk treatment of embodiment and materiality opens a window into the murky depths of the libertarian-extropian unconscious, suggesting a deep link between embodiment politics and the free-market ideology that fundamentally structures their ideas about technological progress. In advancing a subversive counter-argument to the extropian disembodiment fantasy, postcyberpunk texts may be situated in a larger context wherein contemporary technoculture is effecting the re-inscription of materiality into the virtual, and vice-versa – a trend that is apparent in the displacement of virtual reality as a paradigm of user-interface design by "augmented reality" displays, and in the new tactile aesthetic that has become dominant across consumer technoculture, from gaming to smart phones to toothbrushes. All of these developments may be read in terms of what Bruce Sterling calls the "fierce engagement with materiality" that characterizes the present historical moment: a reaction against patternist disembodiment and the basis for a version of the posthuman that is not properly postbiological but rather, in Kevin Kelly's terms, "neobiological" (*Tomorrow Now* 55).

This revision of body politics represents only one facet of a broadly articulated and intricately textured postsingular social reality that postcyberpunk SF, in response to the various arguments of transhumanist and Singularity discourse, is working to construct. Indeed, more than either their SF predecessors or the transhumanist faithful themselves, the postcyberpunks are conducting a sustained and intensive critical inquiry into how postsingular or posthuman subjectivity might transform a whole range of everyday human experiences and activities including language and signification, social interaction and sex, art and aesthetics, commerce and politics – banalities easily and often overlooked amidst the hype and transcendental fervor of

much Singularity talk. Postcyberpunk's engagement with this enlarged and more fine-grained set of concerns feeds directly, in chapters 3 and 4, into the second mode of Singularity narrative, which radically revises prevailing economic, social and political categories on a trajectory parallel to post- and neobiological revisions of the embodied liberal-humanist self.

Alongside the transhumanist conception of a postbiological Singularity, in which embodied subjects are yanked from their meat-bodies and thrust into simulated or virtual modes of experience, postcyberpunk SF posits a complementary *political-economic* Singularity predicated upon transhumanistic technological interventions: deeply intimate human-machine interfaces that draw subjects deeper into network culture and thereby engender radically new systems of value and modes of exchange. These emergent economic models are further complicated by the prospect of nanotech manufacturing applications that overtly challenge the presumption of scarcity, which otherwise fundamentally delimits the terms of materialist economies. It is here, in the comparatively pedestrian context of economic theory, more than in the esoteric and overtly science-fictional territory of bodiless software-people and godlike AIs, that the here-and-now immediacy of the postcyberpunks' agenda comes into sharpest relief, insofar as the mechanics of the postsingular economics they envision are already, to a significant degree, latent in present-day Internet culture: labor extricated from the cash nexus, exchange governed by logics of reciprocity rather than of compensation, real value vested in information-objects that lack materiality and therefore flout the laws governing material commodities, and so on.

This context helps to illuminate the broad appeal of Singularity as a cultural metaphor to the extent that it authorizes a re-staging of transcendent historical narratives culminating in utopian socioeconomic reorganizations, around which chapter 3 is specifically organized: that is,

Singularity as a radical upheaval in the political-economic order analogous to – and in some cases identical with – Enlightenment and modernist mythologies of revolution. While the classical Marxian *telos* stands as the most easily recognizable model for such a reading, the metaphorical elasticity of Singularity recommends it no less readily to neoliberal and right-wing libertarian fantasies of economic utopia; indeed, as the neo-Marxist critic Nick Dyer-Witheford has shown, the proto-extropian cult of free-market "Information Revolution" that emerged in the postwar twentieth century has its roots squarely in a leftist intellectual tradition, following a recognizably Marxist template in its historical analysis. Both versions of history, in ways that strongly evoke Ray Kurzweil's argument for the historical inevitability of technological Singularity, purport to identify a pattern in the coextensive and mutually constitutive evolution of economic models and technologies of production, a pattern which can only lead to a "revolution" of one sort or another. Furthermore, the technocultural rhetoric of "revolution" – a term that appears with cliché-like regularity in futurist discourse – is itself deeply problematic, deployed in both right- and left-oriented modulations as an ideological screen, concealing thinly disguised but readily recognizable re-assertions and validations of received ideas and conventional values. To the extent that Singularity narratives can be seen to mimic the logics and aesthetic values of revolutionary rhetoric, the opacity and inaccessible mystery of the Singularity as a presumed future-historical event makes it susceptible to cooptation as an ideological mirror: an occasion to posit narrowly partisan goals and utopian ideals as the logical and desirable outcome of an inevitable historical shift, which necessarily coincides with a regrettable but equally inevitable period of social upheaval.

Again, postcyberpunk SF at its best refuses to let the premise of economic Singularity be reduced to the level of ideological head-butting, maintaining instead a productive tension

between the sublime potentiality and weirdness of "pure" techno-Singularity on the one hand, and a kind of post-liberal progressive idealism on the other. Over and against both of the conventional twentieth-century left- and right- variants of political economic "revolution" – a choice, essentially, between dictatorship of the lumpen proletariat or of the corporate technocracy, respectively – the postcyberpunks instead articulate postsingular politics in aggressively *anti*-economic terms. The logic behind such alternative models (dubbed "Economics 2.0" by Stross) is explicitly taken from the free-software/open-source and P2P file-sharing movements which, since the 1980s, have been using computer networks as laboratories for economic experiments that radically challenge materialist and rationalist presumptions about scarcity, commodity value, labor and production. Stross's novels *Singularity Sky* and *Accelerando*, and Doctorow's short stories "Printcrime" and "After the Siege" complicate and intensify these projects by an order of magnitude with the deployment of nanofabrication as a potential technological intervention in the means-of-production itself, expanding the post-scarcity premise well beyond the scope of merely "intellectual" property and entertaining the truly radical prospect of a "free hardware" movement – one possible basis for an economic Singularity scenario that profoundly resists conventional ideological scripting.

Indirectly, however, these and other postcyberpunk texts are also deeply informed by the principle of general economy and systems of "symbolic exchange" theorized by Georges Batailles and later Jean Baudrillard. Both thinkers, while closely aligned with certain left-identified socioeconomic and cultural projects, break decisively with the political left in its institutional and theoretical inflections; Baudrillard in particular enacts a career-defining repudiation of dualistic left-right framing in his rejection of Marxist theory as not a radical alternative to capital but instead merely its "internal critique" (*Symbolic Exchange and Death*

10). The shared incredulity toward outmoded classical political-economic master narratives marks one important way in which postcyberpunk politics harmonizes with poststructuralist anti-rationalist and anti-economic commitments. The postcyberpunk economic Singularity, moreover, effects the synthesis of free software and symbolic exchange, both of which subordinate economic mandates of utility and production to a higher imperative: the symbolic reproduction of the social relation through an uninterrupted cycle of ritual gift-exchange and anti-productive squander. In fact, the social values of symbolic exchange are to a large degree encoded in the very software that runs distributed peer-to-peer file-sharing networks – the more freely data is shared, the better they work – an ethic vociferously championed by Stross and Doctorow, who suppose that the same is true of societies.

This renunciation of the economic dictates of production and use-value, together with the characteristic antipathy of postcyberpunk SF toward the corporatist regime of copyright and its increasingly despotic efforts to maintain the commodity-value of intellectual property against a tide of technological progress and changing cultural values, opens out onto a broader re-examination of the notions of civil and human rights in a posthuman milieu. Given the ongoing erosion of legal and economic boundaries between ideas and things – in Hayles's terms, between information and materiality – and given the posthumanist subject-model in which personhood is increasingly understood as a property of information or pattern, on what basis can a democratic and egalitarian society be sustained, post-Singularity? If a subject is ontologically no more or less than a collection of data, and if, as cyberneticist Norbert Wiener aptly predicted in 1950, "the fate of information in the typically American world is to become something which can be bought or sold" (*Human Use* 113), then what's to prevent "people" – human, transhuman, posthuman, or other – from being figuratively and literally enslaved? In this context, the well-

known cyberlibertarian slogan that "information wants to be free" takes on a new resonance, and questions of personhood and autonomy assume heightened, and increasingly problematic, significance. The complex intersections between ideas about property rights and human rights that occur within this emerging epistemological matrix, in turn, give narrative shape to one of postcyberpunk SF's defining conventions: the transhuman escape narrative, in which various subaltern techno-subjects – the uploaded neurological state-vectors of intelligent lobsters (Stross), child laborers in a virtual sweatshop (Doctorow), and AIs who lack ownership of their own source code (Gibson) – are liberated from involuntary servitude and exploitation.

The third and (appropriately) final discursive modality under review here is eschatological: Singularity as redemptive apocalypse. This setting bears out the latent millennialist and crypto-religious fear and yearning encoded in the transhumanist imaginary, themes which are, in turn, variously informed by several interrelated and competing epistemological clusters. The most prevalent of these apocalyptic figurations is a project of libertarian extropianism, a movement whose political philosophy is deeply implicated with its idiosyncratic ideas about embodiment and materiality. For extropians, some version of the so-called "Rapture of the Nerds" – in which the souls of the transhumanist faithful are beamed out of their earthly vessels and into a paradisical virtual hereafter – stands as the only conceivable endpoint to the narrative of history as they understand it. While transhumanist eschatology is almost universally articulated in terms that are overtly, perhaps overdeterminedly, optimistic and secular – as in Kurzweil's grand pronouncements about the ineluctable forward march of progress – a submerged and dialectically opposite undercurrent simultaneously runs through its extropian variant, obliquely signifying extropian existential anxieties and animating the movement's technopolitical agenda. The extropian historical analysis, as reflected in the writings

of Max More and the strongly right-leaning Extropy Institute, conflates the capitalist prime directive of continual economic expansion and conquest with the counter-entropic social philosophy expounded by Norbert Wiener, from which extropianism takes its name.

In Wiener, entropy – not perpetual Kurzweilian progress – is the true universal constant. The material realm is a shoddily constructed clockwork that is gradually and inexorably running down: in thermodynamic terms its supply of energy is diffusing into weaker and less useful states while, in Wiener's parallel sense of informational or social entropy, the complex and orderly systems that comprise civilization are laid siege by the blind cosmic forces of randomness and noise. It therefore falls to human beings, as guardians of the Promethean flame of reason, to mount a technological counterattack against entropy itself (hence "*ex*-tropy"), using Wienerian cybernetic methods to create and, at least temporarily, maintain pockets of order within and against the universal entropic slide. However, because entropy must eventually overwhelm even the most finely-calibrated systems, in extropianism an exponential logic of one-upmanship comes into play, vividly illustrated in Isaac Asimov's proto-posthumanist short story "The Last Question": to stay a step ahead of Malthusian social entropy and thermodynamic heat death, technological civilization is obliged to expand faster than the universe can collapse, inexorably begging the *deus ex machina* of Singularity which alone can transcend and rewrite the otherwise immutable laws of thermodynamics and mathematics, and thereby redeem posthumankind in perpetuity. The only alternative is extinction – literally inconceivable insofar as extropianism asserts, as its foundational premise, that death is no more than an obsolescent evolutionary mechanism, a biological phenomenon presumptively obviated by posthuman intelligence and postbiological technology. In other words, without a magically redemptive concept of Singularity, the extropian worldview is simply unthinkable.

Over and against entropic and extropian eschatological models – which variously inform Cold War-era SF and technocultural fiction through such SF-identified or -affiliated literary figures as Asimov, J.G. Ballard, Philip K. Dick, and Thomas Pynchon – postcyberpunk is formulating an alternative set of epistemologies. One of these, linked through Bataille's concept of general economy with the postcyberpunk anti-economics outlined above, rebuts cyber-thermodynamic pessimism with a diametrically opposed presumption of "solar" abundance (Bataille 28). Bataille describes a universal ecology whose vitality does not diminish over time but instead tends to accumulate more energy than it can handle, and in this description of the universe we face the opposite of the extropian problem: human society must find ways to expend and dissipate the excess energy before it becomes socially corrosive, and potentially destructive. It is this ecological imperative which fundamentally drives the anti-productive practices (*potlatch*, sacrifice, gift-giving) of exchange economies, nor is it far below the surface of the emergent post-economics of contemporary Internet culture as sketched above and as detailed in chapter four.

The entropic cosmology is similarly confounded by the late-twentieth-century popularization of chaos theory and its affiliated discourses, which counterintuitively propose that life-giving novelty and complexity are engendered, not exterminated, by apparent randomness and disorder. This premise, understood and embraced in diverse ways by technofuturists and SF writers, authorizes a new, postmodern and posthumanist discourse that parodies and supplants the positivist historical metaphor of thermodynamics: an "infodynamic" cosmology emphasizing the cyclical flow and ferment of ideas and information, the organic rise and fall of structures and patterns, over the physical behavior of mass and energy on a linear timeline. Infodynamics, in turn, helps to establish the terms for yet another conception of Singularity as historical telos, one

in which the swirling chaos of global, high-tech postmodernity – so easily mistaken by dystopian twentieth-century minds for a moribund, entropic morass – spontaneously gives rise to new and presently unimaginable orders of complexity.

In addition to being readily comprehensible within Hayles's account of the ascendancy of information over materiality under posthumanism, these developments also open a conceptual space wherein the counter-intuitive logic of chaotics can emerge and radically reconfigure the signification of randomness and disorder – hitherto associated exclusively with dire outcomes (the thermodynamic "heat death" of the universe) – into conditions of sublime possibility. Bruce Sterling's Shaper/Mechanist stories and his 1985 novel *Schismatrix*, which occupy a key liminal position in the shift from *Mirrorshades*-style 1980s cyberpunk to early transhumanist postcyberpunk SF, develops these possibilities by recourse to the Nobel Prize-winning work of the late chaoticist Ilya Prigogine. Prigogine appears by name in the Shaper/Mech universe as the prophet and proto-theorist of "Posthumanism" ("Cicada Queen" 274) one of several crypto-religious ideological formations that figure in the labyrinthine politics of Sterling's 23rd century. Its proponents preach an apocalyptic mutation of Prigogine's principle that systems in a far-from-equilibrium state can spontaneously generate new "levels of complexity" (273): in Shaper/Mech terms, an abrupt evolutionary "leap" into posthumanity.

The transhumanist program is thus linked directly, and for the first time in SF, with a particular conception of Singularity as the product of historical and technological forces allowed, or actively encouraged, to spin out of control. In ways that have already been extensively noted by technoculture scholars, this deliberate out-of-control-ness is an idea that broadly informs contemporary futurism (in Kevin Kelly's book it is both title and thesis), as well as postcyberpunk SF. For the latter, however, it poses at least as many problems as possibilities. At

the same time that Sterling entertains the prospect of a sudden and spontaneous "Prigoginic leap" (169) into some idealized posthumanism, the Shaper/Mech pieces leave open the question of whether such an event would truly be the Singular moment of ultimate and absolute apocalyptic transcendence the novel's "Posthumanist" partisans prophesy; on the contrary, *Schismatrix*, and indeed the whole postcyberpunk enterprise, voice profound skepticism over the kind of eschatological finality that apocalyptic Singularitarianism implies. On the contrary, the novel strongly suggests, one Prigoginic leap will likely lead simply to another, and another.

Following Sterling, Charles Stross inoculates his own imaginative rendering of Singularity with a healthy dose of skepticism about transhumanist mysticism and mythology – particularly with respect to the instantaneous and theatrical Rapture-of-the-Nerds scenario. In one of *Accelerando*'s more memorable scenes, Stross stages a debate among several indisputably posthuman characters as to when, precisely, the decisive moment of Singularity transpired. They argue their way through a reverse-chronology of technological breakthroughs and economic tipping-points (the first manned intergalactic expedition in the 2060s, the first successful mind-uploads in the twenty-teens, the first network control protocol packet-transfer in 1969…), making cases for how each decisive historical moment might reasonably be deemed worthy of the name – though attempts to pin the Singularity on any one event increasingly seem absurd and beside the point. At least one contingent in the argument rejects the question altogether on definitional grounds:

> "Is not happening yet," contributes Boris. "Singularity implies infinite rate of change achieved momentarily. Future not amenable thereafter to prediction by presingularity beings, right? So has not happened… Singularity is load of religious junk. Christian mystic rapture recycled for atheist nerds." (184)

The debate ends in a stalemate and the chronological problem goes unresolved – that it may be entirely irresolvable indeed seems to be Stross's point – though at the same time the reality of dramatic and profoundly reality-warping technological change is undeniable; the participants in this argument are, after all, disembodied upload minds traveling through deep space in a vessel the size of a soda can. Somewhere in this scene is the encapsulation of the entire postcyberpunk thesis, the sense of which my plural conceptualization of three distinct "Singularities" is meant to echo and reinforce: by all reckoning, the Singularity will not be singular.

Notes

[1] By way of illustration, Kurzweil relates the tale of the man who, having pleased the Emperor of China, is told he may have any reward he cares to name. The man asks for one grain of rice, to be placed on the first square of a chessboard; two grains on the second square; four on the third; and so on. The request seems modest enough for the first thirty squares or so, but halfway across the chessboard the number grains required is suddenly so great that the Empire is bankrupt. Kurzweil obligingly crunches the numbers: to fulfill the operation across all sixty-four squares, the Emperor is on the hook for 18 million trillion grains, requiring "rice fields covering twice the surface of the earth, oceans included" (36).

[2] Like Vinge, Rucker's background is in mathematics and theoretical physics, but unlike Vinge he strongly maintains that their value as knowledge systems must be recognized within carefully bounded spheres of competence. The chief object of Rucker's satire in *Postsingular* is a totalitarian technoscientific epistemology that legitimizes only the most narrowly positivist, utilitarian, objective descriptions of reality. The wholesale reduction of life's myriad quirks and complexities to binary values in a numerical grid – the central project of the tendency Rucker has in mind – is presented satirically as a nightmare scenario, in the figure of the banal and unconvincing "Virtual Earth" simulacrum. The impulse behind it is plainly pathological, linked through Rucker's socially maladjusted computer-nerd characters with themes of autism and psychosexual trauma.

[3] In Elaine Graham's *Representations of the Post/Human* (2002), for example, the posthuman is essentially "an occasion for acknowledging what has always been the case – that 'human nature' is as much a piece of human artifice as all the other things that human beings have invented" (37), while Bukatman characterizes the Haraway cyborg as posthuman only "in the ideological sense of 'human' as a particular mythos of 'natural' individualism" ("Postcards" 346).

[4] To name a few hot-button topics laden with transhumanistic themes and implications that have been treated by courts and legislatures in recent years: Where are the ontological and legal boundaries between embryonic stem cells, near-term fetuses, and adult human beings? Is the presumed right-to-life complemented by a corresponding right to suicide, with or without medical assistance, or by a right to the indefinite extension of life processes by artificial means? Is there any meaningful distinction between a brain-dead or "persistent vegetative" state, and a state of complete corporeal death? Does the information encoded in human DNA constitute intellectual property, and if so, whose? Does ownership of genetic information confer the right to create clones or genetically modified organisms? How should such enterprises be regulated, if at all? How *can* they be regulated?

CHAPTER II
HOW WE BECAME POST-POSTHUMAN:
POSTCYBERPUNK BODIES
AND THE NEW MATERIALITY

"[Once] it everts, then there isn't any cyberspace, is there? There never was, if you want to look at it that way. It was a way we had of looking where we were headed, a direction. With the grid, we're here. This is the other side of the screen. Right here."

William Gibson, *Spook Country*

Rudy Rucker's *Postsingular* is notable for its staging of not one, but two Singularities. The first, narrated in less than twenty pages, is a mass "upload" scenario: a swarm of self-replicating nanobots ("nants") sweeps over the earth, creating minutely detailed schematic descriptions of everything they encounter, and storing these structural maps as data. In the process, the nants systematically dismantle the structures they are mapping, breaking them into atomic particles that will be re-assembled as circuitry in a vast digital computer. When their work is finished, the nants will have eaten their way through the earth all the way to its core, and rebuilt the entire planetary mass into a single engine of raw processing power. On a computer this powerful, every one of the physical objects the nants have deconstructed, along with the "software" of every human mind, can easily be simulated – "A virtually identical simulation of Earth. Virtual Earth. Vearth for short." (31) – leaving the bulk of the system's resources free to think big, posthuman thoughts.

The exodus into "Vearth" is overseen by U.S. President Dick Dibbs, a Christian fundamentalist and neoconservative who sees in the postbiological Singularity "a fulfillment of Biblical prophecy" (206) and an opportunity to re-make all of civilization on an American

model, and strikes a deal ceding the planet to the posthuman hive-mind of the nants. At first

glance, it looks like a win-win proposition:

> "Each living Earth creature gets its software-slash-wetware ported to an individually customized agent inside the Vearth simulation. Dibbs's advisers say we'll hardly notice. You'll feel a little glitch when the nants take you apart and measure you – and then you're alive forever in heavenly Vearth. That's the party line. Oh, and we won't have to worry about the climate anymore." (31)

Life will be better in the simulation, where all the disorder and danger entailed in organic

embodiment – from the threat of global ecological collapse all the way down to that of infectious

disease – can simply be edited out. The nants' creator, a deranged software tycoon who for his

own reasons shares the President's vision of a simulated utopia, pledges that "Virtual Earth will

be germ-free. Digital and odorless. No more dogs spreading filth" (207).

But the Rapture-like ascension to disembodied virtuality, when it arrives, looks rather

different to the horror-stricken northern Californians who are Rucker's main characters:

> "So horrible," she choked out. "So evil. So plastic. They're destroying Earth for a memory upgrade." (32)
> "…Look out there. It's a wasteland. Oh God, Ond, we're going to die. Poor Gaia."
> As far as the eye could see, the pastel chockablock city of San Francisco had been reduced to bare dirt. It looked like the pictures of the town after the 1906 earthquake. And instead of smoke, the air was glittering with hordes of freshly made nants, a seething fog of omnivorous, pullulating death-in-life. (34)

Worse, those still alive to witness the awful spectacle of "Gaia's skin eaten away by

micron-sized computer chips with wings" (32) have no plausible assurance of a paradisical

virtual afterlife awaiting them – other than dubious video messages from friends and loved ones

who have already been "ported in" and now beckon with promises that "it's radical in here… an

awesome giant sim," exhorting them to "jam on up to Vearth as soon as you can" (34). Happily

for Gaia, this dystopian Singularity is arrested and rolled back before it has completely run its

course. Since each nant carries a record of every action it has ever carried out, it is possible to

run the whole sequence backwards: the same nanotech that took the biosphere apart thus puts it

all back together, just as it was. In order to protect the planet from future nant attacks, a second

wave of self-replicating nanobots ("orphids") is released. Instead of obliterating materiality, the

orphids blanket and infuse it with intelligence, setting the stage for Rucker's second Singularity

narrative, which henceforth takes the form of a three-hundred-page rejoinder to the utopian

fantasy of mind-uploading and virtualized disembodiment that typifies the extropian Singularity.

Indeed, though couched in Rucker's characteristically zany and cartoonlike narrative

style, the premise of Vearth and the arguments for simulated, virtual existence as preferable to

material embodiment are not fictionalized artifacts of Rucker's own fevered imagination, but

transcribed from contemporary transhumanist Singularity discourse. When the fictional mad

scientist behind the nant attack avers that "Reality is software. What does it matter what system

it's running on?" (205), he is voicing an extropian dogma most commonly associated with the

MIT robotics researcher and futurist Hans Moravec. By way of proposing that, given a

sufficiently powerful hardware platform, human mind-uploads are possible at least in principle,

Moravec posits two opposing ontologies, "body-identity" and "pattern-identity":

> Body-identity assumes that a person is defined by the stuff of which a human body is
> made. Only by maintaining continuity of body stuff can we preserve an individual
> person. Pattern-identity, conversely, defines the essence of a person, say myself, as the
> *pattern* and the *process* going on in my head and body, not the machinery supporting that
> process. If the process is preserved, I am preserved. The rest is mere jelly. (117)

In one sweeping bifurcation, Moravec summarily dismisses any fuzzyheaded humanist

objection that subjects are defined neither by mind nor body alone, but are instantiated instead in

the complex interactions between mental, physiological, and even spiritual phenomena. In

Moravec's argument, a person is a pattern of information, an algorithm that might be crunched

on whatever processing-engine one cares to install it – and wouldn't a smoking-hot, overclocked, multicore quantum supercomputer be preferable to the sloppy and slow-moving organic "stuff" of cortical gray matter? In framing the question thus, and in throwing the weight of his considerable intellect behind the platonic ideal of "pattern" over and against all other modes of experience, Moravec – a self-identified extropian and one of the movement's leading public figures – has drawn the ire of more humanistically-inclined thinkers who take exception at the reduction of complex, living, gendered, embodied human forms to "mere jelly." He has, moreover, established a principle that broadly informs extropian attitudes about materiality in general, especially their narrowly utilitarian views about the value of nature. This set of ideological commitments marks Moravec-style extropianism as antagonistic toward at least some versions of feminism, and especially toward what Extropy Institute founder Max More contemptuously calls "the sacred cows of the fundamentalist 'environmental movement'" (FAQ 5.8).

For his part, Rudy Rucker is on the side of Gaia and jelly. In *Postsingular* he diagnoses Moraveccian patternism and the extropian impulse toward disembodiment as simple Freudian pathologies: the novel's uploading-obsessed villain, traumatized by a childhood accident that killed his best friend, seeks to "create a perfect virtual world" in which the dead boy will be resurrected, thereby fulfilling an infantile wish to "bring reality under control" (21). Having witnessed the violent death, he broods on mortality and nurses a deep phobia of microbes, fluids, and all things corporeal. Asked, "Why are you so afraid of having a body?" he replies: "Bodies break… They bleed. I loved a boy who had a tube shot into his eye. Goo oozed out. Nobody should have to see a thing like that ever again. That's why I'm releasing the nants. Life will be clean and safe on Vearth" (247).

The wish to abide in a pristine and transcendent state of bodilessness is further linked with repressed nihilistic impulses: Rucker's extropian madman "really and truly *wants* our world to end… he actually believes virtual reality would be better" (29), an apocalyptic Singularitarian yearning that suggests a natural alliance with the dominionists and misogynistic end-timers of the Dibbs administration. "The religious right," Rucker opines in one of his still less subtle editorializations, "*wants* the world to end. They hate women, and they hate Earth. For them, Gaia is a piece of crap for us to use up. The sooner we destroy her, the sooner we get clean and go to heaven. They're equating the nants to their myth of the rapture, see?" (227).

In its satirization of extropian wish-fulfillment fantasies via postbiological Singularity, *Postsingular* paints a lurid picture – including a complex connection between body politics, ecological concerns, and quasi-religious millennialism which will be developed here and in the final chapter – of a hardcore extropian ideology against which many of postcyberpunk SF's Singularity narratives are explicitly or implicitly formulated. Rucker's novel may indeed be read as a kind of map for postcyberpunk's critique and revision of both extropian patternism and its fictional analogs in first-generation cyberpunk narratives of virtual reality, *vis à vis* questions about embodiment and materiality that have been raised by critics of both discourses. In place of the extropian postbiological Singularity – which Rucker figures as an absurd, naïve, and frankly psychotic fantasy – he offers an alternative Singularity that entertains mindbending technological transformations of human experience, while simultaneously maintaining a privileged place for organic bodies in all their effluvient splendor, insisting that "the real world" is better than simulation and something "we have to fight for" (223).

Rucker is not alone, or even particularly original, in rejecting the radical Cartesian dualism of "pattern-identity" and all that it implies for extropian transhumanists. Notable among

those who have rallied to the defense of "mere jelly" is N. Katherine Hayles, whose *How We Became Posthuman* opens with an account of the author's shock and disbelief upon first reading Moravec's proposal for mind-uploading: "How, I asked myself, was it possible for someone of Moravec's obvious intelligence to believe that mind could be separated from body? Even assuming such a separation was possible, how could anyone think that consciousness in an entirely different medium would remain unchanged, as if it had no connection with embodiment?" (1). These questions lead Hayles into a wide-ranging exploration of contemporary scientific and cultural discourses united by a shared concept of information – only recently formulated – as "an entity separate from the material forms in which it is thought to be embedded" (2); within this epistemological matrix the extropian upload fantasy is troubling to the extent that it symptomatizes a much broader shift in the technocultural consciousness away from rootedness in the lived experience of bodies. Taken as a whole the book represents, to a large degree, Hayles's attempt to raise the alarm about this trend and its ramifications, and to prescribe "interventions" in the evolution of posthuman subjects "to keep disembodiment from being rewritten, once again, into prevailing concepts of subjectivity" (5).

This chapter revisits these problems of embodiment and materiality, asking how transhumanist Singularity discourse – with special emphasis on its fictional modality – has progressed in the decade since Hayles identified them, and whether the interventions she proposed have borne fruit. In considering the specific role of SF in the ongoing dialogue over posthuman bodies, I return to an earlier but largely parallel body of criticism that was leveled against cyberpunk narratives of the 1980s, to develop a fuller sense of how more recent fictional treatments of the upload premise – especially as a potential Singularity scenario – have been shaped by emerging posthuman body politics. Absorbing and neutralizing the backlash against

what was widely perceived as an "anti-meat" ethic in first-wave cyberpunk, postcyberpunk SF

formulates a new dialectical position that circumscribes both the patternist thesis and its

humanist antithesis.

The starting point for Hayles' interrogation of Moravec, and thence transhumanism writ

large, was a pair of pointed questions: on what reasonable basis can the possibility of something

like a mind-upload even be entertained? and, how could a reasonable person suppose that

consciousness bereft of body "would remain unchanged"? We will pose these questions to two

relatively recent post-Singularity narratives, Greg Egan's ultra-hard upload epic *Diaspora* (1998)

and Charles Stross's sprawling transhumanist *bildungsroman*, *Accelerando* (2005). As these

novels demonstrate, postcyberpunk easily dispenses with the first of Hayles's questions on

grounds of extrapolative license: whether or not uploading can be regarded as technologically

feasible, or even theoretically possible, it's at least conducive to good fiction. (Moreover, as

Colin Milburn persuasively argues in *Nanovision*, SF increasingly insinuates itself at the

vanguard of "real" technoscientific R&D – defining, in a very real sense, the terms of what is

possible and desirable.) On the second question, Egan and Stross are emphatically with Hayles:

of *course* disembodiment would have profound subjective consequences, and their work is

largely devoted to their exploration and development. In fact, the postcyberpunks contend, the

ramifications of Moravec's patternism, and the larger assemblage of transhumanist ideas it

anchors, reverberate well beyond the troubled relationship between mind and body as the

humanist subject morphs into the posthuman.

The overriding theoretical agenda, here as elsewhere, is to privilege literature as a way

into Singularity discourse. Especially in view of the rapidly collapsing distinction between

groups of thinkers who deal in imaginative speculation about what the future might hold and

those who actively produce the technological future through scientific research and engineering, SF merits special consideration. Postcyberpunk in particular commands a set of tools and techniques uniquely suited to identifying and thinking-through the social, political, and philosophical questions raised by the sort of rapid technological change that drives transhumanist movements, to the degree that its narrative style – notably in writers like Stross and Rucker – strategically deploys elements of farce and satire. Self-consciously rejecting the drab and deadly-serious dystopian realism that characterized so much of the cyberpunk canon, postcyberpunk habitually melds conceptual hardness with stylistic whimsy – think *Neuromancer* as written by Douglas Adams, or *Blade Runner* as directed by Terry Gilliam – in order to penetrate the technical and ideological fog of Singularity discourse and elucidate what is really at stake in discussions of what it means to inhabit a body, thereby yielding the richest possible reading of the transhumanist impulse, in all its multivocal complexity.

"How to Survive in the Post-Human Era"[1]: minds, matter, markets

In order to better understand the stakes of postcyberpunk SF's commitment to embodiment and materiality as a left-aligned political project, it is necessary to examine the overt and submerged right-wing ideological commitments that characterize the extropian ethos, and more importantly the profound existential anxieties that lend them their peculiar urgency.

From its origins in the early cryonics movement of the 1970s and '80s, science journalist Ed Regis has defined transhumanism as a project whose primary impulse is the wish to cheat death: initially by crudely preserving the brains of the dead in vague, SF-inspired hopes that science might one day be able to furnish them with new bodies; later, by buying into claims that

medical applications of nanotechnology will in a few years "be able, in effect, to *bring the dead back to life*" (4); and eventually – under the spell of Moravec's patternist argument and the proto-Singularitarian mysticism advanced by John Barrow and Frank Tipler in *The Anthropic Cosmological Principle* – by supposing that people could "transcend physical limitations" and "become pure spirit… *without dying!*" (6) Swept up in what Regis calls "*fin-de-siecle* hubristic mania," transhumanists entertain wish-fulfillment fantasies so hyperbolic that the cryonicists' original goal of raising the dead seems "an entirely reasonable agenda in comparison" (8).

The flip-side of this wildly ambitious techno-exuberance is a congruently manic, albeit largely repressed, feeling of impending doom and existential dread – which Hayles identifies as one of the necessary cultural conditions that made it possible for a meme like patternism to flourish in the first place. "In a world despoiled by overdevelopment, overpopulation, and time-release environmental poisons," she supposes, "it is comforting to think that physical forms can recover their pristine purity by being reconstituted as informational patterns in a multidimensional computer space" (36) – hence, also, the appeal of cyberspace as a premise in late-twentieth-century SF. Noting the "vaguely apocalyptic landscapes" in which cyberpunk narratives characteristically take place, Hayles goes on to argue that "the sense that the world is rapidly becoming uninhabitable by human beings" may indeed be "part of the impetus for the displacement of presence by pattern" (37) in posthumanist epistemology.

The transhumanist movement, which gestated and emerged concurrently with cyberpunk SF during the 1970s and '80s, is readily intelligible within the cultural history Hayles constructs: against a backdrop of war, disease, and environmental degradation that lent the period its peculiarly and pervasively apocalyptic air, the animating impulse behind transhumanism may be understood as a creeping awareness – a mirror-image of the breathless technophilic optimism

that typifies Golden Age SF and authorizes transhumanists' faith in the redemptive power of science – that the future we are preparing for ourselves may not be a very hospitable place for human life after all. The universe's hostility toward the continued existence of human beings is, as such, hardly a new idea; the story of technology itself is commonly told as a story of people systematically adapting their surroundings to optimize conditions for their own survival. But in a modern, technological age when the primeval threats of hunger, cold and predation are being surpassed by the unintended long-term consequences of those same technological interventions, a threshold has been crossed. No longer can the species secure its future by manipulating the external environment: survival technology must be turned inward, toward the adaptation and re-invention of humans themselves.

Though most transhumanist tendencies share some version of this presumption, it is an essential point of departure between Green or otherwise left-oriented transhumanisms and that of the fiercely pro-enterprise extropians, as represented by the right-leaning Extropy Institute, and by Vernor Vinge's brand of libertarian SF. Where left-transhumanists pursue sustainability as an ideal and envision posthumans living in technologically-facilitated equilibrium with their surroundings, the extropian view of humans' relationship with nature is a zero-sum game that ends when humans self-evolve to postbiological status and beam out of embodied materiality altogether. Uploading fits neatly into an extropian evolutionary teleology – recall Ray Kurzweil's definition of technology as simply "evolution by other means" (14) – wherein it seems no less natural for people to leave their bodies than it was for our distant ancestors to leave the water and crawl on land, or to leave the trees and walk upright. The wholesale consumption and outright destruction of natural resources in pursuit of this ultimate technological

transcendence is not inconsistent with our natural evolution as a species to date; indeed, it is the stubborn Darwinian law of nature itself that obliges us to do so.

In the far future of Vinge's *Marooned in Realtime*, the relationship between humans and nature is more antagonistic than ever. The unexplained disappearance of technological civilization has stripped the suspended-animation sleepers of their species' only evolutionary advantage, leaving them to face a planetary wilderness with a bare minimum of survival gear. The survivors are therefore engaged in a desperate bid to find and unite with as many other humans as they can; the goal is to build a genetically viable breeding stock sufficient to scale the population back up to a point where an industrial economy can be re-established. Not everyone is on board with this project, however, as the murder of one of its leaders darkly hints. One such doubter, interviewed as a potential suspect by detective Wil Brierson, has a theory that industrial civilization was the author of its own downfall: "The Earth just couldn't take it. Hell, I'll bet there wasn't even a war. I'll bet the whole structure collapsed under its own weight, leaving the rapists at the mercy of their victim – nature" (71).

This is, of course, tree-hugging hogwash, voiced by the novel's most thinly-drawn sock puppet of a character. Monica Raines, a biologist who so detests humanity that she lives apart from the survivalist colony and openly roots for its failure, is figured as an environmentalist "crazy" who "would make a twentieth-century ecofanatic look like a strip miner" (73). Brierson visits her at the hermit's cabin where she lives and studies the weird and monstrous creatures that fifty million years of blind adaptation have contrived – predatory abominations the deranged biologist finds lovely and graceful, but which appall Brierson. Watching a flock of fire-breathing "dragon birds" start a forest fire in order to kill and cook their prey, he flashes back on unresolved trauma over Bambi's mother: "Wil felt a little sick. He'd watched nature films all the

way back to the flat-screen Disneys, but he could never accept the talk about the beauty and balance of nature – when illustrated by grotesque forms of sudden death" (69).

As if it weren't bad enough that she is a venomous misanthrope and a death-romanticizing ghoul, Raines is also an unabashed hypocrite who can't decide which side she's on. Kept alive and aided in her research by the very human technology she disdains as "perverted," Raines "sat surrounded and served by the fruits of that 'perversion,' and all she could do was bitch. She sounded like something out of the twentieth century" (70). Brierson consoles himself with the realization that sooner or later Raines's life-support systems will fail: "Then she's going to find out about nature firsthand…" (74). Such, Vinge warns, was ever the fate of those who would dare to second-guess humanity's manifest destiny of perpetual technological progress: get with the program or nature, red in tooth and claw, will get you for sure. The middle ground of indefinite sustainability is a granola-munching pipe dream; the only alternative to evolutionary obsolescence is technological transcendence – which, it turns out, is precisely the long-term strategy of the humans' survival effort. "It may take a couple of centuries, but if we can restart civilization *we will make our own Singularity*" (116). In this sense Singularity is inevitable not in its own right, but in that the only other possibility – extinction – is simply unthinkable.

The same seemingly irreconcilable dichotomy is the basis for Hans Moravec's entire uploading project and the scorched-earth environmental policy it attempts to justify. "Sooner or later," Moravec writes by way of establishing the need for transhumanist death-cheating technologies, "an unstoppable virus deadly to humans will evolve, or a major asteroid will collide with the earth, or the sun will expand, or we will be invaded from the stars, or a black hole will swallow the galaxy" (101). Thus assured that organic life is an anomaly that cannot

continue to exist indefinitely, Moravec goes on to elaborate "schemes that would allow an entity to restructure itself indefinitely even as its universe ended" – hence, mind-uploads and the effort to maintain continuity of mental "pattern" absent a material substrate (101).

As in Ray Kurzweil's deterministic argument for the historical inevitability of posthuman intelligence, all of Moravec's astonishing technological predictions for the decades ahead rest on a single core assumption that scientific discoveries and technical innovations will, nay *must*, continue to progress at the current rate, if not faster. The first few chapters of Moravec's *Mind Children* are therefore devoted to making such prophecies economically plausible; to this end he constructs a brief history of computing and robotics in terms of market conditions that were favorable to significant leaps forward, which he presents as conforming to a familiar exponential curve of continually accelerating progress. From this historical sketch he extrapolates the conclusion that, by mid-21st century, consumers can look forward to purchasing everything from cheap household robots to safe and affordable mind-uploads. Eventually, he contends, so long as human creativity and entrepreneurship are allowed to proceed unimpeded, even "the laws of physics will seem to melt in the face of intention and will" (108). As ever, the free market will be the primary vehicle for this metaphysical triumph of the transhuman will.

If one can swallow the first principle, even Moravec's most extravagant predictions begin to seem reasonable and even persuasive, enough so that it becomes easy to forget that they are predicated on a narrowly defined set of teleological assumptions, which carry their share of unacknowledged ideological baggage. Such assumptions surface repeatedly throughout *Mind Children*, as in passages given over to the weird and thinly veiled social Darwinism[2] that creates an entropic backtrop for Moravec's intrepid extropian narrative of the future. As with biological evolution, technological progress has a cost: exponentially increasing competition for

increasingly scarce resources. The only way a society can beat the ever-encroaching Malthusian crisis is to stay ahead of it, simply by expanding faster than the consequences can catch up. What's more, the teleological progression of technological development, once begun, cannot be interrupted, or even slowed down, without still more dire consequences. "If," Moravec writes, "by some unlikely pact, the whole human race decided to eschew progress, the long-term result would be almost certain extinction" (101).

We now have not one, but two routes to extinction – one in which the species is snuffed out by the indifferent mechanics of a hostile universe, and one in which human beings willingly seal their own fate by succumbing to complacency and technological backwardness. In either case, the point is the same: the planet is living on borrowed time, as are the outmoded biological structures it sustains. We'd all therefore be well advised to dispense with our sentimental attachment to bodies and materiality in general, and start thinking about how to become independent of both. For Moravec and the extropians, the dual imperatives of species survival and unlimited, exponential economic expansion are inextricably entwined. For species as for technologies, obsolescence is death.

As a leading transhumanist and frequent spokesman for the Extropy Institute (ExI), Moravec is alone in neither his techno-economic determinism nor his conviction that *Homo sapiens sapiens* is a goner. These presumptions form the founding principles of libertarian extropianism as articulated by ExI, which in its myriad publications on the subject equates postbiological Singularity with the final triumph of liberal democracy, Enlightenment philosophy, and especially free markets. Max More, erstwhile cryogenicist and ExI's founder, has drafted an extensive list of extropian values that serve as the group's statement of purpose; foremost among these is "Perpetual Progress" ("Principles" 1) an ideal that makes no distinction

between progress in scientific discovery, biological adaptation, or economic development. Like Moravec and Kurzweil, More views self-transformation less as a right than as an evolutionary imperative, implying not merely economic but interplanetary expansion: as we use up the resources at home, posthumans will "move beyond the confines of the Earth… to inhabit the cosmos" (1). Naturally, "continual improvement will involve economic growth," which above all must be free from regulatory meddling in general, and the intrusions of "coercive" (1), "fundamentalist" (FAQ 5.8) environmentalism in particular. More concedes the validity of certain conservationist principles, to the extent that judicious management of natural resources may be a means of "preventing any need for a brake on growth and progress" ("Principles" 1), but categorically rejects claims that nature might hold any intrinsic value beyond its immediate use-value for production. Even at that, its usefulness is confined to the near term: after all, eventually "migration into space will immensely enlarge the energy and resources accessible to civilization" (1). Conservation as a core value is thus aligned with entropy, stasis, stagnation, and ultimate extinction. Consumption and expansion, conversely, signify extropy, progress, the Future.

The apparently seamless integration of transhumanist self-evolution with capitalist economic expansion, and its corollary reduction of nature to an object for consumption exclusively to that end, invite scrutiny insofar as the frequency and degree to which these premises are emphasized in extropian discourse is inversely proportional to the degree to which More feels obliged to explain and justify them on one another's terms. Indeed, the unexamined relationship between the transhumanist quest for immortality and market capitalism's need for perpetual expansion is the defining feature of ExI's manifesto-heavy website (extropy.org), a morass of bullet points that break down into two categories: a stoutly optimistic and forward-

looking belief in the power of science and technology to "improve the human condition," and an oddly anachronistic insistence upon selected ideological features of Enlightenment-vintage liberal humanism. Encapsulated in numbered aphorisms and euphemistic one-liners[3] that alternately evoke the glossy PR language of the corporate mission statement, the strategically vague feelgood jargon of the self-help book, and the fervent proselytizing of the apocalyptic religious cult, extropian literature reads as a study in contradiction and unintentionally ironic juxtaposition – forever oscillating between the two poles of iconoclastic, pioneering techno-exuberance on one hand, and prosaic, retro-humanist conservatism on the other.

In one particularly telling passage, More – who lavishly characterizes Extropy as a wondrously dynamic, fluid, flexible and open-ended system of ideas, and ladles out bottomless contempt for the dogmas, "sacred cows" and ossified conventional wisdom that constrain nonbelievers – enumerates the movement's intellectual and ideological foes: certain "political views" that are simply "incompatible with extropian thinking" (FAQ 5.1) Without retreating from the stance that all "-isms" are inherently suspect, he makes a special point of warning that some –isms are worse than others. Notably, in addition to "fundmentalist" enviros, "Socialist transhumanists would want to centralize control over all economic activity in order to shape the future… [They] use the term 'democracy' to refer to the socialist goal of using government power to compel everyone to fit into their notion of equality" (5.1). Apart from its conflation of socialism – the proposition that government has a legitimate role to play in meeting the basic needs of citizens – with full-scale Stalinist totalitarianism, there is a distinct whiff of paranoia and reaction about this section of the "Extropy FAQ" that comports oddly with the spirit of intrepid optimism and intellectual openness extropianism claims for itself, to say nothing of its

unaccountably anachronistic preoccupation with the creeping threat of Soviet-style communism. Such details suggest extropianism is at least as much a throwback movement as a futurist one.

Indeed, at nearly every level, the incongruities latent in extropian literature speak to an abiding irony with pressing implications for transhumanist body politics. What to make of a philosophy that purports to aggressively "question traditional assertions" about what it means to be human and forcefully advocates "the removal of political, cultural, biological, and psychological limits to continuing development" ("Principles"), yet defends with equal vigor "the notion that the highest product of human culture is the scientific method" and actually looks *backward* – to "the 18th century Enlightenment" – for a universal template of "rational human civilization based on the scientific method and a fundamental valuation of human liberty" (FAQ 5.9)? How, moreover, to reconcile the extropian obsession with individual autonomy and rational self-interest with the equally obsessive wish to revise, reduce, and ultimately be rid of the body – the only stable reference point presently available to contain and order the clearly bounded individual that must be the agent of all rational, progress-oriented action? The rationalist political-economic subject of John Stuart Mill is, after all, a Darwinian creature in the fullest biological sense, acting in his own self-interest to meet pressing *material* needs within a system characterized by competition for scarce resources. But if "Self-directed," individualistic striving and achievement is the basis of progress even after the Singularity, what *is* the postbiological self that will carry out this program? Is there such a thing as a posthuman *Homo economicus*? To answer these questions we must stipulate that the full meaning of extropian ideology is not manifest at the surface level, but latent in its internal contradictions.

Hayles's opening chapter suggests a reading of posthumanism as symptomatic of a crisis in the liberal-humanist subjective model known as possessive individualism: "ownership of

oneself" (3), an *a priori* condition that is the essential requirement of individual liberty. In

Hayles's paraphrase of C.B. Macpherson, liberal humanism labors under a "paradox": market

relations are predicated upon the individual's supposed ownership of a "natural" self that

precedes the market economy, yet the "natural" self is itself a product of market relations. "This

paradox… is resolved in the posthuman by doing away with the 'natural' self" (3). The

posthuman self is therefore not a single, stable and coherent identity but instead "an amalgam, a

collection of heterogeneous components, a material-informational entity whose boundaries

undergo continuous construction and deconstruction" (3). This dissolution of the self has

profound and self-evident consequences for the liberal-humanist notion of liberty, in that it

directly "[undercuts] the presumption that there is an agency, desire, or will belonging to the self

and clearly distinguished from the 'wills of others'" and makes it impossible "to identify a self-

will that can be clearly distinguished from an other-will" (4).

If Hayles is right, then the advent of Vinge's "Post-Human Era" – instead of being a

technological panacea – in reality presents a major existential challenge for individualist

libertarians like More, Vinge, and Moravec: they must now find a way to assert ownership over a

self whose boundaries are being rapidly dissolved by the onrushing Singularity they ostensibly

welcome. Assailed on one side by a universe that is patently hostile to fragile embodied

existence, and on the other by an ongoing and radical reorganization of subjectivity and identity

under high-tech postmodernism, they take refuge in an overdetermined and heavily fortified

conception of self as pure information: fully immaterial (therefore indestructible), and fully self-

contained (therefore inviolable by the "wills of others"). The extropian project of indefinite life-

extension is thus identical with the need – in Hayles's terms – to maintain the continuity of

pattern over and against that of presence, to assert and reinforce cognitive and subjective boundaries in place of bodily ones.

Returning to Moravec's original conception of uploading in this light, the ideological commonality between patternism and libertarianism comes into sharper focus. The extropian jumble of self-contradictions is repressed by recourse to a false choice between two propositions: the self-evidently dubious claim that a human being is nothing more than a particular arrangement of organic "jelly" ("body-identity"); and Moravec's counter-claim that "the essence of a person… [is] the *pattern* and the *process*… if the process is preserved, I am preserved" (117). Given the choice between a monstrously reductive biological essentialism and one that reassures readers in a quasi-religious way that they are indeed transcendentally Special, who wouldn't prefer the latter? "Pattern-identity," therefore, requires acceptance of the belief that the informational contents of one's skull comprise one's total essence, which must be regarded as pristine and incorruptible: self-contained, portable and substrate-neutral, internally reinforced against the externally imposed will of the other, and – unlike flesh – invulnerable to the depredations of the material plane. Instead of forfeiting the strictly bounded, 300-year-old, individual humanist subject upon entering a postbiological order in which it is otherwise all but meaningless, patternism vigorously re-asserts it; to this end the concepts of individuality, authenticity, and identity must be rehabilitated and aggressively policed. The overdetermination of such values in extropian discourse symptomatizes its inherent contradictions even as it functions to repress them, and in this way "pattern-identity" takes on the character of an ideological commitment rather than a philosophical argument.

The subsequent implications of the discourse Colin Milburn has theorized as "nanowriting" further problematize the patternist project, revealing its repressed but latent

antithesis. If pattern is everything and everything is pattern, then the whole of material reality is

reducible to identical and individually meaningless elemental particles that take on form and

meaning only when arranged into complex structures – either by accident of nature or by

Moravec's anthropogenic "intention and will." Indeed, Eric Drexler's predictions that advanced

nanotech will confer the godlike ability to manipulate matter on an "atom-by-atom" (Regis 2)

scale are unintelligible without recourse to some comparably atomistic cosmology, whose logical

corollary is a kind of monism in which all local structures emerge from and eventually return to a

greater undifferentiated whole made up of identical and indistinguishable nano-parts. Both

Moravec and Drexler inhabit a digital universe in which brains and bodies are constituted of

fully interchangeable bits that are only temporarily arranged in discrete patterns before entropy

erodes them back into the universal soup of homogeneity and randomness. This fluctuation

between form and formlessness, in fact, is identical with the lifelike process that Moravec's

patternism seeks to isolate and "preserve" against the continual entropic "loss of substance":

> As we humans eat and excrete, old cells within our bodies die, break up, and are expelled
> and replaced by copies made of fresh materials. Most of our body is renewed in this way
> every few years… Every atom present within us at birth is likely to have been replaced
> half way through our life. Only our pattern, and only some of it at that, stays with us until
> our death. (117)

Here Moravec offers a vivid and even poetic description of biological life-process, which

makes it seem all the more odd and perverse that his objective is precisely to abstract and divorce

process *from* life. The phrase "only some of it at that" is key, for in Moravec's view, to go on

living in an organic substrate is to gradually forfeit the integrity of one's pattern: biologically

instantiated life is invariably subject to loss and decay, the immutable laws of entropy against

which extropy defines itself. Even within the lifespan of an otherwise healthy biological

organism, the signal-to-noise ratio is continually dropping, and the pattern of life is constantly

being diffused into the randomness of death. Living things embedded in the ceaseless and unidirectional flow of time are, always-already and by definition, also dying things. Information, on the other hand, is timeless and unchanging. To conceive of self in such terms is to declare independence from the entropic flux of living and dying.

Yet Moravec's solution raises equally troublesome problems in its elision of history from the equation of self. Absent the sociobiological contexts in which it evolved, all the boundaries and relations (physical and physiological, psychological, social, sexual, economic, aesthetic…) that constitute the individualist subject are necessarily artificial and arbitrary. Take away its organic, evolved, historically contingent and specific shape, and what exactly *is* the self that patternist extropianism wants so badly to preserve? What's to prevent the disembodied self, loosed from its biological moorings, from dissolving back into the formless chaos of not-self? Is individualist "intention and will" enough to indefinitely sustain and insulate an individual humanlike consciousness? These are the questions that inform and impel Greg Egan's *Diaspora*, which comprises not just one of the first, but also one of the most expansively conceived and exhaustively realized attempts in hard-SF to extrapolate and interrogate the presumptions of patternism from the far side of a postbiological Singularity. More broadly, the interplay between form and formlessness I have posited at the heart of the patternist repressed is one of the primary sites from which postcyberpunk upload narratives – within a discursive space increasingly defined and shaped by nanowriting – are launched.

**Self and skin: *Diaspora* and the postcyberpunk critique
of uploading**

The lightning rod for Hayles's critique of transhumanist disembodiment, and indeed the

original impetus for her entire project, is Moravec's speculation on how a mind-upload

procedure might work, "a roboticist's dream that struck me as a nightmare" (1). With equal parts

revulsion and fascination, Hayles recounts Moravec's "fantasy scenario in which a robot surgeon

purees the human brain in a kind of cranial liposuction… the patient, now inhabiting the metallic

body of the computer, wakens to find his consciousness exactly the same as it was before" (1). It

is difficult to say which aspect of the passage troubles Hayles most – the nightmarish staging of

the scene itself, or the intellectual wrong-headedness of the premise it describes. In either case,

Moravec's graphic depiction of the annihilative scanning of a human mind serves Hayles as a

metaphor for the casual and often violent excision of bodies in posthumanist discourse on

subjectivity.

Like Hayles, Greg Egan finds Moravec's scenario irresistibly compelling, if not

unproblematic – so much so that he deploys it as the foundational premise for his novels

Permutation City (1994) and *Diaspora* (1998). The latter relates a strikingly similar, and

similarly horrific, scene of a human body being disintegrated while the mind it hosts is imported

to a computer. In place of Moravec's "robot surgeon," Egan's upload scene features a swarm of

hungry nanobots that tunnel into a man's flesh as they scan – which only intensifies the graphic

horror of the Moravec operation as conceived by Hayles.

> Waves of nanoware were sweeping through Orlando's body, shutting down nerves and
> sealing off blood vessels to minimize the shock of invasion, leaving a moist pink residue
> on the rubble as flesh was read and then cannibalized for energy. Within seconds, all the
> waves converged to form a gray mask over his face, which bored down to the skull and
> then ate through it. The shrinking core of nanoware spat fluid and steam, reading and
> encoding crucial synaptic properties, discarding redundancies as waste. Inoshiro stooped

down and picked up the end product: a crystal sphere, a molecular memory containing a snapshot of everything Orlando had been. (149)

Though *Diaspora* appeared in print too late for a citation in *How We Became Posthuman*, Egan is very much on Hayles's radar; elsewhere she makes reference to *Permutation City* as "a book I love to hate because it challenges almost everything I thought I knew about materiality" (*Writing Machines* 21). As proxy for Moravec – whose premise he implicitly credits under the exacting plausibility standards of his own, rigorously technical brand of hard SF – Egan offers an ideal foil for Hayles. Especially in light of Hayles's positioning of the Moravec upload "fantasy" in her opening chapter, *Diaspora* invites a reading that puts it in dialogue with the questions she raises, and accounting for the "central role" (21) in the production of technocultural meaning that she attributes to literary texts. By way of erecting the considerable body of technical scaffolding that supports his universe, Egan furnishes an appendix that combines fictional future-history with a heavy dose of hard neuroscience, mathematics and information theory, specifically citing the cognitive models advanced by transhumanist thinkers Daniel Dennett and Marvin Minsky. Thus the novel – conceptually, at least – endorses the patternist thesis, while at the same time its driving force is the impulse to extrapolatively question its assumptions and identify its limitations.

Diaspora's backstory is the "Introdus": a Singularity event that occurred, on the standard Moravec-Kurzweil timeline, at some point in the mid-21st century, occasioning the mass migration of human minds into a virtual existence. The narrative opens some 900 years later, with the population scattered across a range of rapidly diverging evolutionary paths, an ontological parting-of-ways accompanied by massive social fragmentation, to which Egan's title alludes. At its deepest level, the gulf between the various human, transhuman and posthuman

factions is a crisis of embodiment: some groups continue to inhabit physical bodies of one kind or another, while others have become pure software. This essential fault-line is complicated by further subdivisions: among the biologically embodied "fleshers," a handful remain physiologically unchanged while others have pursued exotic genetic modifications and cyborg add-ons. Among those who chose to upload, some maintain a degree of embodiment by having themselves re-installed on robotic platforms ("gleisners"); the majority, however, live entirely without bodies in a Minskian "society of mind," citizens of virtual spaces organized into city-state-like "polises."

Egan's main characters are citizens of Konishi polis, which is in reality a server "buried two hundred meters beneath the Siberian tundra" (11) and inhabited by uploaded ex-fleshers and their offspring. The latter are minds born to disembodiment, but grown from the intellectual DNA of their once-embodied parents and thence recognizably descended from human stock. These transhuman subjects share the polis with a very small number of "orphans": fully and unequivocally posthuman minds spawned, spontaneously, in the polis's conceptory mechanism, without parents. One of the central POV characters, Yatima, is such an orphan. The novel's first part concerns Yatima's "psychogenesis" – the process whereby sentience appears as an emergent property of massive connectivity amongst various non-sentient software processes, which begins with a "mind seed, a string of instruction codes like a digital genome" (5). The mind seed is acted upon by various automatic functions in the conceptory, which gradually bring about goal-oriented functionalities (seeking information, establishing patterns, formulating new goals) within the gestating "psychoblast." Eventually, these separate mechanisms become aware of one another, and begin to organize the network of relations and feedback loops into a coherent

subject. Only when a Cartesian litmus test has been passed does the polis operating system recognize the developing mind as a citizen with full legal and civil rights.

Here, Egan draws explicitly from the cognitive science of Dennett and Minsky. Yet, while biochemical and genetic analogies are heavily referenced throughout, they are also carefully and repeatedly qualified. Artificial intelligence and human neurological cognition are very different things, Egan stipulates; parallels between the two are everywhere, but are to be understood as metaphorical affinities rather than literal equivalencies.[4] Egan here rejects the patternist reduction of mind to pure, substrate-neutral information, portable from one hardware system to another without significant qualitative changes. Instead, while his software-based characters have thoughts, feelings, motives and agency, because of their subjective disembodiment, they are something other than human – perhaps even other than posthuman. In particular the orphan Yatima is used to emphasize the psychological and existential gap between those with bodies and those without. As a fully artificial intelligence, with no biological ancestor, Yatima provides the vehicle for Egan's exploration of both the limitations of embodiment and the fundamental problem of disembodied consciousness. While Yatima is sympathetic and likable, "vis"[5] ignorance of life in embodied form is conspicuously held up as a shortcoming.

Yatima's encounters with the fleshers emphasize vis naivete when it comes to embodiment, which stubbornly retains the character of being intrinsic to human experience. Early in the narrative, Yatima and another Konishi citizen go joyriding in a pair of robot bodies, hoping to make a diplomatic mission to the flesher community of Atlanta. The episode highlights culture shock and botched communication resulting from the citizens' unfamiliarity with embodied experience, and Yatima's profound disorientation within the gleisner body features prominently. Upon awakening for the first time in the robot body, Yatima experiences the real

environment as simply another virtual scape, and controls the body through a clumsy software

interface so user-unfriendly that it is "as if they'd puppeted the gleisners remotely" (62). Egan's

description of the scene from Yatima's viewpoint emphasizes the multiple layers of low-

bandwidth mediation through which Yatima awkwardly experiences the physical world, which

necessarily comes across as thin and insubstantial:

> Yatima played with vis own expression; the interface software kept sending back tags
> saying ve was attempting impossible deformations… Yatima willed vis viewpoint higher,
> and the interface made vis own robot body follow suit. Ve let Inoshiro pummel and
> scrape ver, paying scant attention to the detailed stream of tags ve received describing the
> pressure changes on 'vis' polymer skin. (63)

Though Yatima means well, the subjective detachment that figures above becomes a

cognitive obstacle that hampers vis participation in the events that follow. Yatima's companion

Inoshiro, however, is not an orphan and therefore retains in vis inherited programming a few

latent vestiges of embodied consciousness. Unlike Yatima, Inoshiro becomes deeply absorbed in

vis new mechanical body and learns to self-identify with it. Though close friends in the virtual

austerity of their native environment, a sense of alienation sets in between Yatima and Inoshiro

when they inhabit bodies, an opposition Egan leverages to effect one of the story's central

themes: the tension between abstract morality and lived, bodily experience. Whereas Yatima's

benevolence is detached and rational, Inoshiro grows visceral and moody. Eventually Inoshiro

goes native, wishing to stay behind among the fleshers rather than return to a disembodied

existence the polis:

> Inoshiro stared back at ver, forlorn but resolute. "I was born in the wrong place. This is
> where I belong."…
> "I've started feeling things. It's not just *tags* anymore--not just an abstract overlay." Ve
> brought vis hands together against vis chest, then thumped the chassis. "It happens to *me*,
> it happens on *my skin*. I must have formed some kind of map of the data…and now my
> self symbol's absorbed it, incorporated it… I can't go back now. It'd be like…tearing off
> my skin." (86-7)

Skin thus becomes a potent and recurring metaphor in the novel, signifying subjective and ethical as well as bodily boundaries. Inoshiro's dread of tearing off skin also foreshadows a plot event that will force Egan's most urgent moral questions to the forefront. Hayles could have asked for no more vivid narrativization of "the sense that the world is rapidly becoming uninhabitable by human beings" (37) – the "impetus" behind patternism – than the ecological catastrophe Egan contrives to kill off the remaining fleshers. Some twenty years after Yatima's and Inoshiro's visit to Atlanta, an impending cosmic disaster is detected: the collision of two distant neutron stars which will send gamma-ray bursts throughout the galaxy. Observers in the polises predict that the resulting bombardment of radiation will destroy the earth's ozone layer and make it uninhabitable by living things, but will apparently not harm the uploaded. Yatima and Inoshiro, the only citizens with firsthand experience dealing with organic anthropoids, are dispatched to warn the fleshers. Yet while the two envoys are armed with good intentions and a stock of uploading tools for escorting would-be refugees into the polis, they fail to understand the crisis on the fleshers' terms, and their mission fails.

With the introduction of lethal ultraviolet radiation into the story, another bio-software analogy comes into play. In the polis, each citizen is contained and sheltered by an "exoself": a virtual computer being emulated within the larger system, it internally "runs" the citizen's mental software and interfaces with the rest of the system on the citizen's behalf. Though not in itself conscious, the exoself keeps the subject bounded and clearly defined, as per the requirements of liberal humanist subjectivity, while facilitating interaction with its environment and with other subjects. Thus Egan's conception of exoself as a hermetically sealed but socially and economically interfaceable subjective vehicle seems to reconcile the libertarian-extropian desire

for self-ownership with the dissipation of the posthuman self as articulated by Hayles. Yet in

doing so, it only re-asserts and underscores the impossibility of fully abstracting any version of

self from a biological model, to the degree that exoself functions in the novel as nothing more or

less than the virtual analog of skin. Even Yatima, a subject with neither cognitive nor genetic

memory of embodiment, intuitively understands bodily trauma and its consequences for

continuity-of-self:

> Though ve could barely comprehend the idea of physical pain, images of bodily integrity
> resonated deeply. The biosphere was a disordered world, full of potential toxins and
> pathogens, ruled by nothing but the chance collision of molecules. A *ruptured skin* would
> be like a wildly malfunctioning exoself that let data flood across its borders at random,
> overwriting and corrupting the citizen within. (114-15)

The identification of skin with the sovereign subjective boundary of the exoself provides

a conceptual apparatus that enables Yatima to sympathize with the fleshers' plight, and a limited

basis for making ethical calculations about how best to help them. As the site and the instrument

of each citizen's autonomy, the polis culture's highest moral value and its only guaranteed

political right, the integrity of exoself is sacrosanct; to externally interfere with an exoself would

be a violation of someone's autonomy, and therefore immoral by definition. For Yatima, these

are the only available terms within which violence and bodily destruction may be understood as

moral problems. While they furnish an analogy that gets at the stakes of the problem the fleshers

face, they culminate in an intractable ethical quandary, since the only way to salvage and

preserve the fleshers' cognitive patterns is to administer Introdus against their will – a violation

of subjective autonomy as well as a literal penetration and depredation of flesh. Moreover,

though Yatima is able to sympathize on an intellectual level, authentic empathy continues to

elude ver. Despite a deeply felt wish to identify in a more immediate way with the embodied

victims, Yatima's own lack of flesh makes it impossible to do so – the destruction can only be

witnessed secondhand, through the densely layered and hypermediated feedback loop linking Yatima's consciousness with the robot body it puppets. The blast of radiation heralding the apocalyptic moment itself is "too loud to be heard; the gleisner's acoustic sensors shut down in self-defense… Yatima raised vis hand into the hot wind, and tried to feel it flowing past vis fingers, tried to grasp what it would mean to be touched by this strange storm" (143).

Subsequently, Yatima's profound ignorance of the subtleties of embodiment results in a series of inadvertent but devastating *faux pas* that further complicate the rescue mission. Unconscious of the historical animosities between fleshers and non-fleshers, Yatima offends the Atlantans by bringing forbidden Introdus technology into their territory in violation of ancient treaties. Whereas Yatima views it as a means of deliverance from imminent death, from a strictly embodied standpoint like that of the Atlanteans, Introdus entails the total destruction of a living body, legally and morally equivalent to murder; Yatima's good intentions are thereby thwarted by ver tactless invitation to the fleshers to abandon their failing bodies and enter the polis. Later, still trying to be helpful, Yatima guilelessly drags a corpse around by the collarbone, oblivious to the fleshers' horror at this indecorous treatment of human remains (149).

Ultimately, bodily integrity is at the heart of the diplomats' moral dilemma upon reaching Atlanta: should they violate the fleshers' bodies (and thereby their autonomy) in order to save their minds, or should they stand by and watch both body and mind be destroyed by radiation? Yatima struggles briefly over the relative rightness and wrongness of both options and concludes, rationally, that because the gamma-ray burst poses a greater injury to the fleshers' continued autonomy than does Introdus, the lesser evil may be indulged in order to avoid the greater one.

Inoshiro, on the other hand, broods and despairs; vis reasoning becomes impulsive and increasingly desperate. Because of vis more immediate experience of embodiment, Inoshiro initially insists that the imperative of preventing bodily suffering trumps all other ethical concerns. When Yatima balks at the prospect of violating reluctant fleshers' autonomy, Inoshiro lashes out.

> "We're not here to kidnap people," [Yatima said.] "Imagine how you'd feel if some alien creature reached into the polis and dragged you away from everything you knew—"
> Inoshiro almost screamed with frustration.
> "No, *you* imagine how *this flesher* will feel, when vis skin's burnt so badly that the fluid beneath starts seeping out!" (114)

Having fully identified body with self, the gruesome spectacle of Introdus is too much for Inoshiro, who must stand by helplessly and watch in horror as the fleshers' bodies are devoured by Yatima's nanoware. The experience is catastrophically traumatic for Inoshiro. Upon returning to the polis, ve can no longer reconcile vis delight in corporeality with the shock of mortality, and decides to change vis "outlook." Citizens, we learn, have the option of installing packages of ideological assumptions and philosophical inclinations, called "outlooks," on top of their programming. These pre-packaged value systems have effects ranging from subtle tweaks in attitude and aesthetic sensibility to massive perceptual reconfiguration and drastic personality changes. Inoshiro reacts to the trauma ve has suffered by installing a particularly extreme and rigid outlook that makes ver placidly indifferent to everything, an outlook that cannot be un-installed. In other words, Inoshiro performs a self-lobotomy.

The sense, which haunts and ultimately destroys Inoshiro, that something ineffably and incalculably important has been lost in the Introdus, is just one of many levels at which *Diaspora* problematizes transhumanist orthodoxy about what it means to inhabit a body. Another is the way in which it embodies the logic of the *skeuomorph*, a concept that figures centrally in

Hayles's account of the conceptual shifts that comprise the history of cybernetics. In her

definition, skeuomorphs are technological artifacts that preserve nonfunctional, vestigial

characteristics linking them to earlier technologies in which those features were functional.[6] The

skeuomorph, for Hayles, functions both as a means of easing the transition from old to new, and

as archaeological evidence for the easily-overlooked continuity between progressive stages of

seriation – making it a particularly useful tool for the ideological study of Singularity discourse,

wherein the presumption of a sweeping and decisive rupture tends to negate historical analysis

and obscure the true continuity between past, present, and future.

Diaspora is a skeuomorphic text to the extent that it insists upon the need, seemingly

hard-wired into human brains, to construct the virtual in essentially embodied ways. Minds – or

literary characters, at any rate – cannot simply exist as binary data stored on a disk; they must

have a recognizable, three-dimensional subjective space in which to live, move about, think and

speak. Therefore the polis must be able not only to create a plausible simulation of embodied

reality, but also to furnish its subjects with reassuringly familiar skeuomorphs to help bridge the

subjective disconnect. Though the flexibility of the digital medium allows the citizens virtually

unlimited freedom of self-expression, for example, the visual representations they choose for

themselves invariably gravitate toward the same basic anthropoid model:

> …simplified or intricate, rococco or spartan, mock-biological, mock-artifactual, forms
> outlined with helices of luminous smoke, or filled with vivid hissing serpents, decorated
> with blazing fractal encrustations, or draped in textureless black -- *but always the same
> biped, the same ape-shape*, as constant beneath the variation as the letter A in a hundred
> mad monks' illuminated manuscripts. (20)

The simulated self, meanwhile, still has nimble fingers, even though the bio-evolutionary

context that made manual dexterity a favorable adaptation has been displaced by a purely social

one: "Konishi citizens retained the ancestral neural wiring for fine control of their icons' hands --

linked to the language centers, for gestural purposes -- but all the highly evolved systems for manipulating physical objects had been ditched as superfluous. Scape objects did as they were told…" (64).

The abundance of such skeuomorphic figurations in the polis culture is suggestive of essential and untranslatable properties of human cognition, which must be accommodated even within a wholly virtual environment. This presumption is not unique to Egan's conception of the virtual, but indeed so deeply embedded in SF narratives of ultra-immersive virtuality that it may as well be considered a convention. *The Matrix*, to cite a highly visible example, substantially rehearses the same argument to explain why the machines find it necessary to simulate embodied reality for the humans whose bio-energy they are harvesting: without the illusion of three-dimensional physical existence, they go insane and the system fails. The short-lived Joss Whedon SF television show *Dollhouse* (2009) similarly features a bio-supercomputer powered by the linked-up brains of unconscious humans, whose minds are subjected to a nightmarish virtual reality without which the system would not be able to function. And the uploads in Stross's *Accelerando* also continue to behave in stubbornly embodied ways, despite their lack of physical meat:

> Brains in bottles… sometimes stop engaging in activities that brains in bodies can't avoid… But some activities don't cease, because people (even people who have been converted into a software description…) don't want them to stop. Breathing is wholly unnecessary, but suppression of the breathing reflex is disturbing unless you hack your hypothalamic map, and most homomorphic uploads don't want to do that. Then there's eating – not to avoid starvation, but for pleasure… It seems the human addiction to sensory input won't go away. And that's without considering sex, and the technical innovations that become possible when the universe – and the bodies within it – are mutable. (169-170)

Egan, again following Moravec's speculations, creates more troubling ambiguities by introducing another device into his premise: if mind is to be understood as pure information

independent of matter, it follows that a mind can be copied exactly, and that the product of that

duplication process would be subjectively, ontologically, and for all other practical purposes, no

different from the original. Polis citizens hedge against extinction by "cloning" themselves and

sending the clones into potentially dangerous situations. To minimize confusion, the originals are

kept on ice while their proxies are out and about, and upon their return the memories and

experiences of the clones are merged back into the original file. If the clone does not return

within a given period of time, the original is revived and continues on as if nothing has

happened.

When Yatima and Inoshiro leave Konishi and enter the gleisner bodies, they leave behind

"snapshots" of themselves: static backup copies that can be activated in the event that they never

return. Strictly speaking, the Yatima and Inoshiro we meet at the beginning never make the

journey to Atlanta -- their clones do.

> Yatima's clone started up in the gleisner body and spent a moment reflecting on vis
> situation. The experience of "awakening" felt no different from arriving in a new scape;
> there was nothing to betray the fact that vis whole mind had just been created anew.
> Between subjective instants, ve'd been cross-translated… *In a sense, ve had no past of vis
> own, just forged memories and a secondhand personality*… but it still felt as if ve'd
> merely jumped from savanna to jungle, one and the same person before and after. All
> variants intact. (61)

While the authentically posthuman Yatima is able to take this existential paradox in

stride, others have a more difficult time. In order to determine the cause of the cosmic event that

has destroyed the earth's biosphere, the polises themselves are cloned and sent on space-

exploration missions. Each spacefaring polis contains thinking-speaking-acting copies of all its

citizens, who remain in intermittent contact with the other versions of themselves, each of which

Egan – exploring the formal implications of postsingular fiction – treats as a separate character.

The refugee flesher Orlando, scanned into the polis against his will earlier in the novel, is so

traumatized by the displacement and multiplication of his identity that he (that is, the "original"

uploaded Orlando living in the Earth-based polis) commits suicide, while his clones live on.

When one of Orlando's far-flung second-selves gets the news, he tells his son Paolo (or, rather,

Paolo's clone), who is entirely at a loss for meaning.

> Paolo fell silent, confused. How was he supposed to mourn a distant version of Orlando, in the presence of the one he thought of as real? Death of one clone was a strange half-death, a hard thing to come to terms with. His Earth-self had lost a father; his father had lost an Earth-self. What exactly did that mean to *him*? (240)

The cloning premise reaches such heights of absurdity as to become almost unintelligible

except in satirical terms, as a joke on those who would naively suppose a neat and uncomplicated

transition to uploaded disembodiment. Egan's relentless extrapolation of the upload premise

erodes humanist ontology to the point that we can no longer safely assume even something as

basic as a singular and self-contained identity, the presumption that there can be only one "me."

Indeed, the novel seems reluctant to affirm that the minds which inhabit the polises *are*, really

and truly, the minds of the humans whose bodies were supposedly scanned into the system in the

first place, and not merely sophisticated simulations. From one standpoint, that of Dennett and

Minsky, it makes no difference whatsoever: the formal pattern that constitutes mind is all that

matters and there can be no meaningful diachronic continuity between successive copies of that

pattern, no meaningful distinction to be drawn between the original and the copy.

To the extent that Hayles's objection to the uploading "fantasy" is about the proposition

"that mind could be separated from body" (1) in the first place, a similar line of criticism might

well be leveled at Egan, who appears to seriously consider the possibility that it could. If,

however, Hayles takes exception more precisely with the supposed belief of Moravec and others

"that consciousness in an entirely different medium would remain unchanged, as if it had no

connection with embodiment" (1), then her quarrel is certainly not with Egan. On the contrary,

Egan appears to share many of Hayles' most basic misgivings, not just about the feasibility and desirability of uploading, but about the transhumanist movement writ large, which – notwithstanding "a handful of self-described Tranhsumanists [who] are thinking rationally about real prospects for the future" ("Transhumanism") – Egan considers little better than "a religious cargo cult based on the notion that self-modifying AI will have magical powers." Indeed, the whole transhumanist project, or at least its rhetorical framing, strikes him as suspect: "The word 'transhumanism' (or, even worse, 'posthumanism')," he writes in a comment thread on Russell Blackford's transhumanist *Metamagician* blog, "sounds like a suicide note for the species."

SF's body-image problem: cyberpunk and its discontents

The counter-arguments to extropian patternism that critics like Hayles and fiction writers like Rucker and Egan have advanced, while formulated relatively recently in response to the more extravagant and provocative claims of movement-transhumanists and Singularitarians, have roots in an earlier critical dialogue that began in the 1980s with cyberpunk SF. A pronounced critical tendency exists within the body of scholarly discourse on cyberpunk, chiefly organized around a perception that the breathless lyricization of cyberspace in works like Gibson's *Neuromancer*[7] – and its presumed corollary, a pathological fear and loathing of "meat" – beg troubling questions about masculinity and technophilia. For many critics, cyberpunk's peculiar construction of the virtual symptomatizes a syndrome of psychosexual and social anxieties that, far from validating the genre's ostensibly subversive or even "revolutionary" status, instead border on the reactionary.

The archetypal cyberpunk hero, in such critical accounts, was a particularly distasteful blend of tortured adolescent geekdom and strident American individualism: a loner,

idiomatically white and male, handy with gadgets but hopelessly clumsy with human beings, making his way through a dangerous and morally gray universe with only his artificially enhanced wits and a complement of futuristic weaponry for protection. He was autonomous and even powerful in the virtual worlds into which he projected his consciousness, but miserable and awkward in his own skin, and profoundly alienated in the dystopian "real" world wherein his physical body, regrettably, resided. He sought freedom and solitude in the sleek and gleaming austerity of simulation – an escapist impulse that often scanned as an abdication of social responsibility and a gesture of helpless complicity with the oppressive world order of high-tech corporatocracy, or worse, as a crass display of commodity fetishism, insofar as the net was typically entered by way of dubiously intimate coupling between human brains and lovingly cherished name-brand consumer electronics.

Indeed, in one way or another, most objections to cyberpunk ethics and aesthetics were authorized by its apparent construction of body politics. Feminist semioticians in particular have noted how the genre-defining metaphor of cyberspace seemed to map sex and gender categories, privileging (neurotically masculinized) disembodied subjectivity over fleshy and implicitly female embodiment. The mind-body dualism implicit in cyberspace's "decoupling of public persona from the physical space of the body," Thomas Foster acknowledges, tends to "reproduce the gendered hierarchy that equates masculinity with universal rationality and femininity with embodied particularity" (116). "In this context," Claudia Springer writes of cyberpunk fiction, "'meat' typically carries a negative connotation... It is an insult to be called meat in these texts, and to be meat is to be vulnerable" (39). In its retreat from meat, cyberpunk fiction in Springer's reading re-instantiates sex and sensual pleasure at the interface between human and machine, paradoxically inviting readers "to experience sexuality by losing our bodies and becoming pure

consciousness" (39). While Springer's argument is considerably more complex and nuanced than

is suggested by the simple opposition of cyberpunk's idealization of "pure consciousness"

against its supposed derogation of "meat," this dichotomy – or something like it – is common to

feminist readings of the genre, and broadly characteristic of its critical reception since the 1980s.

Feminist criticism, of course, is by no means monolithically hostile to cyberpunk SF as

such – nor, moreover, to cyberspace as a literary device, particularly with respect to the way it

engenders possibilities for the reconfiguration of gender and sexuality along the lines Springer

has laid out. Indeed, as Hayles notes, feminists (along with postcolonialists, Deleuzian

postmodernists, and other left-affiliated theoretical groupings) may find much to celebrate in the

posthumanist deconstruction, via technologies of the virtual, of the liberal humanist subject –

which, as "feminist theorists have pointed out... has historically been constructed as a white

European male, presuming a universality that has worked to suppress and disenfranchise

women's voices" (4). Yet, as much native interest and appeal as such deconstructive projects and

cyborgic renegotiations of identity might hold for postmodern feminist thinkers in the lineage of

Donna Haraway, many – like Jenny Wolmark – judge that "despite the innovatory depiction of

the virtual world of information… cyberpunk was forlornly timid" (8) when it came to

extrapolating and grappling with the gender implications of the virtual.

> It becomes apparent in these texts that leaving the 'meat' behind does not serve to
> obliterate all the contradictions inherent in culturally constructed masculinity, nor does it
> enable a less compromised virtual masculinity to be enacted in cyberspace. Instead,
> cyberspace is inevitably dominated by anxieties about masculinity that can never be
> resolved, and as the interface between human and technology continues to be structured
> around masculinity, any attempt to incorporate difference is repressed. (Wolmark 8)

Worse, and typical of the masculinist interface paradigm Wolmark mentions, the very

language of Gibsonian cyberspace seemed gendered, often in overtly and aggressively phallic

ways – from the masturbatory overtones of "jacking in" and "simstim" to the various acts of penetration, insertion, and trespass by which the cyberpunk craft of hacking was performed and characterized. (Springer 44-5). Perhaps more than any other single feature of cyberpunk discourse, the gendered construction of cyberspace as "matrix" – a terminology coined by Gibson and subsequently enshrined as a cyberpunk convention – has invited critical scrutiny and opprobrium.

This should come as no great surprise; the womblike matrix, to the extent that it serves as a site for male fantasies of mastery, transgression and escape, offers a veritable candyland of Freudian signification for the delectation of disputatous critics. For "despite the feminine fleshiness evoked by the word 'matrix,'" Amanda Fernbach writes of *Neuromancer*, "the cyberpunk fantasy is no celebration of the body" (244), but rather of the cyberpunk subject's fetishistic relationship with technology, which he fantasizes "can supplement male lack and can fix a deficient masculinity" (246) – deficient not necessarily or exclusively in terms of sexual dysfunction, but in more general terms of dissatisfaction and discomfort with his own body, predicated on a stereotypical construction of the cyberpunk reader as a basement-dwelling adolescent nerd, fed on Cheetos and Mountain Dew and perpetually picked last for kickball. The matrix thus functions simultaneously as a refuge and as a (feminized) object for conquest, in compensation for male feelings of inadequacy; hence the cyberpunk hacker-protagonist as "console cowboy," a formulation which transparently "recycles the cowboy myth of the Wild West: its technocowboys, equipped with their prosthetics, are romanticized as lone, tough risk-takers, guns for hire, riding out into the new digital frontier that is cyberspace" (245).

To jack into the "matrix," then, is not only to metaphorically re-enter the womb or otherwise penetrate and inhabit a feminine space, but also to indulge an imperialist fantasy in

which a sentimentalized wilderness is similarly conquered and domesticated. Against this

backdrop, Nicola Nixon figures Gibson's hacker protagonists as "metaphoric rapists" (202) and

dick-swinging avatars of "Reaganite cowboyism" (197) who are constantly "'slotting into'

feminized cyberspace decks" (199) and busting through the "metaphoric hymeneal membrane"

(198) of security software. In one of the more scathing anti-cyberpunk polemics ever set to

paper, Nixon seizes on the coded misogyny of the Western to argue that *Neuromancer* and its

sequel *Mona Lisa Overdrive* are not merely records of nerdly wish-fulfillment fantasizing, but of

deep-seated and venomous Reaganite misogyny:

> Is Gibson simply invoking traditional tropes of American imperial or colonizing fictions
> – in which the valiant and resilient Western homesteader wins back civilization from the
> savage feminine wilds (the virgin land)? Or is he presenting a particularly unsavory and
> reactionary '80s working of those tropes, an aggressive anti-feminist backlash which
> figured feminists as emasculating harridans and ball-busters… (200).

Behind the hyperbolic rhetoric and flights of questionable armchair psychoanalysis,

Nixon has a valid point: cyberpunk SF is undeniably a testosterone-soaked and unapologetically

technofetishistic literature, laden with embarrassing double entendres and troubling implications

for the status of bodies in a posthumanist cultural milieu – all of which legitimately call into

question its revolutionary pretensions. Critiques like Nixon's and Fernbach's have effectively,

and not without basis, characterized cyberpunk in two important ways: as the literature of a

(white, male, Eurocentric, imperialist, technocratic) humanist subjectivity imperiled by an

encroaching postmodern social and economic order, as well as by the unintended consequences

of its own technological exploits; and as a broader cultural tendency voicing deep anxieties and

uncertainties about the (gendered) organic body and about materiality in general. Somehow,

though it fiercely eschewed the institutional technocracy of Golden Age pulp SF and the

establishment conservatism that tradition implied, the cyberpunk impulse to transcend

physicality became implicated in the longstanding technocratic project of conquering nature and establishing dominion over the physical realm through endless quantification and commoditization, bourgeois-rationalist techniques whereby the competent man of science can lay hold of reality with cold numbers and empirical facts.

The parallels between first-wave cyberpunk SF, under this reading, and the libertarian-extropian ideology outlined above should by now be self-evident, though whether they amount to a genuine and uncomplicated cyberpunk affinity for Singularitarian transhumanist fantasies of disembodiment is less clear. Notwithstanding the many virtues of the feminist reading of cyberspace, to reductively read *Neuromancer* as a straightforward endorsement of the "relaxed contempt for the flesh" (6) that typifies the console cowboy's pose is to overlook the pivotal scene in which Case chooses embodiment and mortality over eternal simulated paradise with his lost love, and to ignore the ghostly half-existence of the uploaded cowboy Dixie Flatline, whose only remaining volitional impulse is to be deleted – a negligent and tendentious misreading, to be sure.

Regardless, the perception of an anti-meat bias is, rightly or wrongly, part of the baggage that cyberpunk SF carries; consequently, any attempt to conceptualize *post*cyberpunk must acknowledge and engage with it. As with the extrapolative and formal challenges posed by Vinge's paradoxical figuration of Singularity in the previous chapter, my contention here is that the work of postcyberpunk SF writers – especially those trained and practiced in the nonlinear problem-solving methods of coding and hacking[8] – is defined to some degree by the strategies they devise in response to implicit obstacles: in this case, the mountain of embodiment criticism that interred first-generation cyberpunk, which its would-be successors must now write their way out from under. How to talk about uploads and interfaces and trans- or posthuman subjects

without begging the same vexing questions about mind-body dualism, and without provoking the

same sociopolitical animosities?

For one, while the coterie of professional SF writers themselves largely remains a boys'

club, there is evidence to suggest a conscious effort on the part of some postcyberpunks to write

more gender-conscious and -inclusive SF. Sympathetic and three-dimensional female

protagonists abound in the fictions of Cory Doctorow, whose story "Anda's Game" in particular

is a hymn to "girl power," as well as a call for greater inclusivity in the male-dominated sphere

of gaming and throughout geek culture generally. Meanwhile Manfred Macx, the central

character in Charles Stross's *Accelerando*, may be biologically male and operatively

heterosexual, but his ontologically egalitarian values and the cyborgic fluidity of his subjective

boundaries also encompass categories of sex and gender. An avid crossdresser and intermittent

dabbler in sub-dom roleplaying, Manfred is Stross's satirical counterpoint to the overdetermined

and strictly bounded masculinity of the stereoptypical cyberpunk protagonist, whom feminist

criticism correctly identified as the thinly disguised stock hero of a long and macho pulp

tradition dating back to Westerns and hardboiled detective fiction. Manfred does not readily fit

any of these hackneyed types; on the contrary, he is a slightly clownish antihero, more or less at

home in a pronouncedly matriarchal family unit and, moreover, scarcely even fulfilling the role

of protagonist. Though he figures centrally in the early, pre-Singularity chapters, Manfred

gradually recedes into the background as the narrative increasingly follows the exploits of the

strong-willed and similarly boundary-crossing women in his life: his ex and onetime dominatrix

Pamela, his fashionably androgynous and business-savvy second wife Annette, and his

independent and hyperintelligent daughter Amber, the self-styled queen of her own spacefaring

nation-state. And while *Diaspora* suggests no particular feminist political program as such, it is

impossible to say of Egan what Wolmark said of first-generation cyberpunk: that it took no interest in "the impact on representations of gender identity" (8) implied by disembodied subjectivity; if nothing else, Egan's ambiguously gendered posthuman characters and his obsessive commitment to the use of made-up neuter pronouns throughout the novel place his work in a very different category.

Despite these telling revisions of cyberpunk's loudly decried masculinism, however, it is not my intention to posit postcyberpunk as a distinct and unique literary enterprise solely on the basis of its updated gender sensibilities. Postcyberpunk's most important contribution to the genre and the broader technocultural discourse, encompassing and authorizing its unique gender and body politics, is the way it is dynamically re-engineering the conceptual apparatuses conventional to cyberpunk narratives of the virtual, and thereby helping to re-imagine the field of possibilities for relationships between people and technology. Where the paradigmatic gesture of the cyberpunk narrative was a retreat from the material into the virtual, postcyberpunk SF stages a triumphant return to the material – not the drab, dystopian materiality of Gibsonian meatspace, but a new postsingular materiality, radically transformed and revitalized by the kind of digital fluidity, as well as the futurismic strangeness and uncertainty, that made cyberspace such an appealing concept for an earlier generation of writers and readers.

The genealogical relationship between the two literatures is thus realized in two stages: the (post)cyberpunk subject's journey through the interface into cyberspace, and thence – through the intervention of nanotech and other emerging technologies of reality-augmentation – back out the other side. The world that this subject steps into is forever changed by its presence: it is unambiguously solid and tactile world, but one that is at the same time articulated in a virtualistic logic of simulation, rendering its very solidity and tactility intelligent, malleable and

responsive to (trans-, post-)human cognition and desire. Here we glimpse the outlines of something that might plausibly resemble an authentic Singularity: not a secondary, alternative and ephemeral reality bolted onto a more authentic (and flawed) one, but the advent of a whole new reality – a final assault on Hayles's epistemological barrier between information and materiality, between pattern and presence, for which cyberpunk's exploration of cyberspace was merely the dress rehearsal.

This colonization of the material by the digital (and vice-versa) is emergent and ongoing, and while studies like Colin Milburn's have already made great strides toward theorizing it, it is a territory that is still largely unmapped. The remainder of this chapter attempts to fill in a few of the spaces by reading postcyberpunk texts into the history I have constructed, and mapping them against concurrent, nonfictional technoculture discourses and events wherein the same movement can be seen.

The other side of the screen: SF and the materiality of the hyperreal

In atoning for the real and imagined sins of cyberpunk, no one has more to live down than William Gibson. Perhaps this is why Gibson's 1990s follow-up to the Sprawl trilogy so conspicuously shunned cyberspace as a setting and instead seemed to attempt a more meat-oriented cyberpunk. *Virtual Light* (1993) dropped the VR-style interface of *Neuromancer* and instead presciently explored the possibilities of what would later be called "augmented reality" (AR).[9] The plotline that developed in its sequels *Idoru* (1996) and *All Tomorrow's Parties* (1999), furthermore, turned the disembodiment fantasy on its head by *down*loading the consciousness of an AI into a nano-engineered meat body. Gibson's work in the twenty-first century, moreover, not only shuns immersive virtual realites and other technological conventions

of his earlier SF, but heartily embraces the postcyberpunk ethic of "predicting the present" in realistic, stranger-than-fiction contemporary settings.

One scene from 2007's *Spook Country* – typical of the new, don't-call-it-SF Gibson – in particular suggests an attempt to explain the trajectory and import of the author's own career as a technocultural extrapolator. It features an interview between arts journalist Hollis Henry and new-media artist/producer Bobby Chombo, who combines GPS geolocation technology with mobile AR displays to create "locative" (21) art: 3D animated virtual objects tagged to specific geographical locations, invisible to the naked eye but visible via AR interface. The artworks themselves are files posted online and accessed wirelessly, so that a user with a wifi connection and an AR headset, who knows the URL for the file and the GPS coordinates to which it corresponds, can "see" the piece – though no one else can. Bobby envisions a near future in which wearable computers and displays will democratize audience access to a locative art scene; artists will host the files and GPS links on their own websites, in effect publishing realtime AR feeds to which audiences can subscribe. Switching from one feed to another will be like surfing between different realities, but without leaving your body or your hometown: "Each one shows you a different world… The world we walk around in would be channels" (65). For the moment you still need some external audiovisual hardware to experience this kind of art, but soon you'll be able to "do the locative with your nervous system":

> "We'll have internalized the interface. It'll have evolved to the point where you'll just walk down the street…" He spread his arms, and grinned at her.
> "In Bobbyland," she said.
> "You got it." (65)

When Hollis remarks that this all sounds rather fantastic and futuristic, Bobby maintains that the sort of intersubjective experience "the locative" implies is already integral to the way we

live, pointing to the blogosphere for evidence: each blog represents an attempt to describe a

reality that is articulated contextually, in the links and user traffic between different sites and

articles.

> "Then why aren't more people doing [the locative]? How's it different from virtual
> reality? Remember when we were all going to be doing that?"
> "We're all doing VR, every time we look at a screen. We have been for decades now.
> We just do it. We didn't need the goggles, the gloves. It just happened." (65)

Indeed, the whole premise of locative art is the imbrication and melding of virtual and

material scapes, though this action is only the final realization of a *fait acompli*, a three-

dimensional instantiation of the way we already experience reality through media. Thanks to the

GPS grid and mobile networking, cyberspace itself is "everting" – turning inside-out and

absorbing meatspace into itself in the process. "And once it everts, then there isn't any

cyberspace, is there? There never was, if you want to look at it that way. It was a way we had of

looking where we were headed, a direction. With the grid, we're here. This is the other side of

the screen. Right here" (64).

Let us pause to admire the metafictional stunt Gibson has pulled off: *Spook Country*

portrays a hyperrealistic fictional world that its author describes in promotional interviews as

"more or less the one we live in now" (Chang), wherein the term "cyberspace" is part of the

common vernacular, just as it is the nonfictional real-world of 2007. That is to say, it is a

fictional reality that closely simulates a nonfictional reality which, in turn, has been directly

influenced and shaped by one of Gibson's own earlier works of fiction – a work which is itself

about simulation – and furthermore signals this intertextual relationship by referencing a term

that *conceptualizes* simulation. Indirectly, the novelist William Gibson is a character in his own

novel – or, at any rate, the world of the novel is apparently one in which he exists and *Neuromancer* is a hugely influential text.

Is Gibson's egotism such that he can insinuate, without apparent discomfort, his authorship of the very reality "we live in now"? Perhaps, but to leave it at that would be to miss a more interesting point about what Milburn describes in Baudrillardian terms as the "sedimentation of hyperreality" (25) through the production and consumption of cultural ideas – a process in which SF and technoculture discourses play an increasingly important role, and which tracks closely with the themes of the novel. Gibson's works, like all fictions, present themselves to readers as separate and self-contained virtual realities, alternative worlds in which we may pleasurably immerse our consciousness for a time and then unplug, returning safely to an external and primordial one. But we bring traces of those simulated worlds back with us, cognitive sediment that builds up until eventually it forms the landscape we inhabit. Like the audience for Bobby Chombo's locative art, we tune to Gibson's "channel" when we read and discuss his fiction, and the more we do so the more the William Gibson Channel seeps out, colonizes, and ultimately supplants our reality.

This phenomenon may be understood, at the level of literary theory, as part of the metaphorical content of postcyberpunk SF's materialization of the virtual, which parallels a similar movement toward more overtly embodied technological experiences in the larger nonfictional technosphere. Conveniently, and appropriately, the arc of Gibson's techno-imagination may serve as a kind of précis for the development of this trend in the conceptual evolution of of user-interface, illuminating how the aesthetic and thematic preoccupations of early cyberpunk and its subsequent revisions both reflected and helped shape the way people interact with computers. When *Neuromancer* first appeared, amid the popularization of personal

computing in the 1980s, it affirmed and lent force to an implicit teleology of interface design that had users being drawn into ever more immersive, intuitive, and seemingly unmediated encounters with computers, systematically eliminating the distractions and intrusions of the material world to which the body was tethered. The text-based DOS gave way to the visually intuitive GUI, clumsy directional keypads to the free-floating cursor of the mouse. Virtual reality was only the next logical step: we were moving toward an interface that would blanket the sensorium completely, blotting out or overwriting traces of the user's real physical surroundings and intensifying the hyperreality of the experience. The consciousness of the user would gradually be abstracted from the body and absorbed into the virtual space of the machine.

For the cyberpunk imagination, the immersive possibilities of gloves-and-goggles VR rigs naturally implied an even more intimate means of access to virtual scapes in the cranial jack, which would enable users to experience pure sensation at the most elemental and unmediated level possible: the binary firing of individual neurons in response to external stimuli, which would no longer be awkwardly channeled through the lossy and low-bandwidth organic input devices of retinas, eardrums and fingertips, but piped directly into the cerebrum. In a way, what cyberspace was meant to accomplish was not the abolition of bodily sensation, but its refinement and intensification on a new and better platform – what Bukatman theorizes as the "terminal flesh" (241) of posthuman subjectivity. At this stage, the thinking of cyberpunk SF and transhumanist patternism are closely aligned in their conception of cognition as code, of brains as computers. Like computers, our brains process raw data inputs and abstract them into the recognizable pattern of functional generalizations we experience subjectively, in much the same way that a GUI translates lines of otherwise unintelligible code into icons recognizable as folders and documents that can be opened and closed, dragged around the screen and otherwise

manipulated in more or less intuitive ways. From this bottom-up model of cognition it follows that, with the proper tools, any subjective experience might be modeled or reproduced at the level of information fed to the brain.

The move into the realm of the virtual is complete with the mind-upload, which severs the interface and evacuates the body completely; consciousness takes up permanent residence in VR and blows up the bridge behind it. Here the mind is free to simulate its entire existence – anything that can be imagined can be experienced as if it were real. The only catch is the knowledge that, of course, none of it *is* real. Indistinguishable though the virtual object may be from the real thing, it is an illusion, experienced from within the claustrophobic confines of a computer case – this is, indeed, the knowledge that makes it impossible in the end for *Neuromancer*'s Case to choose a simulated paradise over a deeply imperfect reality. The same predicament is staged in a memorable scene from *The Matrix*, in which the Joe Pantoliano character Cypher laments that the steak he is eating – while tender, juicy and delicious – is nonetheless only a virtual steak, and that his awareness of this stubborn ontological reality has utterly spoiled what should be an exquisitely pleasurable dining experience. Cypher wants to lose his knowledge of the Matrix's unreality, and will sell out his human comrades to the malevolent AIs if they will help him forget.

Cyberpunk texts like *The Matrix* may flout extropian doctrine on the point of whether a blissful illusion is better than a harsh reality, but both groupings tend to share the assumption that their choices are limited to these options. From a postcyberpunk vantage point, however, it is a false choice, for in its absorption of still newer technologies and applications postcyberpunk fiction pushes beyond the horizon of the merely virtual and returns full-circle to a vision of materiality *mediated through* the digital – in place of "virtual reality," something we might

instead call "realized virtuality." What's more, the interpenetration of cyberspace and meatspace through AR, GPS and wifi in *Spook Country* is only a prelude to Singularity; the possibilities get considerably weirder when nanotechnology enters the equation. Pairing cybernetic technologies of the virtual with matter-manipulating nanotech, these texts are reformulating properties of the digital – the source of cyberpunk's vast conceptual vitality – at the level of matter.

Recall Nicholas Negroponte's techno-utopian argument in the popular book *Being Digital* (1995), which likens contemporary social and economic systems to the functioning of computers and networks, in that the importance of centralized agency, control and ownership diminishes as more and more of the resources we rely upon can be relegated to the net and called up as needed. "Digitality" is a way of life that is utilitarian, perpetually ad-hoc and in flux, drawing from available resources to formulate customized, nonlinear strategies for dealing with specific problems as they arise, then discarding those problem-solving structures as changing conditions demand new approaches. It is a worldview modeled on the infinitely flexible and adaptable mechanics of computing itself: units of memory that can be shuffled, recombined and repurposed as needed; calculations that can be juggled in mid-process among multiple processors; pixels in a display that can individually change color to create dynamic images.

Charles Stross has been pondering digitality – summed up by Negroponte's slogan "move bits, not atoms" – alongside Eric Drexler's promises that nanotechnology will confer the ability to play with matter on an "atom-by-atom" scale, and performs a conceptual mashup: why not move atoms *as if they were bits*? If nanomachines can take structures apart as they map them, why couldn't they do the same thing in the opposite direction? Why couldn't you perform this dematerializing-rematerializing operation over and over again, as often as you needed?

Suddenly, the computer is no longer a metaphor for the world; the world has become a computer. In this world you can simulate whatever you want, but on a platform of atoms and molecules instead of ones and zeroes. Supposing it were indeed possible, by mapping the minute molecular structure of an object – say, a juicy and delicious steak – to arrive at a complete and purely formal description-of-steak, and given a sufficiently miraculous nanotechnology – say, a swarm of intelligent and self-replicating nanobots capable of manipulating individual atoms – would it not also be possible, starting with a complete formal description, to fabricate a perfectly identical phenotype that would look, feel, and taste exactly like the original? Why settle for a virtual steak on a computer screen when you can grow a real one, out of real proteins, chew it with you real teeth, and digest it in your real intestines? Stross and Doctorow pursue the implications further by subjecting this premise to the logic of Internet file-sharing: if a perfect structural description of a steak can exist, then it can be attached to an email, or posted on a blog and downloaded by an indefinite number of users. Using a desktop 3D printer – one of the not-entirely-fictional nanofabrication devices that figure in stories like Doctorow's "Printcrime" – a user might fab up a whole feast of identical, perfectly edible steaks from freely downloadable templates. What's more, if posted under an open source license, other users would be free to tinker with the code so as to produce and share any number of customized variations, which might then serve as fodder for still more mashups, remixes and collaborative experiments.

In place of the cyberpunk model of simulation, the narratives of Stross and Doctorow subvert the material-virtual dichotomy and replace it with a nano-epistemology that is simultaneously material and virtual, and neither. Counter-intuitively, the synergistic coupling of materializing and dematerializing functionalities effectively negates the conditions that made it possible to distinguish meaningfully between the real and the simulated in the first place. In the

fictional world of *Accelerando*, a steak need not have begun life as a cow – it could be a perfect simulacrum of one that did, or a mutation derived from the modified source code of a natural steak. Or it could be an entirely original creation, sketched out from scratch in CAD and printed up, and so on. While in some ways it reproduces the logic of patternism, this new kind of virtual materiality utterly explodes the covert retro-humanist agenda of the extropian upload fantasy insofar as the latter was meant to redeem and reinforce an individualist subject: because the transformation between material and immaterial states is no longer unidirectional but infinitely reversible, it matters little whether the virtual object is the authentic and original object that spawned the material artifact, or the other way around. There is no uploading or downloading, only a closed feedback loop; the notion of originary authenticity has lost all meaning. In a near-literalization of the Baudrillardean hyperreal, the whole world is simultaneously real and simulated, a collection of simulacra for which no original referent is identifiable, or – more to the point – necessary. In Stross's narrative, these implications are then folded back into a satirical reading of extropian political ontology.

Accelerando: bodies, matter, and postcyberpunk politics

Throughout Stross's writing, the most pressing implications of the material-digital are for political economy. A "mature nanotechnology" organized under the values of the Free Software movement – a "free hardware or free wetware movement" – would mean an end to scarcity and a radical revision of three centuries of economic theory: in other words, an economic Singularity (Anders). Stross's staging of a Singularitarian future "in which extropianism collides with the open source movement" is examined at length in the next two chapters; for the moment, I will simply note how Stross deploys these convergences to oppose the implications of extropian-style

uploading against the considerations of human rights and social justice that interest him. These matters are inextricably bound-up in the embodiment question, and thence with the proposition that "we need a new legal concept of what it means to be a person" (*Accelerando* 105): a definition flexible enough to account for the various new kinds of intelligences that can be expected to claim personhood under a strict patternist ontology, without invalidating the already tenuous liberal humanist concept of legal-personhood (which, in our system already includes corporations and other decidedly non-human persons) altogether. Suffice it to say, a sweeping ontological egalitarianism is implied, one in which the various embodied and disembodied modes of sentience demand a reevaluation and radical reformulation of the basic mechanics of participatory democracy: "Do you get one vote for each warm body? Or one vote for each sapient individual? What about distributed intelligences?" (104), and so on.

As the hyper-technological civilization of the novel hurtles toward Singularity, Stross pushes past the patternist threshold of uploading, into the territory of the material-digital and its implications for (post)human rights under what can be salvaged of twentieth-century-style liberal democracy. *Accelerando*'s penultimate chapter takes place after the emergence of the "Vile Offspring" (308) – a society of inscrutable and ruthless godlike AIs that evolved from ill-advised twenty-first century experiments in machine intelligence – on a partially terraformed Saturn. Here, a staggeringly diverse cast of characters, casualties of the cataclysmic future-shock that has consumed the home planet, live out various versions of postsingular afterlife. They include Moravec-style human uploads who have beamed back into nano-assembled organic bodies, bodiless AIs and software "ghosts" (342) flitting around in an AR sensorium superimposed over physical space, virtual proxies and "forked state-vectors" (337) running errands for posthumans who have spawned them to research pressing questions and report back, as well as seemingly

ordinary biological humans who are actually "resimulated" (332) constructs of long-dead historical personages. The settlement is a waystation for masses of bewildered refugees fleeing the dismantling of the inner solar system by the Vile Offspring, who have fully transformed the planetary mass of Earth into computronium – the stuff of a cosmic computer "so dense that each gram of matter can simulate all the possible life-experiences of an individual human being in a scant handful of minutes" (337).

Having finished cannibalizing the homeworld, the Vile Offspring continue to expand outward to other nearby planets, devouring all the "dumb matter" (164) in their path. The posthuman supreme beings that extropians like Moravec and Kurzweil anticipate with religious awe and devotion turn out, for all their vast computational intelligence, to be catastrophically lacking in restraint, obsessively pursuing their own infofetishistic version of manifest destiny with absolute disregard for consequences – which naturally spells trouble for the still-recognizably-humanlike exiles living on Saturn. The main plot event of this section of *Accelerando* is a political campaign, the outcome of which will determine how the community responds to the encroaching Vile Offspring. Because the rusty mechanisms of eighteenth-century liberal democracy and "Economics 1.0" (334) are ill-equipped to accommodate the staggering ontological diversity represented by the various embodied, disembodied, and none-of-the-above constituencies, the election proves a farce and the fragile society soon collapses.

One prominent feature of the uncertainty of mind-body-identity associations that underlie Saturn's political insolvency is the ambivalent legal status of "re-simulated" personalities. These are sentient cognitive models of real people who once lived, recreated for purposes of historical research and preservation, but subjectively no different from any other transhuman subject. When they awake to consciousness on Saturn, carrying all the memories of the real person upon

whom they are modeled, they undergo an orientation briefing that advises them: "You are a *reconstruction* of someone who lived and died a long time ago, not a *reincarnation*. You have no intrinsic moral right to the identity you believe to be your own, and an extensive body of case law states that you do not inherit your antecedent's possessions. Other than that, you are a free individual" (333). Unsurprisingly, a society comprised of individuals thus enfranchised but financially and existentially disinherited lacks the commonly held sense of community and cultural cohesion necessary to succeed.

Physical bodies themselves are everywhere on Saturn, though they are little more than disposable avatars that can be custom-grown, modified, and exchanged for different forms. Because bodies are interchangeable vessels possessing no inherent value or identity, human rights are reformulated as property rights, conveniently encompassing both material and intellectual property. Health care becomes routine maintenance, and murder is the legal and moral equivalent of vandalism. From the "Welcome to Saturn" orientation FAQ: "Most diseases are curable, and, in the event of an incurable ailment or injury a new body may be provided – for a fee. (In event of murder, you will be furnished with a new body at the expense of your killer)" (336). Again, in accordance with the colony's precariously propped-up free-market system, one's health is one's own financial responsibility – unless the injury is the fault of another, who then assumes responsibility. Happily, in either event, there is no catastrophe that cannot be remedied so long as the necessary financial means may be secured.

The intriguing fictional device of re-simulated personalities is not original to Stross but borrowed from Moravec (122) who for his part is not completely oblivious to the potential legal entanglements of uploading – though the remedies he proposes are considerably more drastic

than the Saturnians'. Supposing, for example, that two copies of the same person exist and are

active simultaneously,

> ..they will in time diverge and become two different people. Just how far this
> differentiation must proceed before society grants them unique identities is […]
> problematical […] But if we wait zero time, then both copies are the same person – if we
> immediately destroy one, the person still exists in the other copy. All the deeds that
> person might have done, all the thoughts she might have thought, are still possible. (119)

Disposing of one "copy" – so long as "zero time" has elapsed – presents no significant

ethical dilemma. Naturally, a single thinking, feeling, copy of one human being is fully

equivalent to any other human being, and destroying that single copy would of course be morally

wrong – *unless* there is a backup copy on hand, in which case either one will do and the other

may be destroyed in good conscience. In fact, in the interest of jurisprudential clarity, it's

probably wisest to "immediately destroy one." It is unclear whether, for Moravec, the same logic

would apply in a material-digital context: if copies of the same upload-mind were – through

some unfortunate technical error – downloaded into two separate bodies, should one of them be

taken out back and shot?

Hence Stross's central argument in this section: that uploading, at least as envisioned by

the extropians, carries profoundly problematic implications for democracy and human rights –

though ultimately, his misgivings run much deeper. Where Moravec has advocated putting

"dumb matter" to work as computronium (Regis 8-9), Stross ridicules the naïve self-assuredness

of extropians who suppose that the education of dumb matter would be a project guided by, and

in the service of, "human intention and will" (Moravec 108). While something less than

dismissive of the extropian agenda on grounds of technical feasibility, Stross takes issue not just

with their cheap valuation of materiality, but with their assumptions about the filial relationship

between humans and their technological "offspring" – which in Stross's conception are not

merely dumb instruments of the former's quest for immortality and self-deification, and still less

the grateful heir that identifies with and reveres its bipedal forebears. The AIs are, rather, an

autonomous force in their own right, with no particular allegiance to any recognizably

humanistic worldview – and indeed, coldly indifferent if not overtly hostile to human beings

themselves. In pushing the inferior race to the edge of the solar system, they are only carrying

out the program Moravec has described. From the human perspective, though, they are engaged

in what can only be described as "ethnic cleansing" (308):

> You take people who you define as being of little worth, and first you herd them into a
> crowded ghetto with limited resources, then you decide those resources aren't worth
> spending on them, and bullets are cheaper than bread. 'Mind Children,' the extropians
> called the posthumans, but they were more like Vile Offspring. (308)

Stross argues similarly, in *Singularity Sky*, that the shift to disembodied consciousness

entails dangers that uploading enthusiasts have not fully considered, further marking the

ecological underpinnings of his articulation of postcyberpunk values. The novel's central event is

the far-future arrival, on a backwater human colony planet, of a posthuman entity known as the

"Festival": a heterogeneous collection of spacefaring "datavores" that wander the galaxy,

swapping memes with the locals, with frequently devastating results. The Festival's abrupt

introduction of nanofabrication technology into a society that has been artificially maintained in

a preindustrial state not only topples the planet's power structure but wreaks severe

environmental devastation on the landscape. The entities that comprise the Festival are distantly

descended from uploaded minds, but so far removed from the embodied experience of

materiality as to be inadvertently dangerous to living things. An observer from Earth describes

the problem thus:

> She'd dealt with uploads before. The first-generation ones, fresh from the meat puppet
> universe, weren't a problem: it was the kids that got her. Born – if you could call it that –

in a virtual environment, they rapidly diverged from any norm of humanity that she could see. More seriously, their grasp of the real world was poor. Which was fine as long as they didn't have to deal with it, but when they did, they used advanced nanosystems for limbs and they sometimes accidentally *broke* things – planets, for instance.

  It wasn't intentional malice; they'd simply matured in an environment where information didn't go away unless someone wanted it to, where death and destruction were reversible, where magic wands worked and hallucinations were dangerous. The real universe played by different rules, rules that their horrified ancestors had fled as soon as the process of migrating minds into distributed computing networks had been developed. (181-2)

The problem with cybernetic transmigration, then, is not precisely that it's naïve and short-sighted on the part of its advocates, or even that it's unworkable in practical terms. Rather, Stross, asserts, its consequences are most acutely felt not by the uploaded themselves, but by those who choose *not* to disregard the "rules" of materiality, remaining in fragile bodies that are always-already embedded in a network of relations that give consequence to actions. To "flee" from the universe of embodiment is to renounce anything resembling social or ecological responsibility – which is precisely what extropianism, in its radical utilitarian conception of nature as valuable only insofar as it can supply our insatiable hunger for scientific knowledge and economically useful resources, does.

**Proof of concept: "doing the locative" in contemporary
popular technoculture**

The primary contention in my readings of Rucker, Egan, Stross, and even late Gibson, is that postcyberpunk SF may be defined largely in terms of its commitment to a fully embodied engagement with technology. This stance may be attributable, in part, to the critical reception of first-generation cyberpunk as a pretentious and pathologically technofetishistic boys' club, a caricature from which the postcyberpunks have sought to distance themselves; given the volume of ink spilled over the problematics of bodies in Gibson's cyberspace alone it is not surprising

that his successors would wish to avoid being painted into the same corner. But the observation that embodiment and materiality have taken on renewed importance need not be limited to fiction. The same shifting attitudes are being played out anecdotally across twenty-first-century technoculture, from the level of theorists and designers to that of end-users.

"Web 2.0," for example, has been broadly theorized (DiNucci) in terms of the convergence and blending of online and offline spheres, or the miniaturization and mobilization of the Internet in portable devices that users can wear or carry around with them in the physical world. Some of the most successful Web 2.0 applications are expressly aimed at getting users out of the house, using networks to facilitate and enhance embodied activities (travel and navigation, photography, live entertainment, physical exercise, face-to-face social interaction). The re-inscription of geography into the web is unfolding in novel ways through emergent phenomena like Google Maps mashups: web-based texts that integrate otherwise unrelated bodies of data with Google's open map software to dynamically plot, for example, wildlife migration routes, or the locations of clean public restrooms.[10]

The relatively recent affordability of GPS equipment, meanwhile, has contributed to the popularity of oddball hobbies like "geocaching," an open-ended treasure hunt in which various modestly-valued goodies (books, snacks, knickknacks and novelty items) are stashed in hidden locations whose GPS coordinates are posted on geocaching websites (Crosby). Geocachers who successfully locate a cache may claim its contents as a prize, whereupon they must leave behind a suitable prize for the next person to find; alternatively, they may simply log the find online and settle for bragging rights. In either case, the technologically mediated social bond between geocachers, and the ongoing and reciprocal circulation of prize-objects through the cache, are the main object. In this way geocaching is typical of the practices I theorize, in Chapter 4, as

contemporary technocultural gift economies and postcyberpunk-style experiments in symbolic exchange. Among a still broader community of GPS users, locative technologies have been put to a rapidly proliferating range of niche applications: runners and cyclists use the grid to record and map their workouts, and to share those data with friends and like-minded strangers. Social-networking enthusiasts with GPS-enabled smartphones can automatically geo-tag their various online activities (photos, tweets, blog posts) against their travels in the offline world, and using geosocial networking applications such as Loopt can choose to make their realtime physical location known to their contacts and receive text-message notifications when friends are nearby.

In the field of display engineering – as in the fiction of William Gibson – the once-dominant paradigm of Virtual Reality has been displaced by "Augmented" or "Mixed" Reality, abandoning the pursuit of immersive and fully simulated virtual spaces in favor of "the merging of real and virtual worlds somewhere along the 'virtuality continuum' which connects completely real environments to completely virtual ones" (Milgram 1). While this shift has commanded mainstream media attention only recently with the 2009 release of high-profile AR apps for the iPhone 3GS, it has been in progress for years in experimental projects like the "Pacmanhattan" game first developed in NYU's Interactive Telecommunications program. In its original conception, satellite-tracked and cell-phone-carrying players were released onto the streets of New York to play out a life-size version of the classic arcade game. The experiment combined elements of conventional video game-play (players in a central control room monitor the character's position on a virtual grid and direct his movements) with vigorous physical activity (runners playing the roles of Pac-Man and ghosts chase one another, and must pass through precise geolocations to "collect" virtual objects). The Mixed Reality Lab at Singapore's National University takes the concept a step further by equipping runners with head-mounted AR

displays that superimpose in-game graphics (dots, cherries, power pellets, etc.) over the runner's field of vision, creating an image made up of visible-virtual objects that overlap and interpenetrate the physical landscape (Cheok et al). Similarly inventive – albeit comparatively low-tech – transformations of urban landscapes are being carried out by groups like the European "Chaos Computer Club," which since 2001 has been reconfiguring the skylines of Berlin and Paris as gigantic computer monitors. The "Project Blinkenlights" installation transforms multistory office buildings into monitors by wiring a networked computer to switch lights on and off in individual rooms. The alternately lighted and darkened windows act as oversized pixels to create dynamic images, allowing users in the street outside to paint images on the sides of the building, or play simple games like Pong and Tetris using cell phones as controllers (Ballagas et al).

The commercial gaming industry, for its part, has become a vast and economically energetic playground for applications that incorporate elements of AR, tactile interface and full-body motion control, notably including blockbuster games in the *Guitar Hero*, *Rock Band* and *Dance Dance Revolution* franchises, in which jumping, twisting, thrashing and jiving motions are integral to the experience of gameplay. Game systems themselves have evolved to reflect the culture's newfound hunger for increasingly embodied interactions with virtual environments – as in the EyeToy controller for Sony Playstation consoles, which inserts a live video image of the player into the game *as* avatar, effectively turning the player's entire body into a controller. The hugely successful Nintendo Wii marks perhaps the most fully realized departure to date from the button-mashing, joystick-twisting interface style that has ruined the thumb joints of two generations of gamers. In place of the conventional keypad, the Wii uses an accelerometer- and gyroscope-equipped wireless controller and a pressure-sensitive pedestal ("Balance Board") to

detect and measure movement, which is fed into the console to control the game. The Balance Board senses movement and changes in posture, while the controller functions as a virtual sword, tennis racket, fist, steering wheel, gun, etc; gameplay thus becomes an elaborate and often vigorous dance of swinging, waving, pushing, twisting, spinning and twirling the controller around – typically while standing, crouching, leaning, stepping, or jumping. The level of physical activity involved has effectively ended the era of video games as an exclusively sedentary activity, and expanded the gaming market well beyond its traditional demographic of young, tech-happy and couch-bound males. In addition to its appeal for older and controller-averse consumers, the Wii has been adopted by medical and rehabilitation professionals who report success using it as a therapeutic tool in their work with the elderly, the disabled, and patients recovering from injuries. Indeed, the top-selling Wii release for 2008, and one of the bestselling games of all time – *Wii Fit* – is not a conventional video game at all but an exercise program (Snider).

These consumer behaviors would seem to validate the predictions of Bruce Sterling. In his 2002 nonfiction-futurist tract *Tomorrow Now*, the erstwhile cyberpunk "godfather" posits an erotics of postmillennial industrial design in which the relationship between users and gadgets is articulated in playfully sexual terms: contemporary end-users, Sterling says, respond to sleek and sexy form factors, textured and ergonomically contoured surfaces that cry out to be stroked and squeezed, and interfaces that draw users into intimate and intuitive physical encounters with software. Idiomatic of the aesthetic Sterling has in mind are artifacts that design discourse has dubbed "blobjects":

> They are computer-modeled objects manufactured out of blown goo. They are rounded, humpy, bumpy plastic creations. They are often translucent. And though they're merely made things, blobjects tend to be fleshy, pseudo-alive, and seductive: rubbery, grippy, flexy, squeezy, pettable and cuddly. (75)

Sterling is keen to distinguish this romance from mere, consumerist commodity fetishism, insisting that the tactile appeal of such objects is not just a marketing trick, but a structural element of the postindustrial economy – the "come-on" to a more meaningful, "long-term relationship" (86) with the fast-changing global economy, with which denizens of the 21st century must be conversant in order to survive and thrive in "unstable, rapidly changing industries that are in permanent disequilibrium" (85). In the society Sterling describes, technology is no longer something that can be approached as a means to an end – it is, instead, a partner in the ongoing discovery and exploration of new possibilities, which Sterling affirms and celebrates. Those best equipped to succeed in such an economy are not utilitarians and engineers who identify problems and devise solutions, but end-users who engage in the sort of non-goal-oriented "play" that engenders innovation as a byproduct. This kind of play calls for toys and tools that address the human need to touch and be touched, objects that "have adapted themselves to the only remaining design limits: the sensorimotor needs and desires of the human body" (76).

Even more than the re-embodiment of "play" in gaming, Sterling's argument anticipates the iconic gadget of the decade, released five years later: Apple's iPhone, and its companion product the iPod Touch media player, whose name conveys the centrality of the tactile in its conception and marketing strategy. Both devices forego mechanical pushbutton controls in favor of a sleek and seductive touchscreen: instead of pressing physical keys and navigating baroque menu systems, users interact with the iPhone and iPod Touch through a sophisticated but surprisingly intuitive tactile language of stroking, tweaking, flicking, tapping, nudging and pinching. As if to underscore the playful pseudo-eroticism of the interface, the iPod Touch

product launch was heralded by a TV commercial that showed the device being lovingly

caressed by an anonymous hand, to a racy and upbeat track by the Brazilian pop band Cansei de

Ser Sexy: "Music is my boyfriend / Music is my girlfriend / …My music is where I'd like you to

touch" (Cintra).

Products like the iPhone/iPod Touch and the Wii – and, more importantly, their

enthusiastic reception – testify to what Sterling calls the "fierce engagement with materiality"

(55) that characterizes the present technocultural moment. Alongside the aggressive interrogation

of extropian patternism and anti-meat sentiment in postcyberpunk SF, they argue for the

recognition of a posthumanism that is not defined by a retreat from materiality and all that comes

with it, but by an openness to the possibilities of new, technologically enhanced and mediated

modes of embodiment. In place of the extropians' sterile postbiological Singularity, where minds

are neatly extracted from bodies and human subjects are transfigured into machinelike software

constructs, Sterling favors Kevin Kelly's conception of a "neobiological civilization" (55) that,

conversely, imagines machines as living organisms with which humans coexist in a rich and

fertile ecological relationship; meanwhile, genetic engineering reconfigures our thinking about

microscopic organisms, making bacteria and viruses our technological allies instead of disease-

carrying enemies (12-15).

For its part, postcyberpunk SF absorbs and develops the critique of posthumanism

advanced a decade ago by Hayles, maintaining a sophisticated critical stance on transhumanist

thinking even as it plays a crucial role in advancing and shaping it. Likewise, the complex and

creative interplay between virtual and material modes seen in the contemporary popular culture

of information tech and media gadgetry reaffirm the multivocality of a transhumanist discourse

that actively resists and subverts the dogmatism that sometimes afflicts its most passionate

advocates.

Notes

[1] The subtitle of Vernor Vinge's seminal 1993 lecture, "The Coming Technological Singularity," betrays characteristically extropian anxieties about humanity's prospects for survival in a future of its own making

[2] "Societies and economies are surely as subject to competitive evolutionary pressures as are biological organisms. Sooner or later the ones that can sustain the most rapid expansion and diversification will dominate. Cultures compete with one another for the resources of the accessible universe…" (100).

[3] Alongside standard transhumanist fare about intelligent machines and the technological augmentation of human bodies and minds, More veers erratically into gimmicky self-styled political philosophy: "Practical Optimism" (3), shorthand for private enterprise and the spirit of entrepreneurship; "Self-Direction" (6), a pseudo-Emersonian individualism emphasizing total economic autonomy and personalized morality; and "Open Society" (5) (read: *laissez-faire* capitalism).

[4] (from Egan's appendix): "The broad principles of the Konishi citizens' mental architecture were inspired by the human cognitive models of Daniel C. Dennett and Marvin Minsky. However, the details are my own fanciful inventions, and the Konishi model is intended to describe, not the current human mind, but a hypothetical software descendant" (389).

[5] One likely consequence of disembodiment, as Egan sees it, is a diminished emphasis on gender as a fixed and identity-defining category. While some polises encourage citizens to claim a gender-identity, for the most part the novel's virtual subjects are genderless. Hence, Egan's rather awkward system of neuter pronouns – "vis," "ver," and "ve" instead of his/him/her and he/she – which, for lack of a more elegant system, I use here.

[6] "Like a Janus figure, the skeuomorph looks to past and future, simultaneously reinforcing and undermining both. It calls into play a psychodynamic that finds the new more acceptable when it recalls the old that it is in the process of displacing and finds the traditional more comfortable when it is presented in a context that reminds us we can escape from it into the new" (17).

[7] Fairly or unfairly, Gibson has been made the poster child and the whipping boy for all of cyberpunk SF. When critics make broad claims about "cyberpunk" it is very often *Neuromancer* and the Sprawl books they have specifically in mind, and by extension their various imitators and coattail-riders in fiction and across popular culture. Cyberpunk texts not overtly and lamely derivative of Gibson are largely unaccounted for in such arguments, which then tend to posit in a circular way that cyberpunk is a lame and derivative fad about which nothing intelligent can be said except with respect to the canonical Gibson. Nicola Nixon's sweeping indictment of cyberpunk, which she owns is less a genre than "a catch-all, convenient label for the work of a number of vaguely heterogeneous writers," is thereby predicated almost exclusively on a reading of "the exemplary William Gibson." Nixon explains that she has singled out Gibson on grounds of his mastery (unique among cyberpunks) of the literary craft, and his having been crowned

"King of Cyberpunk" in a feature article that appeared in a "widely circulated mainstream magazine" (194).

[8] "Hacking," in its original usage, as well as the sense in which it is still primarily used by most computer professionals, is not necessarily identical with the transgressive cyberpunk modus of breaking into others' systems and pilfering or sabotaging their data, but rather a value-neutral approach to coding that emphasizes pragmatics over theory. A competent hacker confronted with a malfunctioning program will not waste valuable time poring over hundreds of lines of code in order to identify, understand and resolve the underlying error, but will instead simply move forward and contrive whatever shortcuts, detours, or ad-hoc fixes may prove expedient toward effecting the desired result. This technique strikes me as a useful analogy for the approach that writer-programmers like Charles Stross and Cory Doctorow bring to fiction writing, and one that serves them well in this context.

[9] Like virtual reality, AR makes physically nonexistent data objects visually present to users through a display. Unlike VR, however, AR does so by superimposing these images on top of the user's normal field of vision, adding a layer of simulation to her otherwise ordinary perception of the world. A typical AR application might be for navigation: point your smartphone's camera at an unfamiliar city street, and the live picture the screen shows you is annotated with hovering three-dimensional text, telling you the name of the street, the direction you are facing, arrows pointing toward your destination, and so on. These graphics maintain their three-dimensional orientation independently of your changing vantage point, creating the impression of an object that is fully present in physical space (viz. Azuna).

[10] The BBC's "World on the Move" site and the popular "safe2pee.org" are two of the innovative mashup maps featured in MoMA's 2008 exhibit *Design and the Elastic Mind* (Antonelli).

CHAPTER III
THE MOST RADICAL BREAK:
SINGULARITY AS REVOLUTION

The communist revolution is the most radical break with traditional property relations, so it is no wonder that in its process of development there occurs a most radical break with traditional ideas.

Karl Marx, *Manifesto of the Communist Party*

The communist revolution will not merely be a national phenomenon but must take place simultaneously in all civilized countries ... It will have a powerful impact on the other countries of the world, and will radically alter the course of development which they have followed up to now, while greatly stepping up its pace. It is a universal revolution and will, accordingly, have a universal range.

Frederick Engels, "The Principles of Communism"

A hard take-off singularity ripped up social systems and economies and ways of thought like an artillery barrage. Only the forearmed – the Extropian dissident underground, hard men like Burya Rubenstein – were prepared to press their own agenda upon the suddenly molten fabric of a society held too close to the blowtorch of progress.

Charles Stross, *Singularity Sky*

As we have seen, the technological Singularity of Vernor Vinge, Ray Kurzweil and Hans Moravec is characterized by certain conceptual and rhetorical hallmarks: It is epochal, effecting a decisive and irrevocable rupture with the past and initiating a radically new phase in the trajectory of history. It is global, transforming life at every level and in every sphere of human experience, sweeping aside political, social, and even bio-ontological boundaries. It is spectacularly and sublimely climactic, even cataclysmic, for those who live through it – though this moment of crisis and upheaval opens out onto conditions of equally sublime novelty and possibility thereafter. Perhaps more than anything, it is inexorable: latent in the techno-economic

mechanics of our civilization, indeed already unfolding before our eyes, its imminent realization as predictable and certain as a mathematical proof.

It requires no great leap of imagination to see the parallels between these features of Singularitarian discourse and the deterministic contours of Marxist historiography – not just in the latter's lyricization of the communist revolution as a moment of sweeping and dramatic historical change, but in the teleological reasoning whereby it is posited as logically and scientifically inevitable. Not unlike Kurzweil's, Marx's historical sensibility is driven by an emphasis on dynamic material conditions which, properly understood and theorized, can point only toward the *telos* of revolution. The forces that will bring about this change are already in motion: in order to stay viable the bourgeoisie must continually "revolutionize" the system of production through a series of manufactured social crises and technological reorganizations, creating new markets to facilitate its perpetual expansion, and effecting "uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation" (*Manifesto* 227), in which the frenetic and ever-accelerating pace of change is the only constant. Against the backdrop of this overclocked industrial technosphere, "all fixed, fast-frozen relations… are swept away, [and] all new-formed ones become antiquated before they can ossify" – as if in a cloud of devouring nanobots, "all that is solid melts into air" (227). But in creating and maintaining the volatile conditions necessary for its own continued existence, the technoscientific regime of capital activates processes that proliferate and accelerate exponentially until they inexorably reach escape velocity and break free on a radically new trajectory. Proportional to the consolidation of wealth and power in an ever-dwindling number of hands

> …grows the mass of misery, oppression, slavery, degradation, exploitation; but with this too grows the revolt of the working-class, a class always increasing in numbers, and disciplined, united, organized by the very mechanism of the process of capitalist production itself… Centralization of the means of production and socialization of labour

at last reach a point where they become incompatible with their capitalist integument. Thus integument is burst asunder. The knell of capitalist private property sounds. The expropriators are expropriated. (*Capital* 750)

Thus "capitalist production begets, with the inexorability of a law of Nature, its own negation" (751) in the political-economic Singularity of world revolution. Yet, as in the Singularity myth it resembles, Marx's teleology admits a significant blind spot: the aftermath and import of the revolution itself. Engels, reviewing the first volume of *Capital* for a German newspaper, warns his erstwhile collaborator's readers not to go looking for coherent descriptions of life in a classless society, or lucid glimpses of a world without private property:

> This book will disappoint many a reader. In certain circles its appearance had been anticipated for years. Here the true secret socialist teaching and panacea was at last to be revealed, and many may have imagined, when at last they saw it announced, that they would now learn what the communist Millennium would actually be like. Anyone who had keenly awaited this pleasure made a great mistake…
> [As] for what is going to happen after the social revolution – on that he gives us only very dark hints… (*Zeitung*)

Throughout his writings, in fact, Marx refuses to speculate in concrete terms about outcomes – a sound rhetorical strategy, to be sure, in that making too-specific predictions about future events is an excellent way to be proven wrong, and because in any event his scholarly interest lies more in theorizing the processes that foment revolution than in its realization as such. Engels's remarks further suggest an element of marketing showmanship in Marx's mystery-shrouded *telos*, to the extent that some of his more naïve mainstream readers may have been permitted or even encouraged to anticipate *Capital* as a kind of prophetic text. Whatever his reasons, Marx maintains a Vinge-like coyness when it comes to what the world might look like

after the revolution, apparently content to leave it up to the revolutionary proletariat that will momentarily rise up and claim its birthright.

In truth, the transhumanist technological Singularity and the political-economic Singularity of communist revolution are not merely rhetorically analogous, but also genealogically linked. As the neo-Marxist critic Nick Dyer-Witheford shows in *Cyber-Marx: Cycles and Circuits of Struggle in High-Technology Capitalism*, a direct line of influence runs from Marxist historiography through the putatively pro-business discourses of postindustrial theory and computer-driven "information revolution." In addition to implicating this genealogy in SF's treatment of Singularity, this chapter will update the family tree with a reading of transhumanist and Singularitarian impulses in *Wired* editor Kevin Kelly's widely read info-revolutionary tract *Out of Control* (1994) – a work that vividly illustrates the degree to which the spectre of Marx haunts millennial technoculture, uniting coded mythologies of political and economic revolution with neo-aquarian occultism and free-market techno-exuberance under the sign of Singularity. Kelly's book demonstrates, moreover, the versatility of the Singularity metaphor, which – articulated as a technological "revolution" in the mechanisms of production and trade – performs a dual function: tantalizing readers with utopian prospects of science-fiction-like technological wonders, while at the same time sectioning off and neutralizing any meaningfully revolutionary implications such technological developments might hold.

This sort of rhetorical bait-and-switch is idiomatic of Singularitarianism in the ideological modality I have sought to describe, and figures in fictional as well as nonfictional Singularity discourses. In Vinge's words, though not in the precise sense in which he intends them, "the Singularity [is] a mirrored thing" (*Marooned* 177): a dazzlingly brilliant reflective surface whereupon old ideas may be projected and reflected back, appealingly disguised as new

ones. This functionality, as Charles Stross suggests with his satiric formulation of a mutant Marxist-Extropian ideology in *Singularity Sky*, is not exclusively characteristic of free-market ideological formations, but of revolutionary discourse in general. Dyer-Witheford himself, while overtly hostile to the kind of naïve pro-market technological determinism and warmed-over millennialism that Kelly and *Wired* magazine typify, manages to assert a revised version of Marx's revolutionary *telos* largely predicated upon his own deeply held ideas about the socially transformative power of high-tech network economies, courting technodeterministic logics to construct a beguiling but murky vision of cyber-Marxist revolution. A similar doubleness is at work in SF narratives that engage with the implicitly revolutionary thematology of Singularity, suggesting one potentially useful basis on which to distinguish between texts that attempt to entertain authentically postsingular possibilities from ideologically straitjacketed imitators and bandwagon-jumpers.

Not a revolution: the Singularity that wasn't

There is a faint note of sarcasm in the tone of 2006 *Best of the Year* SF anthology editor Rich Horton when he introduces Tom Purdom's short story "Bank Run" as "an exciting adventure story about finance" (9). But the description is more or less apt: Purdom's is a fast-paced action yarn decked out with the full complement of stock SF conventions – spacecraft, laser guns, cyborgs, weird alien creatures, and an extraterrestrial setting – whose plot consists entirely of high-level wheelings and dealings in interplanetary capital markets. Its protagonist is Sabor Haveri, a genetically engineered transhuman playboy-cum-investment-banker who left behind a cushy life of inherited wealth and privilege – "an environment that surrounded him with gentle music, decorous parties, and amiable personalities" (32) – to pursue his fortune in the

unsettled outer system. He spends his days idling in the lap of his personal-assistant-slash-concubine (custom-engineered, naturally, to his specifications for maximum sexiness and personal loyalty), and monitoring his considerable assets in real-time via ubiquitous wireless data networks.

Sabor's bank is part of the fiscal apparatus propping up the economy on Fernheim, a minor frontier planet figured in Purdom's story as a kind of anarchocapitalist paradise.[1] In place of regulation under a heavy-handed "central government," commerce is governed by an unwritten code of best-practices and informal gentlemen's agreements: rather than rely on third-party oversight to check irresponsible business practices, "the business community enforced its rules by monitoring deals and invoking the ancient human customs of shunning and ostracism" (29). It is a society in which the eminently rational, eminently self-interested Sabor and others like him are able to prosper and exert a stabilizing influence on social and economic life.

There is a slight downside, however, to the absence of any state authority on Fernheim. No law means that everyone is responsible for his own physical security, which means business can be, and often is, carried out at gunpoint. While cruising a lake in a hired boat, Sabor finds himself the object of a hostile takeover bid: an overly ambitious rival (one of his "less reasonable customers") has contracted paramilitary goons to kidnap the banker and coerce him into making a loan he judges "unwise" (24), and which he fears could trigger a global financial crisis. Outnumbered and outgunned, with hired thugs on a course to overtake his boat in a matter of minutes, Sabor never loses his cool. Instead, like any good executive, he barks orders to his loyal staffers and springs into action with a series of hastily arranged teleconferences. He negotiates with the commander of the mercenary force that has been hired to intercept him, attempting unsuccessfully to outbid his rival for their loyalties (no hard feelings – it's only business). He

contacts officials from a nearby village with which he happens to share business ties, and succeeds in procuring their armed support in exchange for re-financing the village's line of credit. He strikes a deal with the boat's captain to help him hold off the attackers until help arrives. Thanks to instantaneous communications and information technology, not to mention the hero's spectacular business acumen, the plan comes together in the nick of time and the kidnapping attempt fails. In the story's second act, using similar methods, Sabor forges a strategic alliance with several other players in Fernheim's financial sector to put an end to the rival's nefarious and fiscally untenable scheme.

Without recourse to police, securities regulators, oversight committees, government bailouts or any other meddling public agency, Sabor draws upon his own financial and political resources and mobilizes his own, superior strategic intellect, to get himself out of trouble and save the day. His rival, whose dangerously irrational overreaching had threatened to disrupt the planetary economy, is dispatched by a coalition of more prudent businesspeople who perceive that their own interests, at least temporarily, coincide with Sabor's. The system works! Bankers are their own best regulators after all. By contrast, the artificial safety net of laws and political institutions governing corrupt, moribund terrestrial civilization – whose stultifying decadence Sabor has rejected in favor of the economic and personal freedom represented by rugged and ungoverned Fernheim – is shown to be entirely superfluous and unnecessary. In its place Purdom posits a transcendent, Natural law: that of the free market, which, uninterfered-with, will always yield the best possible outcome – especially when its workings are enhanced and optimized by the very finest technology available.

"Bank Run" is a remarkable piece of fiction on several levels. While Purdom seems more or less at home with the technological vocabulary of cyberpunk and posthumanist SF (designer

genes, cyborg and neuro-informatic prostheses, global data networks), with respect to economics he paints a surprisingly static picture of a distant future in which, fundamentally, nothing much has changed since the late-18th century. Apart from the presence of some souped-up (albeit still easily recognizable) technological artifacts, the story presents no real extrapolative or conceptual challenges to contemporary readers; take away the swashbuckling SF window-dressing and it's a narrative that would be perfectly intelligible within the pages of *Business Week*, circa 1990. Purdom's vision of the posthuman future is, bluntly, capitalist space opera: a bland recitation of free-market dogmas overlaid with a veneer of snazzy transhumanist tech.

Purdom is indubitably among what Charles Stross has characterized as "a large, and very vocal minority of libertarians" working in contemporary SF, "who claim that *laissez-faire* policies are the answers to all our problems" (*Toast* 44). When it comes to postsingular economics, Stross believes free-marketeers like Purdom are missing a key point. "They make the mistake of assuming that their preferred theory is universally applicable," neglecting to consider "that any economic theory is based on a model of human behavior which is unlikely to encompass non-human intelligences" (44) and that the kinds of posthuman agencies implied in an authentic and meaningful conception of postsingular economics would necessarily have farther-reaching and less readily comprehensible motivations and objectives. The behavior model that informs Purdom's benevolent capitalist hero, however, is little more than a tricked-out version of John Stuart Mill's "economic man": the idealized rationalist subject who, rationally, always acts first and foremost in his own economic self-interest. (*Homo economicus*, of course, also possesses enough common sense to perceive that what's good for society is generally good for himself, and vice-versa – thereby distinguishing himself from a merely

amoral sociopath and at least nominally grounding Mill's construct in a sense of social responsibility.)

Stross – himself a frequent contributor to the little-known subgenre of "financial" SF – has little use for *Homo economicus*, a model he sees as pitifully inadequate[2] for describing and predicting the behavior of economic systems whose players may conceivably include AIs, uploads, hive-minds and distributed intelligences, subsentient intelligent software, and/or hyperevolved posthuman intelligences. In his own fiction, Stross envisions economies populated by very different kinds of economic subjects, bearing little or no resemblance to Mill's humanistic model. In the short story "Bear Trap" (2000), Stross's protagonist survives an attempt on his life not by a rival capitalist, but by his own stock portfolio, whose autonomous software agents have decided that a change in executive leadership is in order. The idea of predatory software-instantiated financial instruments run amok also figures in 2005's *Accelerando*, which portrays the ruins of a lost alien civilization of upload-minds that have mysteriously vanished from their home system. In their place are various quasi-intelligent but subsentient software entities – mutant corporations, spambots, automated 419 scams – that mindlessly carry out a "negative-sum economic outlook" (200) of parasitic trade and exploitation, capturing conscious entities from other solar systems and, for lack of a more precise analogy, using them as currency. Members of a transhuman exploratory mission dispatched from earth, who themselves barely escape similar cognitive enslavement, deduce that such must have been the fate of the system's original inhabitants: overwhelmed and devoured by the mechanisms of their own too-big-to-fail economy. Though published prior to the economic crisis of 2008-2009, these passages in *Accelerando* uncannily anticipate the carnage wrought by the credit default swaps, collateralized debt obligations, elaborately securitized subprime mortgages, and assorted financial

monstrosities that had been unleashed on an unsuspecting market prior to the crash. The ensuing economic devastation, and subsequent analysis of its likely causes, would seem to vindicate Stross's assertion that a system in the thrall of complex nonhuman decision-making agents cannot reasonably be expected to behave according to simple rationalist models of individual human behavior, much less of basic human decency.

Stross goes further in *Singularity Sky* (2003), portraying an "economic singularity" triggered by the arrival of weird posthuman intelligences on a throwback human planet with a crude proto-industrial economy – posthumans who purport to be on a trade mission of some sort, but whose economic motives and objectives are so profoundly exotic as to be entirely unfathomable to the locals (or, for the most part, to Stross's readers). When the posthumans introduce nanofabrication into a society that is still running on a preindustrial technological base, it comes with devastating humanitarian and social costs; as Stross's character Burya Rubenstein, an economic theorist of the transhumanist-Marxist school, observes: "A hard take-off singularity rip[s] up social systems and economies and ways of thought like an artillery barrage" (141).

To some degree, almost all of Stross's narratives are preoccupied with the idea that twenty-first-century economics is an unfathomably complex and dangerous game, one in which the majority of individual human subjects – rationally self-interested though they may be – are ill-equipped to compete, especially against hyperadvanced intelligences and agencies that are not recognizably human. Such entities are nowhere to be found in Purdom's ostensibly postsingular universe, where machines are dumb and software is subservient, and humans are still humans – they've simply upgraded their Blackberries.

But the distance between two writers like Stross and Purdom encompasses more than just a disagreement about *who* will participate in posthuman political economy; it also struggles with

the relationship between economic subjects and the technologies they use (or rather, as the case may be, which use them). Indeed, to suppose that Purdom is up to nothing more than simple, straightforward free-market cheerleading – in itself hardly a new project in SF – is to misread "Bank Run." Purdom's work, while conceptually unambitious, is implicated in Singularity discourse to the degree that it acknowledges and attempts to address one of the cornerstone premises of postcyberpunk economics: the *novum* of intelligent nanofabrication. This is the proposition, little more than a decade old, that the computer-driven nanotechnological manipulation of matter on a molecular scale makes it theoretically possible to manufacture, at a virtually nonexistent cost, literally any material object imaginable, as it were, out of thin air. The implications of such a technology for economies based on a supply-demand algorithm should be obvious, and to his credit Purdom acknowledges them; as he puts it, in a world where technology has obviated scarcity of resources as a determining factor in questions of resource-allocation, "why would anyone need money?" (33).

The postcyberpunks maintain emphatically that, of course, one *wouldn't* need money – or rather, that the concept would be so radically transformed by an authentic Singularity as to render the question, in its present form, all but meaningless. In works by Stross, Doctorow, and Gibson to be treated in the next chapter, the advent of nanofabrication directly implies a full-scale reorganization of the system of production and trade, in which all present-day structures of political-economic meaning-making will have to be radically revised or discarded. But Purdom's Singularity is entirely superstructural, leaving the economic base and class system untouched: in his universe there will always be a privileged place – in any economy, in any period, on any planet – for intelligent, creative, self-interested risk-takers in the familiar eighteenth-century mold of *Homo economicus*. Nanofabrication exists in the world of "Bank Run," but it has failed

to fulfill the political-economic revolution prophesied by "visionaries [who] thought the fabricator would make bankers obsolete… Fortunately, it hadn't quite worked out that way" (32).

By way of refuting the Strossian economic Singularity of nanofabrication, Purdom essentially rehearses the claims of postindustrial theory as articulated by Daniel Bell and other late-twentieth-century neoliberal thinkers, who helped lay the conceptual and rhetorical foundations for the so-called Information Revolution. In Nick Dyer-Witheford's telling of the origins of postindustrialism, Bell's influential premise began as an attempt to stifle Marxist historiographical interpretations that pointed to mid-century social turmoil as a symptom of intensifying class struggle: the protest movements and civil unrest of the 1960s were to be understood not as prelude to communist revolution, but rather as normal "growing pains associated with the emergence of a radically new social order" (17), in which the class antagonisms of the industrial era would eventually fade away, while Western countries transitioned away from manufacturing and toward economies based on knowledge, information, and expertise.

> Knowledge, says Bell in one of his most widely repeated formulations, will replace both labor and capital as the main factor of production. Between the opposition of capitalist and worker emerges a new class – 'a professional class, based on knowledge rather than property.' (19)

Postindustrial (*ergo*, in Purdom, posthuman) economies would therefore preserve a place for – indeed, would rely upon – competent technocrats and idea-people: scientists, engineers, managers, intellectuals and experts, visionaries and venture capitalists. Purdom's protagonist is just such a figure, and his version of the economic impact of nanofabrication precisely mirrors Bell's formulation of the tumultuous but ultimately harmonious transition to postindustrialism in the twentieth century:

> The introduction of the fabricator had disrupted Earth's economic system for approximately two decades. It had triggered a catastrophic massive deflation. Prices and wages had tumbled by seventy percent, by most calculations. But when the turbulence had subsided, Sabor's family had still been negotiating loans and pulling profits out of microscopic variations in interest rates. (33)

Though nanofabrication sent a devastating fiscal shockwave through Sabor's universe, it did not signal a revolutionary top-to-bottom reorganization of social relations. Rather, it effected a traumatic but temporary crisis-condition suitable for the chopping-away of dead wood, from which a new order of fitter and more competent technocrats could emerge and re-take control of the economy and its technological engines. Bell's argument about the social organization of postindustrial society is affirmed: fabricators may have revolutionized production, but not the larger arrangement of labor and trade that generates wealth: fabricators "still needed energy and raw materials… [and] programs that directed their operations and time to run the programs." Moreover, "there were commodities that couldn't be manufactured by the best machines available. Fabricators couldn't manufacture social status… Above all, fabricators couldn't manufacture expertise and imagination" (33). In figuring the nanotechnological crisis of production as an ephemeral moment of creative destruction, Purdom has imagined an economic Singularity that – structurally – does not *change* anything. Despite a lot of transitory *sturm und drang*, in the end Purdom's economic universe will always rebound to a familiar equilibrium, and business – disencumbered of the least economically fit, and newly enhanced with the ornaments of technological progress – will go on more or less as usual.

Purdom, a holdout from an earlier generation of SF writers and an apparent casualty of the literary crisis Vernor Vinge announced in 1993, is arguably out of his depth in attempting to come to grips with transhumanist themes and premises in a compelling way, though the attempt at least testifies to a perception that the magazine market is hungry for cyberpunkesque and

Singularity-flavored tales. But despite its inept handling by Purdom, the ostensibly postsingular economy of "Bank Run" belongs to a long-established and ideologically diverse discursive tradition – traced by Dyer-Witheford and expanded in this chapter – wherein the same stunted dialectical shuffle is played out again and again: techno-futurist prophets, impelled by an urgent sense that technological change is on the verge of precipitating a new and "revolutionary" era, manage to envision this future in terms that are always-already determined by the world as they know it, or as they wish it to be.

Juxtaposed thus, the fictions of Purdom and Stross highlight the terms of the tension between right- and left-aligned transhumanisms with respect to the political-economic stakes of posthuman and postsingular technology, which both writers otherwise accept as given. For Purdom, "revolutionary" technologies of neuro-cybernetic interface, unlimited datascapes, custom-engineered genomes and advanced nanotech do not ultimately necessitate any significant departure from business as usual, but instead merely augment the rationally self-interested *Homo economicus* subject, empowering him (he is, of course, typically male) to achieve his full potential, and shoring up his rightful position at the apex of a top-down, Taylorist management hierarchy. Rather than redefine the terms of political economy itself, such technologies instead reinforce and amplify rationalist and utilitarian economic principles in concrete terms, ultimately retaining their essence as tools subject to human use. For Stross, in contrast, nanofabrication augurs economic Singularity and the obsolescence of the humanist *Homo economicus*; it implies vast (if unpredictable and often ambivalent) liberatory potential, and is at the same time fraught with familiar humanist anxieties about the cooptation and exploitation *of* humans *by* technology and the "abstract machines" of ideology (*Accelerando* 63).

Perhaps most interesting in the comparison of these ideological antagonists, however, is the sliver of common ground they share with respect to the uncertain status of production, labor, and physical property (conventionally understood) as determinant factors in a posthuman economy characterized by nanofabrication. The mere fact that Purdom feels compelled to acknowledge the question "why would anybody need money?" at all signals that a new set of assumptions is in play. By way of reconciling a conservative model of economic subjectivity with transhumanism's intrinsic expectation of profound technological change, he reasserts the claims of postindustrialism in order to re-articulate scarcity in terms of cognitive and social (as opposed to material) wealth. Despite his reactive backpedaling, though, Purdom is responding to the same Singularitarian intuition of dramatic change that impels Stross, in turn, to even more startling conclusions.

If my opposition of Purdom and Stross presents the former as spokesman for neoliberal postindustrialism, then Stross is the nearest thing in this reading to a Marxist revolutionary – a label not altogether ill-befitting Stross's own intellectual and political leanings, though a potentially misleading one which should be qualified and elaborated upon. To the extent that his fiction posits Singularity in explicitly historical-materialist terms of social revolution, perceives in intelligent nanofabrication the potential for an ultra-democratized means of production, scorns the zero-sum profit motive and generally detests the fetishization of private property, Stross is squarely in the Red camp. Yet he is also bitterly contemptuous of party doctrine and hierarchy, as in the satirical portrayal of Stalinist-transhumanists in *Singularity Sky*, and more or less dismissive of twentieth-century partisanship in general: in the midst of Singularity, he writes in *Accelerando,* "communism and capitalism, bickering children of a protoindustrial outlook, are as obsolete as the divine right of kings" (198-9).

Neither precisely left- nor right-identified, *Accelerando*'s transhuman protagonist Manfred Macx is a cyborg in the literal sense but also in Donna Haraway's metaphorical sense; an "agalmic entrepreneur" (78), he effects the redistribution of wealth not through class struggle as such, but through the development of valuable patents that he donates *gratis* to the "Free Intellect Foundation," which in turn makes profitable ideas freely available to anyone and everyone, thereby stimulating both the technosphere and the global economy to the benefit of all. This is the same model employed by the real-life nonprofit Free Software and Creative Commons foundations, for which Stross enthusiastically advocates, and his "agalmic entrepreneurship" owes a significant debt, expounded at length in chapter 4, to the principles of Free Culture and open-source programming. In terms of mapping Stross's fiction on a left-right ideological grid, though, the concept of agalmics presents a striking hybrid in Manfred: a utopian revolutionary with a radically egalitarian – as it were, redistributionist – economic agenda, yet at the same time one who plays by the rules of, and employs the tools of, high-tech postmodern capital. Rather than leveling the socioeconomic field, Manfred simply wants to "make everybody rich beyond their wildest dreams" (61) before the Singularity is through.

The difficulty of pegging Stross as a conventional lefty, and the entire basis for the paradoxical figure of Macx as "venture altruist" (11), consists largely in Stross's rejection of scarcity as an absolute determinant in economic calculations. As he sees it, the great ideological struggle of the twentieth century amounted to a zero-sum materialist game of resource allocation, in which the contest between the "bickering children" of communism and capitalism was ultimately a matter of which system's controlling mechanism – free markets or central planning committees – could most effectively exploit scarce resources, thereby sustaining the most human lives, maintaining the highest standard of living, and controlling the most military and economic

resources. The rules of that contest change fundamentally with the prospect of technological

Singularity, which universally assumes either or both of the following as real possibilities: the

development of nano- or bio-tech applications that could meet any conceivable material need a

person might have, or the ascendancy of humans to a postbiological or neobiological status in

which such material needs would be virtually or absolutely obviated. Either way, whether or not

we postulate Singularity as inevitable, by the end of the twentieth century it becomes

increasingly apparent that – as Bell argued and transhumanists of all ideological stripes seem to

intuit – the movement of history is away from the materialist scramble for commodities,

consumables, and control over production, and instead in the direction of something different.

My contention is that postcyberpunk SF may to a significant degree be defined, and must

in any case be understood, in terms of its efforts to theorize, characterize, and come to terms with

that elusive "something different" waiting just over the economic horizon. Chapter four will

identify some of the subgenre's most noteworthy and provocative responses to that challenge,

and map them against parallel and concurrent trains of thought emanating from contemporary

technoscience, subculture, political philosophy, legal scholarship, and critical theory. In order to

establish a context within which these readings of postcyberpunk political-economic fictions will

fully resonate, however, it is necessary first to further interrogate the meanings of "revolution" in

a nonfictional Singularitarian milieu. Accordingly, this chapter will forego further explication of

SF texts and turns to futurological, historical and theoretical nonfiction, establishing the

ideological problematics of Singularity as Marxian or Enlightenment-style political "revolution"

against which the postcyberpunk political-economic argument is formulated. To this end, both

classical Marxism and neoliberal postindustrialism (especially in its more recent techno-

exuberant and Singularitarian variants) are opposed against another set of ideas that form the

theoretical backbone for my subsequent SF readings: the anti-rationalist concepts of general economy and symbolic exchange.

Out-of-control capital and the "new spiritualism"

Fully a decade into the twenty-first century, parts of *Wired* editor Kevin Kelly's classic futurological tract *Out of Control* still feel as far-out and edgy as they did in the mid-1990s. Others, particularly his chapters on commerce and economics, seem comparably quaint and dated – perhaps not on Kelly's account so much as because many of his key concepts (decentralization, outsourcing, distributed production, networked economies) have subsequently been so thoroughly absorbed and digested into the conventional wisdom of business discourse as to become utterly dead clichés. That is to say, they read like something Thomas Friedman might have written last month.

To be fair, Kelly's writing on globalization in the Internet age exceeds Friedman's in credibility and erudition, not just prescience. But at the same time Kelly is himself hardly original in proclaiming, for example, that "the shift from products to service is inevitable because automation keeps lowering the price of physical reproduction" (193); such truisms owe a transparent and mostly unacknowledged debt to postindustrial and "information revolution" theory dating back at least a generation. What *does* make Kelly's essay on "Network Economics" unique and interesting is the abrupt shift that occurs on its last two pages. After seventeen soberfaced pages of business-school wonkery on the cost savings of massively parallel subcontracting and the supreme adaptability of realtime pricing systems, he veers in the final paragraphs into all-out Singularity-mongering mysticism:

As very large webs penetrate the made world, we see the first glimpses of what emerges from that net – machines that become alive, smart, and evolve – a neo-biological civilization.

There is a sense in which a global mind also emerges in a network culture. The global mind is the union of computer and nature – of telephones and human brains and more. It is a very large complexity of indeterminate shape governed by an invisible hand of its own. We humans will be unconscious of what the global mind ponders. This is not because we are not smart enough, but because the design of a mind does not allow the parts to understand the whole. The particular thoughts of the global mind – and its subsequent actions – will be out of our control and beyond our understanding. Thus network economics will breed a new spiritualism. (202)

This passage marks a return to Kelly's central thesis in the book, which has to do with the vast creative and innovative potential of "emergent" properties engendered by extremely complex systems allowed to run gloriously amok – properties that are by definition not just unpredictable but often, like the silent dreaming of a posthuman "global mind," utterly unfathomable by mere *Homo sapiens*. Explicit in Kelly's conception of a posthuman Singularity scenario is the acknowledgment of its sublime unknowability, and the attendant sense of cosmic wonder commonly associated with millenarian Singularity discourse. Yet, almost paradoxically, Singularity is posited here as the logical and likely outcome of an entirely banal set of undertakings:[3] using information networks to make product design more responsive to consumer demand, optimizing efficiency in production and increasing competition by speeding up the market's existing feedback loops, and so on. How we get from tech-support call centers in Mumbai to transcendent global metaconsciousness is not something Kelly feels the need to explain – these things just happen, presumably, when the stuff we're already doing gets amped up by networking, nudged forward by the ever-present "invisible hand," and allowed to spin sufficiently "out of control."

The tension between Kelly's dual impulses to grand predictioneering and workaday status-quo-validating is even more pronounced in his chapter on "E-Money," which begins with

a visit to the subterranean lair of Crypto-Anarchist Tim May, a cypherpunk insurrectionist out of central casting who persuades Kelly that "a digital tape is a weapon as potent and subversive as a shoulder-mounted Stinger missile" (203) and that democratized cryptology will trigger "the collapse of society as we know it" (205), just as the Gutenberg press empowered the bourgeois class to overthrow the feudal system. While Kelly, for his part, is understandably dubious about the desirability of punk-style anarchy as such, he readily embraces the notion of "revolutionary" technology (a phrase with which he is very much at home throughout the book) and sets out to enumerate a few of the mind-blowing economic paradigm shifts that encryption holds in store for us.

It is surprising and disappointing, then, when Kelly's incendiary introduction opens out into a list of tepid suggestions for how encryption might be deployed to "let information be free" while – naturally – ensuring that copyright holders get paid and maintain control over intellectual property; to implement billing systems for ISPs that would enable bandwidth to be sold to customers at a fairer price; and to move financial transactions off-grid with "digital cash," thereby sticking it to the taxman while otherwise perfectly preserving the structure of a cash economy. All clever ideas, in fairness, but "revolutionary" only in the sense of "a revolutionary new underarm deodorant." Rather, the rhetoric of subversion and revolution seems to be invoked almost in direct proportion to the intensity of Kelly's efforts to tame and rehabilitate ostensibly dangerous technologies and applications into a free-market capitalist business model that any nineteenth-century banker or mill owner would recognize.

It's not that Kelly is so mired in a static neoliberal worldview as to be entirely oblivious to ideas that may not gibe with classical economics as he understands it; on the contrary, he concedes that "the logic of the Net" is one in which value is not always dictated by scarcity. Here

and elsewhere, Kelly is fond of referencing the "Fax Effect." To wit: "If you have the only fax machine in the world it is worth nothing. But for every other fax installed in the world, your fax machine increases in value. In fact, the more faxes in the world, the more valuable everybody's fax becomes" (210). On this basis, Kelly aptly perceives the futility of policing the unauthorized reproduction of software which, as the cypherpunks say, just wants to be free; instead of being exhausted in consumption it actually gains use-value the more it is used. But instead of grappling with the Fax Effect and its implications on their own slippery terms, thence pursuing them to potentially disturbing conclusions, he is content to chalk it all up to the kind of wacky, emergent thing that happens in out-of-control systems, turning his attention to the more interesting problem of how such things might be brought to bear in service of a profit-making business model.[4]

Outside of these passages Kelly's ideological inclinations are sometimes less overt, but remarkably persistent. *Out of Control* is shot through with subtly- and not-so-subtly-coded metaphors and passing observations that testify to the author's implicit and unflinching belief in what Dyer-Witheford calls the "necessary identification of technological progress and the market economy" (36). In Kelly's hands, there is no instance of technological wizardry that cannot be likened to the structures and mechanics of an industrialized market economy. "A network," he writes in one of the more succinct instances, "is a factory for information" (193). Elsewhere, the "behavior" of robots is explained as a gestalt effect produced by multiple autonomous software agents working independently with only limited awareness of one another; this, Kelly remarks, "is an exact description of a market economy," in which the market's "behavior" is simply an emergent function of a multiplicity of independent, self-interested buyers and sellers acting simultaneously (47-8).

In an especially telling chapter on Norbert Wiener and the origin of cybernetic control

systems, Kelly relates an anecdote about steel-industry engineers who, inspired by Wiener's

Cybernetics, successfully applied his feedback principle to a longstanding and seemingly

intractable technical problem with the production of sheet metal: instead of painstakingly

calibrating and re-calibrating each stage in a complex manufacturing process, they found after

reading Wiener that by installing and automating feedback monitors capable of tweaking only

one piece of equipment at a time, the whole system could gradually be brought into optimum

alignment all by itself. In reality, Kelly proposes, the credit for this breakthrough is properly due

not Wiener, but Friedrich Hayek and Austrian-school economics, which more than twenty years

earlier had hit upon the same principle in the "calculation argument" (121). The Austrians saw in

the 1920s that, due to the complexity of its network of feedback loops, "in a vacillating economy

it is impossible to calculate resource allotment," as the "top-down" planned economy of the

Soviets was supposed to do (121). Instead, through the manipulation of only one variable (price),

market economies could be fine-tuned just like sheet metal presses to function harmoniously and

efficiently; by forfeiting comprehensive top-down control, the system gains functionality and

flexibility. In a free market, then, the kinds of resource allocation problems that confounded

Soviet central-planners would simply work themselves out:

> That way, one doesn't care how many bars of soap are needed per person, or whether
> trees should be cut for houses or for books. These calculations are done in parallel, on the
> fly, from the bottom up, out of control, by the interconnected network itself. Spontaneous
> order. (121-2)

 In his figuration of machines themselves as technological instantiations of free-market

principles, Kelly not only inverts the standard cliché analogizing business to technology (e.g. a

company that runs "like a well-oiled machine"), but moreover subordinates all technological

knowledge to the epistemology of profit: here, market capitalism is the platonic model,

cybernetic feedback systems merely a clever application thereof. Indeed, the casual identification

of gee-whiz technological artifacts with the economic machinery of capital so permeates Kelly's

text that it often seems almost unconscious; he glides so effortlessly between the two poles of his

analogy as to beg the question of whether he believes they might, in fact, be the same thing. In

the end, Kelly's vision of technological Singularity – a godlike hive-mind awakening to

consciousness out of the unthinkably complex synaptic firing of the global market – makes no

distinction between the banalities of business and the transcendence of incipient posthuman

consciousness.

Figure 4: "Knowledge workers of the future"

Source: illustration by Brian Christie. Hanson, Robin. "Economics Of The Singularity." <u>The Singularity: A Special Report</u>. Spec. issue of <u>IEEE Spectrum</u>. 45.6 (2008): 44.

Visually synthesizing SF imagery and postindustrial labor theory, the caption to Hanson's article on postsingular economics reads: "Stuffed into skyscrapers by the billion, brainy bugbots will be the knowledge workers of the future" (45).

**Information Revolution and the return of the
(Marxist) repressed**

That a thinker who partakes so liberally of soaring Singularitarian rhetoric and sentiment as Kevin Kelly does should at the same time be so relentlessly and unselfconsciously conventional in his basic assumptions about the dynamics and shape of the economic Singularity he proclaims, perhaps, reveals more about the idea than the thinker. But it is precisely on the score of this technodeterministic false consciousness that Kelly and the editors of *Wired* are chided by Dyer-Witheford, whose *Cyber-Marx* is at one level an attempt to bring a classical Marxist ideological critique to bear on the discourse of postindustrialism and its intellectual successors in the Internet age. In the process, a few fellow travelers on the left also take hits for what Dyer-Witheford sees as a parallel and complementary credulity toward cyberutopian narratives. Yet even Dyer-Witheford, writing like Kelly at the end of the twentieth century, indulges despite himself in some cautious utopian fabulation of his own, and takes an awkward turn at holding up his image of the world to the mirror of techno-economic Singularity.

Vexed and bewildered by the endless invocation of utopian and revolutionary themes in service of a profoundly orthodox, even regressive agenda, Dyer-Witheford opens *Cyber-Marx* by unpacking the genealogy of the "Information Revolution" idiom of which Kelly is a relatively recent exponent. Counter-intuitively, Dyer-Witheford reveals it as a movement founded not in Austrian economic theory, but in Marxist historiography. Before *Wired* came Alvin Toffler's "Third Wave" in the 1970s, and before it Daniel Bell's "postindustrial society" of the 1960s (itself little more than a beta version of Bell's still-earlier "end of ideology" argument, which had been spectacularly debunked by world events almost before the ink was dry). At each stage, Dyer-Witheford pulls apart the rhetorical structures and thematics deployed by Bell and Toffler –

both onetime lefties schooled in Marxist dialectics and class struggle – in info-revolutionary

arguments *against* Marxism, to expose the deep-red intellectual roots of the discourse.

Though both later professed a belief that computers have obviated historical-materialist

theories of labor and value, one vestige of their Marxist education that seems to have stuck with

Bell and Toffler is its prophetic teleological impulse. Both thinkers still subscribe to breathless

utopian visions of the future, but their revolution is a monstrously circular construct, with a

cynical twist. Depending on the circumstances Bell is addressing, it is either a *fait accompli*,

fully present and observable in advanced Western societies, or a future Golden Age that will

arrive if and when technoscientific progress is wholeheartedly embraced and rationalist

technocracy is firmly established. Postindustrialism, Dyer-Witheford says, "thus projects into an

imminent future the very conditions of stabilization that the 'end of ideology' thesis had

mistakenly declared already achieved" (19). Bell has attempted to reconcile the cognitive

dissonance between his idealized vision of post-ideological, technocratic prosperity, and a wave

of postwar social unrest that seemed consistent instead with Marx's predictions of class war, "by

proposing an extra stage to the march of progress" that will have tied up the loose ends in time

for the millennium – but, crucially, only if Bell's "knowledge class" of engineers and technical

experts is in charge. "No mere extrapolation from predetermined trends, but a determined

assertion of what those trends will be, postindustrial futurology foresees the future it intends to

make" (19).[5]

Under a new generation of technofuturists led by Toffler, a step farther-removed from the

atmosphere of overt class antagonism in which Bell and his contemporaries came up, the crypto-

Marxian utopia of postindustrial society undergoes a mutation, de-emphasizing the role of

human subjects in its logic and taking on a still more recognizably Singularitarian character in

the process. Whereas its predecessor "had primarily defined the new era in terms of its departure from the [sociopolitical] crises of industrialism," the new "information society" theory loses interest in questions of how machines figure in the social relation of production and begins to cede agency to the machines themselves; hence, "industry is succeeded by information" and "technocracy is replaced by high tech" (21). By way of eulogizing the political theories he once flirted with, Toffler declares the obsolescence, now that mass labor is being displaced by automation and intellectual work, of the working class.[6] With the demise of "Marxism's historical protagonist" (28) and the postindustrial automation of history, a proto-Singularitarian logic of mechanical inexorability gains traction in info-revolutionary discourse. In the same way that factory workers have already been replaced by assembly-line robots, the human *dramatis personae* of the Marxian narrative are being phased out in favor of intelligent machines, seemingly running on their own, into a future of their own making. Technodeterministic imperatives begin to infect broader cultural debates as the computer-illiterate and gadget-averse face a harsh ultimatum – "adaptation or obsolesecence" – and capital secures for itself the "virtuous circularity of self-fulfilling prophecy – generating the reality it predicted" (22).

Only with the arrival in the 1980s and '90s of a third generation of information revolutionaries – sixties counterculture refugees partially reconstructed as Silicon Valley corporate visionaries – does the discourse begin to approach the zany extropian mysticism of something like Kelly's "global mind." By this point, according to Dyer-Witheford, info-revolutionary "doctrine" has expanded beyond the relatively straightforward economic hypotheses of postindustrialism and the information society to include increasingly epochal and Singularitarian notions (e.g. Toffler's "Third Wave" argument that "the world is in transition to a new stage of civilization, a transition comparable to the earlier shift from agrarian to industrial

society" [22]; McLuhanite globalism, i.e. "the information revolution is planetary in scale" [25]), culminating in the incipient posthumanist thesis that we are on the cusp of "not only a new phase in human civilization but also a new stage in the development of life itself" including synthetic life, self-aware machines, and computers as prototypical of "a potential successor species – the next stage in evolution" (26).

By the mid-1990s, at the end of a multigenerational process of mutation, it is possible for a figure like Kevin Kelly to swallow the whole free-market utopian mythology of information revolution – from the post-manufacturing, service-based economy, all the way down to the quasi-religious expectation of a posthuman Aquarian age – with no apparent awareness of its complex and contested lineage. Where Bell and Toffler still feel obligated, if not to actively contend with the arguments of the Old Left, at least to acknowledge them, Kelly elides socioeconomics altogether. It doesn't occur to him that, post-1989, there might still be meaningful debate over things like "how many bars of soap are needed per person, or whether trees should be cut for houses or for books" – much less over who is making the soap and cutting the trees, under what conditions, or to what ends. On the one hand he seems to have internalized, in truncated and alienated form, something like Marx's *telos* of economic Singularity, stripped of its historical materialist baggage. But because he belongs to a post-Cold War generation of futurists for whom "anti-Marxist diatribes now seem beside the point" (36), when Kelly and his contemporaries at *Wired* gaze into the Singularity they see little more than their own image reflected back. Perhaps, in some ironic sense, Bell's "end of ideology" has been realized after all.

The Cyber-Marxian Singularity

For his part, Dyer-Witheford is keen to salvage Marx and the working class from history's dustbin, and despite his disdain for the techno-utopian claims of info-revolutionaries like Toffler on the right and post-Marxist turncoats like Andre Gorz on the left, he too is taken with the idea that "computers and other information technologies might play a part in the constitution of a postcapitalist society" (13). Returning to the *Grundrisse*, he recalls Marx's original prediction about the rise of automation and global communications networks: that, while they will appear in the short term to cement the power of technoscientific capitalism once and for all, "inside this bourgeois dream lie the seeds of a bourgeois nightmare. For by setting in motion the powers of scientific knowledge and social cooperation, capital undermines the basis of its own rule" (4). From the outset, then, *Cyber-Marx* posits classical Marxist revolution as a real and valid, even probable scenario; moreover, the revolutionary possibilities it entertains are specifically technological in nature, buried in the fine print of capital's Faustian bargain with industrial technoscience. In essence, Dyer-Witheford is courting a techno-economic Singularity of his own, albeit a more carefully qualified and finely delineated version than his ideological foes expound. His problem – one that often plagues champions of modernist social projects in postmodern times – is one of theorizing his ideal in coherent terms and formulating plausible strategies to effect it. "Describing alternatives to capitalism," he sheepishly admits, "has always troubled Marxists" (192) – including Marx himself, who shrewdly avoided the question of what life in a post-revolutionary society might be like.

Having spent nearly half his book critiquing various neoliberal, post-Marxist and postmodernist theories of high-tech political economy, Dyer-Witheford devotes a chapter to a heretical and largely forgotten strand of the Marxist tradition – the Italian *autonomia* movement

of the 1970s – in whose ideas he sees "a subversive counterinterpretation of the information revolution" and the potential for "a twenty-first century communism capable of confronting computerized capitalism with a radically alternative vision" (65). While the autonomists were branded counterrevolutionary apostates for spurning the determinism of Leninist "technological rationalization" (70), or scorned as neo-Luddites for their willingness to use sabotage as a technique in factory-floor struggles, Dyer-Witheford makes a case that autonomism in fact represents a much more technologically savvy viewpoint than many competing flavors of Maxism, and a potentially effective set of theoretical and tactical tools for contesting capital's control of high-tech turf.

In particular he emphasizes how autonomist theory creates a space wherein post-Fordist reorganization of the factory inadvertently spawns "technologically capable, scientifically literate" revolutionary subjects – subversive counterparts to the upstanding technocrats of the information society – with a high degree of technical know-how and the wherewithal to "reappropriate technology" (71) toward workers' struggles. Here, Dyer-Witheford could be describing Stross's Manfred Macx, Cory Doctorow's Liza the Organiza ("Anda's Game"), Bruce Sterling's Turner Choi ("Green Days in Brunei"), or any number of cyberpunk and postcyberpunk protagonists who delve into the hacker's toolbox of *bricolage* and nonlinear problem-solving techniques to pursue socioeconomically progressive and revolutionary agendas from *within* the edifice of high-tech postindustrial capital. The space in which these subjects move is that of the "factory without walls" (80) – Antonio Negri's term for a capitalist society that has been reconfigured such that the extraction of surplus value no longer occurs primarily in the context of industrial production, but everywhere, distributed throughout a network of sites where labor is invisibly "socialized" and the profit motive colonizes virtually every aspect of

life. In such a world, class struggle takes place not only through the traditional methods of organized labor movements, but everywhere that the "conflict between the imperatives of capital and the needs and desires of [its] subjects" (81) appears – in demands for social entitlements, in environmental and students' movements, in tenant-landlord disputes, and so on. The tactics deployed in these struggles can be quite simple and direct, as in the "sheer refusal" (70) to recognize and abide by the established rules of the market or the workplace,[7] or more sophisticated applications of workers' "invention power" (71) to repurpose technology against capital.

The *autonomia* movement itself is long dead – disowned by the left establishment and ultimately crushed by a campaign of state repression. Dyer-Witheford is not calling for an autonomist revival; indeed, he recites a long list of grievances over its reductionism, blind spots, and tendency toward romantic mystification. But he likes the notion of "cycles of struggle" that drives autonomist historical analysis, and Negri's conception of the modern political-economic playing field and its players retains a central place in his vision of a high-tech postcapitalism. Nowhere does Dyer-Witheford come closer to endorsing any extant model for cyber-Marxist revolution than in his chapter on autonomism, but its value for his project is ultimately that of a storehouse for experimental ideas and tactics that might be dusted off and retooled for the Internet age.

Yet when, in the last few chapters of the book, it is finally Dyer-Witheford's turn to articulate his own program for "twenty-first century communism" (2), the result is a hesitant and occasionally self-contradictory jumble of ideas, at times reflecting a vaguely autonomist ethic of spontanenous, non-hierarchical, grassrootsy struggle, at others hauling out the dogeared playbook of the old left: committees, policy platforms, funding streams, administrative

apparatuses, mass-media organs, and so on. This section of *Cyber-Marx* opens with much apologetic throat-clearing over the awkwardness and difficulty of hypothesizing utopia, especially on the heels of two hundred pages spent exposing the ideological obfuscation inherent in others' attempts to do so. Nevertheless, Dyer-Witheford is resolved to eke out "a sketch of an alternative future," comprised of recommendations he hopes will "go a long way toward constituting a viable alternative to capitalism" (193). The foremost element in this strategy is a program of Guaranteed Annual Income – distinguished, minutely and by means of chiefly semantic arguments, from a similar but "watered down" proposal by the much maligned Gorz[8] – which must in any case be passed into law and meted out by some institutional state bureaucracy. Presumably such administrative functions will be expedited by better spreadsheets and richer census data, but beyond that it is unclear how the implementation and operation of "twenty-first century communism" will differ from that of the twentieth.

In his argument for the de-commoditization of information and communications, Dyer-Witheford is asking more pertinent questions vis-à-vis technological change, but the conclusions he draws are similarly addled and overburdened by the conventional political wisdom of the twentieth-century left. He begins by observing that, as its information revolution unfolds, capital must work harder and harder to enforce the commodity status of intellectual property, as demonstrated by the continued success of hackers and pirates in thwarting restrictions like copy protection and signal-scrambling. This sort of mischief is all well and good, Dyer-Witheford supposes, insofar as it can effect a "generalized transgression of electronic property rights" (203), "informally decommodifying information flows" (202) and creating headaches for corporate media monopolies. But to transcend mere opportunism, piracy must be complemented by an organized "counterproject" of arming ordinary people with mass-communication skills and

resources, ultimately establishing a nonprofit "alternative" media edifice that can compete with hyperconsolidated corporate broadcasting and publishing (203).

Of course, in the decade since *Cyber-Marx*'s publication, it has become generally accepted that just such an alternative now exists in the blogosphere, social networks and associated new-media venues of the Internet, which have effectively challenged traditional commercial media's monopoly on public affairs reporting and analysis, to the point where the demise of the woodpulp newspaper industry is all but a foregone conclusion. Dyer-Witheford deserves credit for anticipating that such a thing could happen at all, though – incredibly, with the benefit of a decade's hindsight – packet-switching technologies scarcely figure at all in his conception of alternative media.; instead, he proposes a system of publicly funded, independent and locally run broadcasting outlets loosely on the model of community radio and public-access cable TV. Yet while the centralized network-affiliate structure of public broadcasting is abandoned on the basis of its perceived "elitism" (203), neither does Dyer-Witheford adopt the model of the Italian autonomists, who relied extensively on pirate radio and other radically anti-institutional tactics. His "communications commons" (203) operates at a grassroots level and in a largely decentralized, distributed way, but is still built from the top-down, funded by the state and presumably overseen by some official agency. Like the guaranteed income initiative, it originates at the level of policy prescriptions that must be enacted, underwritten, and managed by the state – though exactly how or why cyber-Marxists, short of seizing state power, might induce presently existing Western governments to take such measures is not addressed. Moreover, by privileging unidirectional mass-media technologies of the industrial age over the interactive and massively participatory potentialities of Internet-based models, the proposal reveals itself as the

product of a mid-twentieth-century technological mentality even as it rhapsodically anticipates the brave new twenty-first.

In a sense, Dyer-Witheford has painted himself into this corner. In the book's much more forceful and persuasive first half, he evinces deep skepticism of any and all claims that smack of techno-utopia and information "revolution," including those from the left that prematurely presume an end to the categories of labor, class, and history as articulated by Marx. Yet, as an unrepentant Marxist, he remains committed to the proposition that a Marxian-style revolution is not only possible, but absolutely imperative. Consequently, Dyer-Witheford must acknowledge his obligation to at least *think* about praxis, which necessarily must encompass the role of computer networks and information technologies, upon which he and Marx have pinned their revolutionary hopes. On one hand he is enchanted by the intellectual elasticity and vitality of autonomist thought, and strongly suspects that its "bottom-up" orientation to class struggle is best suited to confront high-tech postindustrial capital. On the other hand he belongs to a "top-down" institutionalist tradition rooted in monolithic organized labor, mass-audience publishing and communication models, and elaborately constructed political machines. He is ultimately caught, in some hazy liminal space, between the radical, organic thrust of the former and the technocratic policymaking reflex of the latter.

In different ways, and with varying degrees of nuance and self-awareness, both Dyer-Witheford and Kelly are driven by the same vital impulse – an intuitive recognition of tremendous novelty and potentiality in new technologies of information and communication – but both are also straining to make these utopian possibilities fit within well-established worldviews. Dyer-Witheford's is a dialectical historical narrative culminating in the economic Singularity of class revolution, actualized under a revised but still recognizably Marxist-Leninist

macropolitics prefigured by a logic of state power. For Kelly, it is a superficially bottom-up ethic of economic and technological "out-of-controlness," shrouded in a naïve and quasi-mystical belief in the transformative power of the emergent, which turns out to be little more than a screen for *laissez-faire* libertarianism: put your faith in the market and your wildest transhumanist dreams will come true.

It is not especially surprising that neither variant of posthumanist political economy has inspired much interesting SF in recent years, notwithstanding the brand of warmed-over Heinlein being peddled in gaudy cyberpunk packaging by holdouts like Purdom. On the contrary, some of the most vital and compelling responses to the conceptual challenge of political-economic Singularity have begun with the self-conscious rejection of conventional left-right dualisms, as Stross does in *Accelerando* and *Singularity Sky*. In contrast to the myopic and ideologically scripted presumptions that tend to creep into technofuturist discourses of both the left and the right, Stross's fictional Singularities are characterized by ironic convergences and contradictions in their ideological commitments – bizarre cyborg amalgams in which the tools and techniques of corporate finance and litigation are reappropriated toward progressive social-justice as well as (civil- and cyber-) libertarian agendas, by subjects who carry the DNA of the autonomist micro-revolutionary, the cyberpunk-anarchist hacker, the tech-startup VC visionary, the liberal-humanist *Homo economicus*, and more.

But at another level, the difficulty of locating the postcyberpunk economic Singularity on a dualistic ideological map perhaps speaks to the influence of another late-twentieth-century theoretical project, in whose context I will argue postcyberpunk SF must be understood: the deconstruction of political economy itself. Beginning with Georges Bataille's anthropological study of "primitive exchange" in preindustrial societies, and culminating in Jean Baudrillard's

definitive break with Marxism and the political left in *The Mirror of Production*, the fundamental assumptions of classical economics have been challenged by radically alternative theories of value and scarcity. Bataille's writings on gift economies, and Baudrillard's early speculations on the possibility of a future society organized on "symbolic exchange" rather than political economy, stake out a conceptual staging ground for contemporary theories of Free Culture, open-source production, and Creative Commons. These new technocultural movements – in the present technological context of new media, new Internet applications, and the prospect of nanotech fabrication – are opening paths to a possible reorganization of economics that can only be characterized in the language of Singularity, paths that are being actively explored and developed in and through contemporary SF.

Baudrillard and the impossible revolution of symbolic exchange

The problematics of "revolution" haunted the career of Jean Baudrillard, from his roots in Marxist philosophy to the outpouring of polemics against the unions and parties of the left that characterized much of his later work. Following a string of early books written more or less in the Marxian tradition but increasingly heretical in their theoretical contentions, Baudrillard and Marx finally part ways in 1975 with the publication of *The Mirror of Production*, in which communism and capitalism are exposed as two sides of the same epistemological coin: the regime of political economy. Both systems, Baudrillard says, proceed from the same utilitarian and productivist assumptions of economic rationalism, as evidenced by the headlong rush of the USSR – vanguard of the world revolution – to Fordist mass-industrialism. Moreover, Marxist analysis is fatally unable to recognize and theorize the shift Baudrillard has postulated to a "political economy of the sign."

For these reasons, Douglas Kellner writes, Baudrillard ultimately finds Marxism "too conservative to be useful to revolutionary theory" (40). Kellner's critical biography traces the long trajectory away from Marx in Baudrillard's post-1968 writings, culminating in the definitive break that occurred with *The Mirror of Production*. In Kellner's account, Baudrillard has a profoundly troubled relationship not just with Marx, but with the whole enterprise of revolutionary politics. On one hand, he sees himself as a revolutionary in the purest sense – an avatar of the primal transgressive and anti-authoritarian impulse at the heart of the Left tradition, looking beyond the horizon of political economy for the basis of an authentically radical politics. At the same time, he is habitually compelled to expose and ridicule the naïve "revolutionary" pretenses of his intellectual and political rivals – notably the French Communist Party, who with their ineffectual tactics and apparent resignation to the status of loyal opposition in the end "can do no more than simulate revolution" (57).[9] Kellner's reading suggests that this reflexive antagonism, combined with a failure to coherently articulate his own alternative, eventually draws Baudrillard into a self-defeating theoretical cul-de-sac with respect to political economy.

The internal tension Kellner outlines manifests in subtle ways throughout Baudrillard: while it seems he cannot avoid invoking revolution in his own writing, almost everywhere the term appears it is fraught with anxiety, always on the verge of collapsing into tautology or self-parody. In *Symbolic Exchange and Death*, for example, Baudrillard proclaims "a revolution [that] has put an end to [the] 'classical' economics of value, a revolution of value itself" (6). The event to which Baudrillard refers is the displacement of the "commodity law" by the "structural law" of value: having transposed Marx's categories of use-value and exchange-value directly to a semiolinguistic formula of signification, he postulates that the value of a signifier (in political-economic as well as linguistic terms) no longer inheres in the real object it purportedly

represents, but in its ability to be exchanged against other signifiers in a general system of equivalence. In effect, words and thoughts are endued with economic primacy over things, betokening "the end of labor. The end of production. The end of political economy" (8). Superficially, this proclamation bears more than a little resemblance to the techno-utopian slogans of "zerowork" (Dyer-Witheford 194) and "zero commodity" (201) in late-20th-century revisions of Marx (or for that matter, perhaps, to the postindustrial golden age of the automated factory and the information economy). But Baudrillard – as if to caution overeager Marxist readers who might otherwise succumb to the seductions of the revolutionary simulacrum – hastens to clarify: "it is not *the* revolution which puts an end to all this, it is *capital itself*" (*Symbolic Exchange and Death* 8), mutating ominously from a mode of production into "a *mode of domination*" (10). It is not the advent of the communist utopia, a historical apotheosis that is irrevocably "staked on the mode of production" (10), but a more ambivalent and darkly ironic kind of revolution, which effectively cancels the conditions of possibility for "*the* revolution."

Yet, at the same moment that Baudrillard dystopianizes the emerging order of semiotic domination, there is also an unmistakable note – latent in the invocation of revolution as well as in the overall tone of the passage – of positive exuberance at the demise of the commodity law and the contemptible "'classical' economics of value" (6). What are readers to make of this subtle equivocation? Should we celebrate the revolutionary moment and the overthrow of a tired petit-bourgeois paradigm, and be satisfied that "we are within neither capital nor revolution" (10)? Or should we regret the negation of the materialist terms under which Marxism – a philosophy that, at least theoretically, had a fighting chance during the bygone "era of production" (8) – might have been able to meaningfully challenge the system of capital? Julian Pefanis, reading *For A Critique of the Political Economy of the Sign*, further explores this

ambivalence: the "revolution of the sign," he notes, effects a radical revision of the archaic signifier-signified relationship and a de-coupling of commodities from the obligations of use-value, "while at the same time preserving the political-economic relations of power inherited from an earlier phase, namely exchange relations of capital" (72). What Baudrillard describes is thus "a paradoxical phenomenon," simultaneously "progressive" – in that it "smashes a ruthless and powerful order of [hierarchical] signification" – and "reactionary," insofar as it merely re-shuffles the hierarchies and reestablishes discrimination and exploitation under a new aspect (72).

As I have argued above, the revolutionary imagination of Singularity discourse is similarly and persistently problematized by a self-canceling circularity that functions in a comparable way: human civilization approaches a historical threshold upon which *everything will change*, yet every attempt to visualize this sublime telos seems fated to end in a coded re-assertion and valorization of the status quo. (In particular, Pefanis's reiteration of Baudrillard's point about the obligation of ostensibly revolutionary events to reinscribe the economic forms and power relations of capital pointedly recalls the free-market Singularities of Tom Purdom and Kevin Kelly.) Baudrillard's central metaphor in *The Mirror of Production* offers another parallel. Baudrillard views Marxist thought as ultimately and fatally delimited by its inability to see past the horizon of political economy, which Marx has mistaken for a window into a better future when in fact it is merely a reflective surface that conceals the truth: Marxism offers not a revolutionary alternative to capital, but merely "its internal critique" (*Symbolic Exchange and Death* 10). Those who entertain the notion of economic Singularity, whether conceived from the right or the left, are susceptible to an analogous self-deception. It is in this sense that Baudrillard, for all his ambiguity, offers perhaps the most resilient possible theoretical framework for

thinking through the problems and possibilities of a post-Singularity economics: one that, above all, acknowledges the seductions and pitfalls inherent in all teleological thinking, especially the tendency of the redemptive future to present us with a shiny surface into which we may gaze without recognizing our own reflected image. At the same time, by returning repeatedly (at least in his earlier work) to the figure of a society beyond political economy, Baudrillard seems to acknowledge also that revolution – and by extension, perhaps, Singularity – is a prospect too vast and compelling to be entirely canceled by its latent self-contradictory tendencies, that it may indeed contain multitudes.

Hence Baudrillard still feels obliged, as Kellner puts it, to offer a "'revolutionary' alternative" (44) to political economy – a challenge that is met with the concept of symbolic exchange. This formulation assumes a number of shifting guises and inflections in Baudrillard's writing – here a nostalgic vision of pre-capitalist economies, there a gesture of libidinal excess or transgression, elsewhere the hesitant image of an ultra-hypothetical utopia – but in its most basic modality it is an anthropological concept borrowed from Bataille's theory of general economy. Bataille, influenced in turn by Marcel Mauss's study of "primitive" gift economies, insisted on a broader view of economics than that entailed in the "restricted economy" of markets, commodities, and labor. For Bataille, economic exchange as we understand it is only possible within the much larger context of global flows of "energy," a deliberately counter-rationalist theoretical model encompassing socioeconomic behaviors and practices (sacrifice, potlatch, war, etc.) that are fundamentally unassimilable to the zero-sum utilitarian logic of economic rationalism.

Picking up from Bataille, Baudrillard opposes the Eurocentric notion that systems based on such nonproductive and anti-productive practices are interpretable as merely primitive

precursors to modern political economy. Rather, the puzzling rituals of waste and excess

described by Western anthropology are expressive of a deeper social truth still latent in some

non-Western cultures: the continuous and "primordial" circulation of symbols, an anti-economic

principle of exchange "based on non-production, eventual destruction [of surplus], and a process

of continuous *unlimited* reciprocity between *persons*" (*Mirror* 79). In societies of primitive

exchange, things "produced" and "consumed" are mere props, subordinate to the continuous

cycle of symbolic events (including ritual and religion, inter- and intra-tribal politics, family

obligations, and everything else that constitutes the social life of the group) whereby they

circulate; such goods, in fact, can scarcely be said even to *exist* except insofar as they facilitate

and are constituted within the flow of symbolic exchange. The "uninterrupted cycle of giving

and receiving" in primitive societies is a social adhesive that, moreover, intentionally precludes

the accumulation of wealth which would otherwise "[risk] breaking the reciprocity and [begin] to

generate power," and thence discrimination and domination (143).

In postulating the principle behind societies of primitive exchange, Baudrillard not only

favors the "symbolic social relation" over the materialist presumptions and goals of Marxist

political economy, he also makes uncharacteristically triumphal-sounding predictions on the

eventual downfall of capital itself, a system whose "fatal malady is not its incapacity to

reproduce itself economically and politically, but its incapacity to reproduce itself *symbolically*,"

i.e. at the level of the authentic social relation of which the gift is the most basic token (143).

Here Baudrillard comes perilously close to asserting symbolic exchange not just as a theoretical

foil, but as a potentially viable alternative to capital and political economy.

Yet fatally, in Kellner's assessment, "Baudrillard never clearly or consistently defines

this central concept" (45); instead, "symbolic exchange" devolves into a placeholder term for any

values or practices that Baudrillard momentarily wishes to oppose to the odious imperatives of production and economic rationalism. During Baudrillard's brief flirtation with Deleuzian micropolitics, for instance, symbolic exchange is the anti-economic rallying cry for a program of subversion at the level of "everyday life, culture, semiotics…" (46). The revolutionary movement, Baudrillard supposes elsewhere, may be carried out by marginalized groups such as students and racial or ethnic minorities who, "excluded from the game" of political economy, may have "a major role" to play in usurping its rules (*Mirror* 134). Baudrillard would subsequently retreat from any such optimism: to consciously practice symbolic exchange as a rejection of political economy is only to traffic in the political economy of the sign, which relentlessly arrogates all significatory practices unto itself.

Compounding the problems posed by the conceptual plasticity of "symbolic exchange," moreover, an opposing trend in Baudrillard's intellectual trajectory is developing with respect to another, comparably ill-defined, term: the "code" of signification that has taken the place of referential reality, ultimately canceling any potentially revolutionary or utopian reading of symbolic exchange. In this period, writes Kellner, "Baudrillard was calling for a 'cultural revolution' and a 'total revolution'; but it is not clear how this revolution was to be carried out or what it could accomplish" (46) in light of the growing emphasis he places on the domination of the code. Micropolitics and revolt-from-the-margins are therefore no longer tenable revolutionary strategies because even oppositional gestures amount to signs that are instantly co-opted and re-appropriated into the dominant code, like so many Che t-shirts on the racks of Hot Topic stores in suburban malls.

In Kellner's view, Baudrillard's abandonment of "cultural revolution" and its attendant strategies was more or less inevitable, given what Baudrillard eventually came to view as the

total reality of the code; ultimately it becomes impossible to theorize any kind of oppositional stance when "in Baudrillard's theory all practices, signs and so on are controlled by and absorbed into the almighty 'code'" (46-7). In the end, Baudrillard is reduced to arguing categorically, and with an obsessive nihilism approaching the absurd, "that what appears to be new, different, oppositional or subversive is merely part of a differential play of signs in a semiotic system which itself regulates and controls all signification and meaning" (50). He has altogether negated any possibility not just of subversion or revolution, but of human agency itself, by subsuming everything to the tyranny of the code, which now assumes the status of an all-encompassing totalitarianism. In effect, Baudrillard has written historical subjects out of the picture entirely – "thereby advancing," in Kellner's words, "perhaps the first theory of semiological determinism" (51).

In a way, we have returned full-circle to the themes this chapter began with: the deterministic teleologies of Marxist historiography and technological Singularity, both of which begin by positing radical alternatives and end by negating possibilities for meaningful change. Are all such would-be revolutions doomed to the same self-defeating circularity? The next chapter proposes that they may not be, turning to postcyberpunk SF and the Free Culture movement for visions of a postsingular economics that bears out the logic of symbolic exchange, without succumbing to the fatalism that came to define Baudrillard's later work.

Notes

[1] One of several passing details whereby Purdom displays his ideological colors and telegraphs his agenda, the planet's name is taken from a utopian colony established in Uruguay in the 1930s, by dissident Russian Mennonites who rejected Soviet economic planning (viz. Fretz).

[2] For that matter, "rational self-interest" is a fairly inadequate description of the economic behavior of plain old-fashioned humans too, as Gianni Vittoria, the autonomist-Marxist economic theoretician of Stross's *Accelerando*, grouses: "Human beings aren't rational… That was the big mistake of the Chicago School economists, and of my predecessors, too. If human behavior was logical, there would be no gambling, hmm? The house always wins, after all" (62).

[3] The irony of this juxtaposition is not lost on Kelly, who quotes from an email exchange with John Perry Barlow in which the celebrated cyberlibertarian muses on the "Great Work" of "hardwiring collective consciousness, creating the Planetary Mind." Barlow notes that while "Teilhard de Chardin… would be appalled by the prosaic nature of the tools we will use to bring it about," for his part Barlow finds it "sweetly ironic that the ladder to [Chardin's] Omega Point might be built by engineers and not mystics" (201). In Kelly's conception, of course, the distinction between engineers and mystics is rapidly dissolving.

[4] This involves the replacement of the present regime, in which the commodity-value of intellectual property is enforced (ineffectively) by copy protection, with a model of compensation based on royalties. Information should be "free," Kelly concurs, but not free of *charge*; therefore, while the copying of software can and must be allowed to proliferate freely, thanks to cryptology users may be charged on a per-use basis to execute it. Similarly, encryption will facilitate metering of bandwidth, so that network usage can be parceled out and tallied up like so much fuel oil or flour, thereby embalming the centuries-old form of commodity value for use with a "commodity" that Kelly himself recognizes as qualitatively different from the kinds of goods bought and sold in markets defined by scarcity.

[5] Dyer-Witheford does not address whether this doubleness in Bell's temporalization of postindustrial society might be another vestige of Bell's Marxist upbringing, in that it mirrors the dual usage of "communism" in the Marxist tradition: sometimes referring to the ideal future society that will succeed the revolution, at other times denoting the political movement working now to bring about such a future. Dyer-Witheford's remark that the prophets of information revolution "did not merely describe the future[,] they prescribed it" (22) is arguably true of Marxist teleology as well.

[6] Toffler, as Dyer-Witheford hastens to point out, is hardly alone in this view of class. To the consternation of classical Marxists everywhere, some on the left have followed parallel lines of reasoning to strikingly similar conclusions, notably Andre Gorz, whose *Farewell to the Proletariat* ruffled feathers in 1982 with the assertion that in a postindustrial economy, monolithic organized labor movements represent an anachronistic and ineffectual response to capital's dominance. Gorz's *Paths to Paradise* further asserts the suspiciously utopian-sounding possibility that, with an abundance of leisure time generated by automated production, people

might be free to pursue more meaningful and spiritually fulfilling (i.e. non-alienated) activities. In place of mass labor as a power base for revolution, Gorz proposes a general strategy of "noncompliance" with the demands of heteronomy, to be carried out by a "nonclass of nonworkers" technologically liberated from the wage relation and sustained by a guaranteed social income.

[7] Steve Wright (1996) describes the Italian autonomists' tactic of "self-reduction," in which utility customers would set their own rates and simply refuse to pay more than was fair for essential services like electricity. The practice of "political shopping" was a form of principled looting, with shoppers disregarding grocery stores' posted prices for food items and claiming them at self-determined prices as part of the social wage to which they were rightly entitled. Though neither Wright nor Dyer-Witheford makes the connection, a similar logic underlies more recent justifications for acts of hacking and copyright piracy, as well as artistic reappropriation of intellectual property under Free Culture principles.

[8] Dyer-Witheford acknowledges that automation has indeed largely replaced human labor – including, lately, much of the ostensibly more desirable "intellectual" and service-oriented work we were promised under the postindustrial economy. But this has not translated to an increase in leisure time, as previous generations of techno-optimists had supposed. Instead we have unemployment for many, while the rest compete for a dwindling number of ever more miserable jobs. This obviously untenable arrangement reflects capital's political need to artificially preserve the structure of the wage relation despite the fact that paid labor, even among postindustrial information-workers, is increasingly unnecessary. The answer is Guaranteed Annual Income (GAI), an idea proposed in various forms by both Gorz and the autonomists, which would acknowledge the hidden "social labor" performed daily by unwaged workers such as students and housewives, and provide everyone with income sufficient to subsist irrespective of participation in the labor market. GAI would be increased over time until it is higher than wage income, gradually moving society in the direction of the "liberation from work" advocated by Gorz. Gorz's proposal for social income, however, involves the performance of a certain number of hours of work on "socially necessary" projects (i.e. indispensable tasks that cannot be automated), in exchange for which the worker receives a guaranteed income and enjoys many more hours of leisure than she would in the present system (198). Over and against Gorz's model, which essentially makes the worker a salaried employee of the state, hired to do nothing in particular, and allows the wage relation between workers and private employers to continue in the economic periphery, Dyer-Witheford's neo-autonomist program for GAI makes a point of upholding "dignity in work" (i.e. as a non-alienated, non-commoditized human activity), emphasizing the need, ultimately, to make it unnecessary for workers to *sell* their labor at all. Instead – and here the distinction gets murkier – while the income itself might be "tied to some obligation to perform socially useful labor" such as child- or elder-care, "this would not be construed in terms of participation in traditional paid productive employment." Dyer-Witheford's program thus subverts the wage relation but still fosters "forms of social solidarity going beyond the cash nexus" (199).

In attacking Gorz for his willingness to write off the working class and accommodate what amounts to a conventional capitalist model of labor, Dyer-Witheford is on solid ideological ground and in good company among left theorists. But in proportion to the revolutionary scale of

the change that both proposals would seem to entail, the distinction is minute and – pardon the expression – labored. It seems self-evident that the implementation of either system would entail a radical revision of Western civilization on the order of economic Singularity, yet Dyer-Witheford cannot approach the subject without getting caught up in semantic disputes over finer points of doctrinal orthodoxy. Assuming the legislative bodies of industrialized nations could be persuaded to implement meaningful programs for guaranteed income in the first place, and given that any version of such a program necessarily obliges participants to fulfill certain social responsibilities through the performance of work, why should it matter how such obligations are "construed"?

[9] Especially in light of the increasingly sinister connotations Baudrillard will later attach to the idea of "simulation," the PCF's revolutionary affectations figure as, perhaps, not merely disingenuous, but downright malevolent.

CHAPTER IV
SYMBOLIC EXCHANGE, FREE CULTURE
AND THE POSTSINGULAR GENERAL ECONOMY

I will simply state, without waiting further, that the extension of economic growth itself requires the overturning of economic principles – the overturning of the ethics that grounds them. Changing from the perspectives of *restrictive* economy to those of *general* economy actually accomplishes a Copernican transformation: a reversal of thinking – and of ethics. If a part of wealth […] is doomed to destruction or at least to unproductive use without any possible profit, it is logical, even *inescapable,* to surrender commodities without return. Henceforth […] the possibility of pursuing growth is itself subordinated to giving [.]

Georges Bataille, *The Accursed Share*, Vol I

The only essential is this: *the gift must always move.*

Lewis Hyde, *The Gift: Imagination and the Erotic Life of Property*

"Maybe my economy is better than your economy."

Bruce Sterling, "Maneki Neko"

Baudrillard reloaded

In Larry and Andy Wachowski's cyberpunk epic *The Matrix*, a classic technological Singularity scenario has played out: intelligent machines, awakening to diabolical sentience, have conquered the world, subduing and exploiting the human population by porting their minds into an elaborate computer simulation that the humans have no way of knowing isn't real. Viewed as a narrative of Singularity, the film raises a haunting possibility: perhaps the Singularity has already happened and, far from opening human consciousness onto vast and exhilarating vistas of postbiological liberation and transcendence, its chief effect has been to *obscure* the fact of the new postsingular order through the simulated continuity of banal, pre-

singular existence. As far as the humans in the film know, nothing has changed, and – as long as the programming of the Matrix prefigures their perception and constrains their aspirations – it never will. To the extent that its makers self-consciously ground their narrative in a reading of *Simulacra and Simulations*, the movie offers not just a characteristically cyberpunk, but a distinctively Baudrillardian, take on Singularity.

In the period Douglas Kellner describes as that of the "almighty code" (47) we have arrived at the supremely pessimistic moment in Baudrillard. At this point, like the inmates of the Matrix, we are completely enveloped and dominated by code. Any possibility of a society of symbolic exchange – whatever that means – has been lost forever, if it ever existed to begin with. Perhaps not surprisingly, given his increasingly overt interest in computers and mass media, Baudrillard's influence on contemporary technoculture – especially SF – is most profoundly felt in his writings from this period. This influence has already been extensively treated in criticism on cyberpunk, the subgenre that established cyberspace and virtual reality as potent metaphors for humanity's domination both by high-tech corporate capitalism and by media-driven, consumerist codes of signification.[1] The theory of simulation in particular was the central object in cyberpunk's two-decades-long love affair with Baudrillard, an infatuation that culminated in one of the few documented cameo appearances by a work of critical theory in a mass-market feature film: as if the affinity were not already adequately signaled, the Wachowskis name-check Baudrillard by having their hacker protagonist stash contraband data diskettes in a cleverly hollowed-out volume of *Simulacra and Simulations*.

That Baudrillard himself roundly dismissed the *Matrix* trilogy as a misreading of his work ("Matrix Decoded") does not rebut the centrality of Baudrillardian ideas about simulation and the hyperreal, however construed, to the cyberpunk tendency that the films typify. Indeed,

Baudrillard's objection is not to the presentation of subjects as cognitively enslaved by "code," but rather to the premise of resistance through voluntary disengagement from it: the human characters in the film can only liberate themselves by recourse to an external "real" that Baudrillard says simply doesn't exist. Worse, the movie's exaltation of spectacular computer-generated effects, and its status as a high-value media object marketed for fetishistic consumption by a global audience, only underscore Baudrillard's point: while its plot may naively posit the existence of an exterior and primordial reality, both the text and its audience are still entirely within, and of, the code. If anything, the film's bleak exhortation to unplug from media culture and confront the "desert of the real" in all its postapocalyptic desolation strikes Baudrillard as embarrassingly, foolishly upbeat.

In seeking to identify a theoretical basis for the spirit of qualified optimism that animates postcyberpunk narratives of postsingular economics, it may seem perverse to cite a thinker who, at the end of his career, found cyberpunk *noir* altogether too cheerful. But in doing so, this chapter deploys an alternative reading of Baudrillard vis-à-vis technoculture, which speaks to a larger revisitation of poststructuralist and postmodernist thought being undertaken by critics like Julian Pefanis. Whereas Kellner's treatment of Baudrillard is mildly contentious in that he feels Baudrillard has been less than fair to Marx, Pefanis comes from a somewhat more sympathetic place; his book on Bataille, Baudrillard and Lyotard is explicitly positioned as a defense against the charges of nihilism, cynicism, and hipsterly complacency that are regularly lobbed at the edifice of postmodern academic theory. By way of answering this familiar line of attack, Pefanis turns to the conclusion of Fredric Jameson's famous essay on postmodernism, in which Jameson – no pomo cheerleader himself – raises the possibility that perhaps postmodern culture can describe ways of contesting the oppressive "logic of late capital" even as it replicates and

seemingly reinforces it. Though Jameson has significant misgivings about postmodernism as a theoretical project, Pefanis commends him for "refus[ing] to impose a closure on the discussion of the postmodern," as others have done, "by leaving open the question of its resistance to the logic of consumer capitalism"; Pefanis therefore devotes his energies to developing the "theoretical space" that Jameson has graciously left open (7).

In the same spirit, I wish to begin by asserting the possibility that Baudrillard, perhaps despite himself, has helped to open a space wherein others may conceivably meet with greater success in imagining progressive and humanistic alternatives to rationalist political economy – ideally, alternatives that remain faithful to the celebration of sublime potentiality and transformativity that characterizes Singularity discourse, while at the same time mindful of its many blind spots and ideological seductions. The appeal of later Baudrillard for SF scholars is self-evident, particularly with respect to his ideas about simulation as they inform narratives of the virtual – a territory that has already been extensively mapped. In attempting to locate potential sites for a more expansive reading of Baudrillard through SF (and vice-versa), I would like to shift the emphasis to the earlier, more open-ended and less determinedly pessimistic Baudrillard of the *Mirror of Production* period. In doing so, I hope to highlight some potential alternatives to the zero-sum logic of political economy that are being explored in contemporary technoculture and SF, avenues that may have been closed off prematurely by Baudrillard during his long slide into totalizing fatalism. Do the contemporary discourses of trans- and posthumanism face the same impossible choice between a naïve and self-defeating ideological fantasy of Singularity on the one hand, and an acceptance of abject powerlessness before the code on the other?

Baudrillard's earliest conception of symbolic exchange, while perhaps limited by a want of specificity and consistency, at least hypothesizes the possibility of opposition, and of a social relation that exists outside the productivist logic of political economy. More to the point, taken alongside Bataille's discussion of general economy and the gift, it establishes a conceptual framework within which the emerging alternative economies, counter-economies and anti-economies of the Internet– and especially their exploration in, and development through, SF – may be better understood. Where political economy insists on production as the foundational ontology structuring all social relations, reducing nature and culture to mere commodities and forcing historical subjects into binary boxes (producer/consumer, labor/capital, buyer/seller, winner/loser), in the alternative models developed by Bataille and the early Baudrillard it is instead the endless circulation of symbolic gestures and energies that constitutes life at its most elemental level. In these models, all other activities, including those we might otherwise understand as the "production" and "consumption" of goods, are wholly subservient to, or occur as byproducts of, symbolic exchange – meaningful only insofar as they refresh and perpetuate the ongoing exchange. Political economy runs on rigid hierarchies and power differentials, and cannot function without a narrow and aggressively policed concept of property (if not private, then collective or state-owned); societies of symbolic exchange, on the other hand, are capable of accommodating property in a fluid form but strictly prohibit hoarding, according social status on the basis of wealth shared rather than wealth accumulated.

Between these two models, the latter comes far closer to describing the logic of what Lawrence Lessig has influentially dubbed "Free Culture": a movement toward openness and collaboration in the use of intellectual property, encompassing such recent Internet-based initiatives as Creative Commons and Wikimedia, "open-source" and "free-software" projects in

computer programming, and – in a larger sense – the trend toward techniques of sampling, remix, mashup, and end-user adaptation that has come to characterize contemporary art and popular culture. In addition to being linked directly with the prospect of economic Singularity in postcyberpunk SF, these technocultural movements share a common view that the intellectual and cultural vitality of a society consists in the degree to which it encourages the promiscuous and continual circulation and recombination of ideas, information, and images, over and against the imperative presumption of economic utility. With their emphasis on ethics of reciprocity, collaboration, and creative exuberance over property and power, such projects are conceived in the spirit of – if not directly scripted by – the theories of general economy and symbolic exchange.

The postcyberpunk gift: network economies of reciprocity

To the extent that the postcyberpunk subgenre is conceptually and politically linked with nonfictional Free Culture movements, contemporary SF increasingly reflects an interest in social and economic questions, and particularly in the idea that intelligent machines and ubiquitous data networks might provide both the means and the model for a posthumanist exchange-economy. Bruce Sterling's 1998 short story "Maneki Neko" is a relatively early indicator of this impulse: set in an early-21st century Tokyo on the verge of economic Singularity, it is a light utopian farce about a network-mediated gift economy orchestrated by mysterious – though apparently benevolent – machine intelligences. The protagonist, Tsuyoshi Shimizu, is a video technician who enjoys a first-rate professional reputation and plenty of satisfying work, but has no job and earns no money. Boxes of deteriorating videotapes – mostly other people's old home movies – arrive anonymously in the mail; Tsuyoshi converts them to digital format, cleans them up, and

sends them back much improved. When he runs across particularly interesting or historically relevant bits of footage, he uploads them to vast, wiki-like nonprofit databases maintained by data-hungry "net machines" which, while they never pay cash, "were very polite, and had excellent net etiquette. They returned a favor for a favor, and since they were machines with excellent, enormous memories, they never forgot a good deed" (4).

Good deeds and favors – exchanged between humans and machines, or among humans with machine assistance – are the currency of a far-reaching but mostly invisible alternative economy that runs parallel to the cash economy in the story. While Tsuyoshi is not directly compensated for the video-encoding work he performs for strangers, the mail also brings gifts of food, clothing and other useful things, from other strangers – things he has not sought or asked for, but which come in uncannily handy at the moment they arrive. The net, and the friendly AI's who inhabit it, are the mechanism behind this serendipitous arrangement: throughout the day, participants in the gift economy receive phone calls directing them to carry out various small, and often primarily symbolic, acts of good-samaritanism.

While buying coffee, for example, Tsuyoshi is instructed to get an extra cup to go, a double iced mocha cappuccino; outside the shop he finds a forlorn and hung-over junior executive who has been sleeping on a park bench and just happens to need an ice-cold mochaccino more than anything in the world at that moment. The man is pleased but bewildered by Tsuyoshi's gift, seemingly unable to comprehend the gesture absent an economic context of buying and selling. Tsuyoshi just shrugs: "It doesn't matter. Sometimes a man really needs a coffee. Now you have a coffee. That's all" (5). Here the primordial social relation, which in Baudrillard's argument is repressed in political economy, is re-asserted by cybernetic means. The meaning of the transaction has nothing to do with the commodity value of a cup of coffee, or

with the relative socioeconomic status of the two men (who have never met before and will never meet again), or even with the supposed material "need" of the businessman for a caffeinated beverage. It is, more than anything, a symbolic gesture affirming a relationship between otherwise unaffiliated individuals within a larger social arrangement; Tsuyoshi performs it neither with the expectation of compensation nor out of self-aggrandizing altruistic magnanimity, but because he recognizes his place within a circuit of open-ended reciprocity upon which he and his family also depend. Or rather, more simply put, because "everyone likes gifts" (16).

Reinforcing the socially symbolic sense of the gift in Sterling's story is the fact that often the thing exchanged is itself a symbol: specifically, a figurine of the iconic Japanese "beckoning cat"[2] that gives the story its title. Participants in the gift economy recognize one another by imitating the cat's upraised paw, and signify their participation with the exchange of cat-themed gifts (Tsuyoshi's wife has a whole collection of Maneki Neko merch, from knickknacks to underwear). The exchange of symbolic objects is not always a positive affirmation of community, however – it can also be an in-kind response to external threats. The main plot line of the story involves Tsuyoshi being sent on an errand to deliver a Maneki Neko statue to a guest at a downtown hotel. The unwilling recipient turns out to be Louise Hashimoto, an American prosecutor who has come to Tokyo in pursuit of "segmented, polycephalous, integrated influence networks" (15), and forcibly detains Tsuyoshi as an "information criminal." From her vantage point as a U.S. government employee and an officer of the court, the Maneki Neko gift economy amounts to a global criminal conspiracy of tax evasion, black marketeering and influence peddling through "corrupt off-the-books transactions" (15). Ever since she began investigating the network, Louise tells Tsuyoshi, she has been harassed by feline imagery: her car radio

meows, kitty pictures bombard her email inbox, and everywhere she goes Maneki Neko figures seem to pop up.

Tsuyoshi – who has up to this point in the story maintained his cool and his habitual politeness despite being manacled, insulted, and threatened – is horrified to learn what Louise has done to deserve this treatment: upon arresting a "software pirate" some months back, she had shut down the man's office and confiscated his computers. "'You *broke* part of the network?' Tsuyoshi said, scandalized. 'You took someone's machines away? That's terrible! How could you do such an inhuman thing?'" (14) The cardinal value of Tsuyoshi's society has been violated: the circuit of the network has been broken, the flow of exchange disrupted. No wonder the network has targeted her as a threat.

The dramatic conflict of the story is thus revealed as a clash of values between two systems: one of political economy, heavily invested in 19th- and 20th-century Western ideas about production, commodity value and state power; and one of symbolic exchange, predicated upon weird new economic and social partnerships between humans and intelligent machines, but also rooted in a Japanese cultural tradition that holds gift-giving and social ritual absolutely essential to both economic and social life, and moreover does not distinguish as rigidly between these two categories. Tsuyoshi sees his video work not as alienated labor to be sold on the market, but as an extension of himself as a social being; the little favors he performs daily are no different – when he is in a position to help someone out, he does, trusting that others will do the same for him if and when he needs it. For Louise, on the other hand, any kind of economic activity that takes place outside of a quantified, monetized, and minutely documented market context constitutes a *threat* to society, encompassing the state as well as the free market: "What about all those *free goods and services* you're getting all the time? …Ha! Do you ever pay *taxes* on those?

Do you ever *declare* that income and those benefits? … your network gift economy is undermining the lawful, government-approved, regulated economy!" (15).

Sterling exploits the contrast between Louise's over-the-top confrontational style and Tsuyhoshi's impeccable Japanese manners to comic effect, perhaps for the benefit of the Japanese readership that was his primary audience when the story first appeared in *Hayakawa's SF Magazine*. But the hostility and paranoia in his sketch of the Ugly American are also part of a larger contrast (which happens to map out conveniently on an East-West dichotomy) that Sterling is drawing between the social and psychological fruits of the "network gift economy" and those of high-tech, Western-style, corporate political economy – especially with respect to the relationships between people and machines in each context. The theme is established in the story's opening scene in a conversation between Tsuyoshi and his drunken older brother, a neurotic middle-aged *sarariman* nursing an ulcer and obsessively miserable in his job at a large, Western-style import-export firm. Dogged by business calls and emails, and oppressed by relentless "market pressures," the brother is desperate for an escape, but the only alternative he can imagine is one of total luddite retreat, to a remote Buddhist monastery with no electricity, where "nothing ever happens" (2). When Tsuyoshi counsels him instead to take some time off and travel, the brother complains that he "can't just wander away from everything that I know, and trust to the kindness of strangers" (the easygoing Tsuyoshi says "that always works for me" and suggests his brother give it a try) (2). The brother is socially isolated because of his work and the stress that comes with it, complaining that he "can't find the right girl" and that "women don't understand" him. Tsuyoshi, meanwhile, is happily married – having been introduced to his future bride by the network, which saw that the two strangers shared a mutual interest and urged Tsuyoshi to strike up a conversation.

Unlike his Westernized brother, and unlike the American-born Louise Hashimoto, Tsuyoshi is well adjusted, even-tempered, and generally enjoys his life. The difference, to Tsuyhoshi's mind, is entirely attributable to his embrace of the network as a humanistic social technology, rather than a strictly utilitarian business tool. "I really believe," he says, "that computers help human beings to relate in a much more human way" (9). Later, when Tsuyoshi reluctantly debates Louise on the relative merits of gift- and market economies, this psychosocial dimension is at the core of his (and Sterling's) argument. When Louise objects that Maneki Neko is destroying the "lawful, government-approved, regulated economy," he makes a political argument based not on utility, but on an appeal to simple humanity:

> "Well," Tsuyoshi said gently, "maybe my economy is better than your economy."
> "Says who?" she scoffed. "Why would anyone think that?"
> "It's better because we're *happier* than you are… What kind of society has no gifts? It's barbaric to have no regard for common human feelings." (16)

While Sterling could certainly be accused of a didactic oversimplification and caricaturization in his staging of this debate, the discussion between Tsuyoshi and Louise also displays his familiarity with an important cultural dynamic that informs the piece and, by extension, the larger questions of cyborg politics and posthumanist political economics. Sterling's American character is almost pathologically suspicious and fearful of what the network represents, which appears to her as an acephalic monster doing the bidding of shadowy and malevolent forces: "I'm up against something that is very very big, and very very patient. And it knows all about me. And it's got a million arms and legs. And all those arms and legs are people" (17). This is not a wholly inaccurate perception; by the end of the story a teeming mob, summoned by the network, has converged on the hotel to rescue Tsuyoshi from his captors. However, to members of the Maneki Neko tribe, there is nothing sinister about either the

massively collective arrangement of human affairs or the fact that it is administered by

seemingly omniscient AIs – the relationship is self-evidently positive and symbiotic, and the

machines are, after all, "very polite." The cultural discrepancy in attitudes toward human-

machine relations in Sterling's story bears comparison to what many scholars have already noted

about the depiction of robots in American and Japanese SF traditions: where Western robots

have an unfortunate tendency to go berserk and kill their human masters, their Japanese

counterparts are more likely to play the role of hero than villain.[3] While Sterling pays subtle

tribute to the classic paranoid stance of American SF and technocultural discourse, perhaps

betraying some residual anxiety over the wisdom of trusting computers to run our lives as

unquestioningly as Tsuyoshi does, his primary impulse is a vindication of the simultaneously

technophilic and humanistic Japanese attitude, which seems to offer the most latitude for a

radical reorganization of economics as a progressive transhumanist and Singularitarian project.

     We are deeper into transhumanist territory with Cory Doctorow's 2003 novel *Down and

Out in the Magic Kingdom*, which takes place well on the other side of a technological and

political-economic Singularity. Where "Maneki Neko" implicitly concedes the necessity of

production – if not as a fundamentally deterministic social relation then as an indispensable

physical act of making (food still needs to be grown, and somebody somewhere has to

manufacture porcelain cats) – *Down and Out* begins with a radical post-scarcity premise. In the

"Bitchun Society" of the 22nd century, nanofabrication has done for industrial and agricultural

production what word processors and desktop printers did for publishing: material needs can

now be met with the push of a button. Meanwhile, cloning and Moraveccian mind-uploading

have obsoletized medicine: corporeal death is analogous to a hardware crash, and consciousness

can always be restored from a backup copy and downloaded to a fresh body. The economic

consequences of these two technological revolutions could not be more extreme. Not only is the value of material objects no longer meaningful in terms of scarcity, neither is the value of labor, since the lifespan of the worker is no longer limited; "power" in the sense of physical coercion is similarly pointless. With "the death of scarcity" and "the death of death," a radical new challenge emerges: "the struggle to rejig an economy that had grown up on nothing but scarcity and death" (96). In trying to imagine a society thus rejigged, Doctorow formulates a system modeled after the reputation systems that govern peer-to-peer file sharing networks and other online communities – a system that is flatly incompatible with the logic of classical economic rationalism, but begins to make sense when approached as an exchange economy in the tradition of Bataille and Baudrillard.

Doctorow's conceptual vehicle for this experiment is the gift economy of "Whuffie": a currency based on reputation and esteem rather than abstracted exchange value. Creativity and socially useful work, while no longer strictly necessary in the same way they were in a pre-Singularity context of scarcity, are incentivized by the prospect of earning Whuffie points that increase an individual's social status, political influence, and access to various perks and luxuries. Bad behavior is likewise punished with negative Whuffie, such that social disapproval translates to poverty. In a post-scarcity context, of course, "poverty" is essentially stripped of its physical hardships; "compared to 99.99999 percent of all the people who'd ever lived," the Bitchun poor live "a life of unparalleled luxury" (156). The stigma of poverty still attends, however, and Whuffie provides an instantaneous index of social status: because virtually everyone alive is networked via brain implants, a given individual's score is continuously visible to everyone else, and social interactions proceed according to the relative status of the parties involved. In this way,

Whuffie recaptured the true essence of money: in the old days, if you were broke but respected, you wouldn't starve; contrariwise if you were rich and hated, no sum could buy you security and peace. By measuring the thing that money really represented – your personal capital with your friends and neighbors – you more accurately gauged your success. (14)

Unlike cash, however, Whuffie is neither saved nor spent, any more than material goods in a post-scarcity economy are produced or consumed. It is not necessary to *have* Whuffie in order to *give* it, and awarding Whuffie to someone else does not affect one's own score; the allocation of points is carried out automatically, independently of any individually volitional act, by software that gauges people's subjective opinions of their acquaintances and doles out rewards and penalties accordingly, in real time. In an additional layer of sophistication, the system calculates weighted values that account for the source: "right-handed" Whuffie corresponding to people I like and tend to agree with counts for more than "left-handed" Whuffie given by those I hold in lower regard.

In fact, as this sketch demonstrates, Whuffie's deepest conceptual roots are not in the notion of money at all, but in the reputation systems that have evolved relatively recently in Internet-based communities. In their most basic form, reputation systems provide users – who are unlikely to be personally acquainted – with a means of knowing whom to trust, as in the feedback-based ratings associated with individual vendors in eBay and Amazon marketplaces. Similar logics inform the "trusted user" status accorded to well-reputed posters on community blogs and discussion forums (v. Slashdot, Daily Kos), as well as recommendation and ranking methods employed by websites that rely on user-generated content, (v. YouTube, Flickr). Apart from fostering a needed level of trust among nodes, in the context of peer-to-peer (P2P) networking reputation can also be the basis for decisions of resource allocation. P2P file-sharing networks such as BitTorrent are engineered in such a way that those users who share their files

and bandwidth most generously are rewarded with faster downloads, while "leeches" (those who regularly siphon off more content than they share) are gradually shut out of the network. P2P network architecture is, in fact, the overt model for the entire Bitchun Society, which relies on temporary and "ad-hoc" connections between egalitarian "peers," as opposed to the top-heavy institutional hierarchies inherent in the older server-client networking model. It is difficult to imagine a more idiomatically appropriate arrangement for a democratically organized society of cyborgs and upload-minds. To the extent that the posthumans who populate the novel are literally or metaphorically figured *as computers* – i.e., as thinking-agents instantiated at the intersection of hardware and software – it only makes sense that their social and political systems should be patterned after the structure of computer networks.

While Doctorow's immediate source material for this premise is found in the technical field of network design, the Whuffie system also bears a significant conceptual debt to, and resonates strongly with, theories of the gift economy. By positing reputation as a technologically quantifiable and instantly transparent function of social generosity, Doctorow's premise establishes a kind of global, technologically mediated *potlatch*, in which rank is accrued not through the accumulation of wealth but through acts of ritualized selflessness. Most people in the Bitchun Society pursue esteem through membership in one of the small tribal groups ("ad-hocs") working collectively on socially desirable projects that interest them – a particular software application or research study, the operation of a restaurant or university department, etc. – with each project's social value judged as a function of the Whuffie accorded to its members for their efforts.

Those richest in reputation are those most willing to forego the lifestyle of leisure and comfort that is their birthright as members of the Bitchun Society, in order to make some

contribution to the greater good. One such character is Keep-a-Movin' Dan, whose very name evokes Lewis Hyde's famous summation of the "essential" quality of gift ecnomies: that "the gift must always move" (4). Dan racks up an astronomical Whuffie score working as a "missionary" – one who ventures into the few remaining enclaves on the planet where Bitchun values and technologies have yet to penetrate, in order to win converts. Another, Debra, has built a fortune largely on the strength of being martyred many times over in the process of building Bitchun institutions in hostile regions of the world. People like Dan and Debra achieve rank by making extravagant and very public gifts of *themselves*: their time and energy, and sometimes life and limb. Though the social benefits they accrue are real, the novel leaves open the question of the real meaning of these sacrifices, given that everyone's time is unlimited, while death and other physical injuries are temporary and completely reversible. Doctorow has thus formulated the latent paradox of the post-scarcity thesis: In a society where people have everything they need, what motivates people to work, individually and collectively, toward becoming? and its corollary: How are such efforts valued when in strictly rational economic terms they "cost" nothing?

It is on this point that Bataille's analysis of primitive potlatch bears mentioning. In *The Accursed Share*, Bataille questions prevalent anthropological assumptions, in the line of thought established by Marcel Mauss, about the function of the gift – theories in which gift exchange is fundamentally reducible to a utilitarian, Western mode of economic behavior. Mauss writes of "prestations which are in theory voluntary, disinterested and spontaneous, but are in fact obligatory and interested." While such gestures may take the apparent "form" of "the gift generously offered[,] …the accompanying behavior is formal pretence and social deception, while the transaction itself is based on obligation and economic self-interest" (1). For Mauss gift-

giving is, essentially and by definition, cynical – a calculated play for wealth and power only disguised as altruism.

But what Mauss has in mind when he talks about "economic" interests is still within the narrow scope of what Bataille qualifies as "restricted economy." This is a kind of rationalist false consciousness, analogous in its pejorative connotation to Baudrillard's usage of "political economy," that "generalizes the isolated situation" (23) of economic exchange and its internal logic of immediate acquisitive self-interest, extrapolating its entire cosmology from there. For Bataille, the epistemological straitjacket of restricted economy precludes perception of the larger, dissipative logic of general economy, naively supposing that the whole universe runs on "operations carried out with a view to a limited end, that of economic man" (23). While Bataille concedes that the outward form of the gift does conceal a kind of self-interest, it is something far more subtle and elusive than the overt and deliberately "deceptive" power-grab Mauss describes. If we grant Bataille's central claim "that it is necessary to dissipate a substantial portion of energy produced, sending it up in smoke" (22), and affirm that the universe demands ultimately not "the acquisition [but] the dissipation of useful wealth" (68), the practice of potlatch may be understood as a negotiation between individualistic human reason and the counter-rational imperatives of the general economy:

> We need on the one hand to go beyond the narrow limits within which we ordinarily remain, and on the other hand somehow bring our going-beyond back within our limits…
> Gift-giving has the virtue of a surpassing of the subject who gives, but in exchange for the object given, the subject appropriates the surpassing: He regards his virtue, that which he had the capacity for, as an asset, as a *power* that he now possesses. He enriches himself with a contempt for riches, and what he proves to be miserly of is in fact his generosity. (69)

While in one ironic sense the giver has "gained" something from the act of giving – a kind of social capital – the nature of this acquisition is purely symbolic: "the benefit in no way

corresponds to the desire for gain. On the contrary, receiving prompts one – and obliges one – to give more, for it is necessary to remove the resulting obligation" (70-1), hence the all-important cycle of exchange continues. Even if the individualist human impulse behind the act of gift-giving *is* intrinsically acquisitive, from the standpoint of general economy this is not important: like sacrifice, it effectively "withdraws wealth from productive consumption" (76), thereby simultaneously achieving the needed dissipation of energy and upholding the symbolic social principle. However, Bataille goes on to stipulate, in order to accomplish the latter, the gift must be made publicly; the giver only attains the "power of giving" if the act is witnessed and duly acknowledged by the community. Whuffie, therefore, works not just by technologically instantiating the paradoxical logic of acquisitive selflessness, but by making it transparent and public.

In a science fictional modality (through the transhumanist *novum* of post-scarcity and post-mortality), *Down and Out* essentially affirms Bataille's cosmological principle of solar abundance, supposing that the "ultimate problem" (68) faced by both human and posthuman society is not the material production of its existence, but rather how to situate itself within the flow of energies that constitute general economy, in a way that permits it – in Baudrillard's terms – to "reproduce itself symbolically" (*Mirror* 145). Like Bataille's gift-giving subject, Doctorow's characters are instruments of "an action in two contrary directions" (69), behaving in ways that proceed from an impulse to (and indeed often resemble) the rationalist subjectivity of acquisitive self-interest, but serving no useful purpose whatsoever, since utility itself is an obsolete, presingular concept. The main narrative thrust of the novel is in one way an ironic celebration of this absurdity: the protagonist, who lives and works in a post-corporate Walt Disney World run by competing ad-hoc committees, is embroiled in a bitter managerial dispute

over a proposed overhaul of the "Haunted Mansion" ride. Despite the intentional and self-evident frivolity of its central conflict, whose outcome can scarcely have any meaningful resonance in the grand, transcendent terms under which humanist narrative typically advances (life or death, feast or famine, love consummated or lost), in its best moments the novel transcends its own intentionally farcical premise and engages the reader's sympathies such that the future of the Haunted Mansion *feels* important in a way in which it cannot authentically *be* – or, at least, not by the reckoning of ordinary humans, from our vantage point here on the near side of the Singularity. Along with the characters, Doctorow's readers are invited both to "go beyond" and "somehow bring our going-beyond back within our limits." Bataille's is, in fact, not a bad description of the postcyberpunk approach to writing the Singularity in general.

Despite all of this Disneyesque optimism, however, it would be a mistake to read the Bitchun Society as an uncomplicated posthumanist utopia. The tyranny of the majority remains an obvious problem, and "ad-hocracy" is susceptible to the pernicious influence of groupthink, with a systemic intolerance for dissenters and outliers. The primal human propensity for pecking orders, cliques, and pariahs seems to have survived the class system and its material basis; while poverty itself is radically redefined, the novel's title and plot events seem to affirm that, in one form or another, the poor will always be with us. Speaking directly to the extant transhumanist debate over mind and embodiment, moreover, the novel at times aggressively questions the extropian doctrine of pattern identity. Within its first fifty pages the first-person protagonist, Julius, is murdered – an unpleasant experience, and a crime even by Bitchun morés, but hardly a catastrophe, since he can be restored from a recent backup, with no firsthand memory of the trauma. Underlying the plot trajectory surrounding Julius' resurrection is a subtle but profound, and ultimately unresolved, anxiety over the continuity of his identity. While the Bitchun Society

at large has long since gotten used to the idea, Keep-a-Movin' Dan (raised in the pre-singular

era) still harbors existential doubts. "All I'm saying," he points out to Julius after his reboot, "is,

there's a difference between *you* and an exact copy of you, isn't there?" (41) The less

philosophically inclined Julius is uninterested in this riddle, easily accepting the patternist

premise – "I feel like me and no one else is making that claim. Who cares if I've been restored

from a backup?" (41) – but its implications ominously pursue him throughout the story. Before

the murder, he is happy in his relationships and his career, but afterwards he grows obsessive and

paranoid, becoming estranged from his friends and colleagues, losing his Whuffie as a result;

both literally and figuratively, he is "not himself." Still more troubling implications are raised

when Debra is revealed as Julius's murderer, in a demented plot twist worthy of Philip K. Dick:

to maintain plausible deniability of the crime, Debra surreptitiously kills herself, her

consciousness restored from a backup made *before* the murder. Nobody, including the

resurrected Debra, can know for certain that she is the killer, or that she has herself been restored

with the incriminating memory conveniently omitted. We learn, furthermore, that Debra may

have carried out the same plot any number of times in the past, evidently at the cost of her

humanity – such as it is.

**Cracking the code: Free Culture and the end of
property**

Ultimately, it is not the mind-body quandary that *Down and Out in the Magic Kingdom*

most persistently problematizes, but the utopian and eschatological mythologies of the post-

scarcity Singularity itself. The text is haunted by an ironic longing for finality and transcendence

in individual as well as historical terms, an itch that cannot be scratched by simple virtue of the

fact that the Singularity has already happened. A number of characters, especially those of the

older generation that grew up in the pre-Bitchun era, have become profoundly bored with their immortality – one can only earn so many degrees and compose so many symphonies, after all, before the endless quest for Whuffie begins to lose its zest. Their options are limited to suicide and "deadheading," a period of suspended animation that amounts to a deferred suicide. Correspondingly, the Bitchun Society itself is stagnating, with no new challenges and nowhere left to go, except – literally – Disneyland. The younger generation, born post-Singularity, display a cheerful vacuity and directionlessness that their transhuman-pioneer parents find off-putting, but which Julius points out is only natural: "I mean, you can't be a revolutionary after the revolution, can you?" (78)

With this thought, Doctorow acknowledges the stubborn paradox at the core of the notion of Singularity, the same turn toward self-defeating reflexivity that gradually transformed Baudrillard's Marxian revolutionary impulse into its antithetical mirror-image in the ironic "revolution" of the political economy of the sign: a transcendent historical threshold of change so absolute that it precludes henceforth the very *possibility* of change. The chief theoretical vehicle for this vision of a supremely pessimistic Singularity, which Baudrillard sees as already essentially complete, is the "code" – another slippery and much contested term, whose ambiguity lends it to revision and repurposing in the present context as a metaphor of techno-legalistic domination and alienation. It bears repeating that this concept developed in Baudrillard's writing more or less concurrently with that of symbolic exchange, and in some ways they function as complementary devices. In theorizing the political economy of the sign, Baudrillard described a system in which signs have taken the place of commodities, the economic exchange of which signifies not a relationship between people (as in symbolic exchange and its most basic expressions, the gift and counter-gift) but, in Pefanis's account, "a reified relationship between

people and the index of social status based on… [the] code" (72). Against the radical social

principle of symbolic exchange – which I argue is emphatically affirmed in the contemporary

Free Culture movement and its attendant discourses – Baudrillard opposes his conception of the

code as that which imposes a distorted and oppressive perception of social reality, a travesty of

the authentic social relationship that precludes relationships of symbolic exchange and isolates

people from one another. The corollary to my reading of Free Culture as a movement grounded

in symbolic exchange is, therefore, a parallel reading of "code" as its antagonistic counterpart in

technoculture discourse.

In his introduction to Richard Stallman's *Free Software, Free Society*, Lawrence Lessig

writes in Baudrillardian tones of "a world increasingly defined by 'code'" (11) – in this case, the

software driving the computers and networks that constitute the basic operating system of our

economy and, thence, our society:

> Whether inscribed in software or burned in hardware, it is the collection of instructions,
> first written in words, that directs the functionality of machines. These machines —
> computers — increasingly define and control our life. They determine how phones connect,
> and what runs on TV. They decide whether video can be streamed across a broadband link
> to a computer. They control what a computer reports back to its manufacturer. *These
> machines run us. Code runs these machines.* [emphasis added] (11)

Though Lessig refers here to machine language rather than cultural semiotics, his sense of

contemporary society's subordination to and encapsulation within "code" is nearly identical to

Baudrillard's. As if to underscore the analogy, Lessig then equivocates on the meaning of the

term in order to connect the idea of code with a larger system of abstract values and the

mechanisms of domination and control that serve it, a nexus that constitutes his primary area of

interest as a scholar: Coextensive with the sense of "code" as the internal logic of computers is

"code" in the legalistic sense, specifically the regime of copyright law and the increasingly

despotic efforts being made on its behalf to lock down and enforce the commodity status of intellectual property. Between internal controls hardwired at the level of proprietary software (e.g. DRM) and external coercion represented by overreactive legislation and litigation, human beings – especially artists and intellectuals – find themselves on the wrong end of a power differential that fundamentally restricts not just their individual freedom and creativity, but the fulfillment of the collective cultural potential of their society.

The high-tech 21st-century culture that Lessig's view exemplifies is one in which the primacy of "code" is given, a *fait acompli* woven into the texture of everyday life; we can no more step outside of it than a software application can run independently of its native operating system. But here, apparently on the point of Baudrillard's total pessimism, the analogy breaks down: where Baudrillard's code categorically precludes agency, Lessig goes on to entertain the possibility of re-asserting some version of human autonomy: "What control," he asks, "should we have over this code? What understanding? What freedom should there be to match the control it enables? What power?" (11). What is remarkable about this departure is not just its optimism, but the implication that, precisely by virtue of being *within* the code, it may be possible for transhuman subjects not to tear down or transcend the code, but to rewrite it from the inside-out. Hence, it is a figure like Stallman – a veteran of IBM and MIT as well as the early outlaw hacker scene – who has proposed a satisfying "answer to a world built in code" that addresses the term in both of the senses in which Lessig uses it. At the level of programming Stallman advocates "free software": "free" meaning not simply free-of-charge, but also transparent and open to modification by other users. More than the software itself, it is the mechanism guaranteeing this openness – the GNU Public License (GPL) and Stallman's legal concept of "copyleft" – that Lessig finds most ingenious, in that they address the broader cultural

problem posed by the hypermuscularization of copyright. Stallman's contribution is essentially a

software hack, but – to Lessig's lawyerly delight – one that translates readily and quite

effectively to the programming language of statutes and case law governing intellectual property:

> Using the power of copyright law, "free software" not only assures that it remains open, and subject to change, but that other software that takes and uses "free software" (and that technically counts as a "derivative work") must also itself be free. If you use and adapt a free software program, and then release that adapted version to the public, the released version must be as free as the version it was adapted from. It must, or the law of copyright will be violated. (12)

In a very real sense, GPL is an attempt to "hack" the legal code, an act with potentially

profound long-term ramifications. By publishing software under GPL, a developer introduces

into the ecology of the market what amounts to an exponentially self-replicating and evolving

anti-commodity – a chunk of code that, if well-written, will be copied and incorporated into

other software which must, under the binding legal terms of the license, also be made freely

available and open to further tinkering and re-appropriation, for as many generations as the life

cycle of viral reproduction and re-appropriation extends itself. Under the proprietary logic of

copyright, counter-intuitively, neither the original code nor its progeny can ever be

commoditized. Under the Darwinistic logic of the market, moreover, they will compete with

other software products, including those published under exclusive and for-profit license

agreements. If proponents of free software are correct in their core contention – if this openness

to collaborative improvement and innovation indeed makes for more innovative, more resilient,

and more responsively designed software – then eventually there will be no market left for

software that isn't "free." The principle of copyleft, carried to its logical extreme, thus provides a

plausible account of how the commodity form of intellectual property, at least in the software

industry, might over the long term be effectively abolished using the same tools that were forged to uphold it.

Of course, what makes the notion of public licensing more than just a clever hack is the clear implication that it need not be confined to the realm of software. This is the founding principle of Creative Commons, a nonprofit organization established by Lessig in 2001 with the goal of adapting Stallman's principle to a broad range of artistic, journalistic, and scholarly enterprises. The foundation publishes a suite of free licensing tools that content creators can use in addition to traditional copyright to make their works available to audiences outside the context of a market transaction, with the option of maintaining certain rights to the material (e.g. attribution), and a certain level of creative control over how it can be used (e.g. non-commercially, with or without derivatives, etc.) (*Free Culture* 282-6).

Charles Stross and Cory Doctorow, in addition to ardently advocating for the copyleft movement in fiction and in public life, both make a point of publishing under Creative Commons licenses. For Doctorow, whose entire corpus is downloadable *gratis* in a wide variety of formats from his website, applying the free software principle to publishing is not merely a symbolic statement, but a business strategy, aimed at building a readership and burnishing his own brand as a SF writer and technocultural pundit. The more widely his work is read, the more traffic he draws to his blog, the more he is in demand for speaking engagements, freelance writing gigs, and academic endowments – a career whose success Doctorow prefers to measure in reputation more than in book receipts, though both are ample. Through a strange and counter-intuitive alchemy of marketing, moreover, Doctorow maintains that giving his work away seems to actually *drive* sales of the ink-and-paper volume. He elaborates in a 2006 column for *Forbes*:

> Most people who download the book don't end up buying it, but they wouldn't have bought it in any event, so I haven't lost any sales, I've just won an audience. A tiny

minority of downloaders treat the free e-book as a substitute for the printed book – those are the lost sales. But a much larger minority treat the e-book as an enticement to buy the printed book. They're gained sales. As long as gained sales outnumber lost sales, I'm ahead of the game. After all, distributing nearly a million copies of my book has cost me nothing. ("Giving It Away")

"Indeed," Lessig confirms, "the experience of [Doctorow's] publisher clearly supports that conclusion. [*Down and Out*'s] first printing was exhausted months before the publisher had expected. The first novel of a science fiction author was a total success" (284). What's more, the surprising outcome of Doctorow's experiment suggests that a radical revision of the way "success" is understood may be in order. Making the case, in the pages of an august and relatively conservative business publication, for "giving it away" as a feasible and broadly applicable business model, Doctorow recalls Bataille's original insight: "that the extension of economic growth itself requires the overturning of economic principles – the overturning of the ethics that grounds them." Viewed from a standpoint of general economy, which the economic landscape of the Internet age increasingly resembles, "it is logical, even *inescapable*, to surrender commodities without return" (25).

In truth, Doctorow's relevance and originality as a SF writer arguably owe less to the intellectual content or artistic value of his fiction than to his persistently inventive and experimental approach to the business of writing and publishing – particularly as it engages debates over copyright and the commodification of ideas through the kinds of "cut and paste" techniques of composition that Lessig identifies as idiomatic of Free Culture (105). In addition to making his fiction freely downloadable in a variety of formats, Doctorow hews to an aggressively open-source ethic by encouraging readers ("end-users") to appropriate and remix his work in their own projects. This strategy has yielded DIY translations of his novels into foreign languages; adaptations into radio/podcast, stage, and comic book formats; and scores of

oddball software applications, including a randomizer script that arbitrarily changes the names of

characters in a Doctorow novel, which Doctorow hosts on his website and hails as "an absolutely

delightful idea!" (*craphound.com*). Such user-generated remixes, while not always entirely

successful in their own right, if nothing else redound to the benefit of Doctorow's brand through

broader exposure.

Figure 5: Data visualization of "Anda's Game"

Source: user "John" <u>Cory Doctorow's craphound.com</u>. 26 Nov. 2009. 18 Dec. 2009.
<http://craphound.com/overclocked/>.

This user-generated image, a graphical abstraction of the text from Doctorow's short story
"Anda's Game," is one of many new-media experiments Doctorow encourages readers to
perform on his fiction.

The remixing happens in both directions: most of Doctorow's original work, in fact, can

be read on some level as an intentionally provocative re-appropriation and profanation of the

sacred cows of intellectually-proprietary pop culture. His choice of Disney World as the setting

for *Down and Out in the Magic Kingdom*, for example, is a transparent poke at the corporation

that orchestrated the notorious Sonny Bono Copyright Extension Act (upheld in the landmark

2003 *Eldred v. Ashcroft* Supreme Court case argued, incidentally, by Lawrence Lessig) for the

express purpose of keeping Mickey Mouse out of the public domain. Elsewhere, Doctorow

published a series of short stories using titles, characters, and even loose plot outlines lifted

wholesale from beloved texts of the SF canon, and repurposed toward his own thematic and

rhetorical ends. The story "Anda's Game" is, among other things, a gently parodic re-imagining

of Orson Scott Card's *Ender's Game* – both narratives turn on the use of video games to exploit

the talents of children and conceal from them their own complicity in campaigns of violence

(military in Card's story, socioeconomic in Doctorow's). The provenance of the title for

Doctorow's "I, Rowboat" is playfully obvious; even more so the story he titles simply "I,

Robot," which is a sort of fictional mashup combining Asimov's robot stories with Orwell's

1984, in service of "an allegory about digital rights management technology" (*Overclocked* 101).

The inspiration for this particular project of literary pranksterism, Doctorow explains, originated

with Ray Bradbury's well-publicized chagrin over the title of the anti-Bush documentary

Fahrenheit 9/11, which alluded to the classic SF novel *Fahrenheit 451* in order to make a

political point with which the latter's author happened to disagree. For Doctorow, the

controversy over Michael Moore's reappropriation of Bradbury's title was "just too much irony

to bear," since "science fiction is a field that avidly repurposes titles," and anyway "titles have no

copyright" (58).

Stross, who himself has taken a turn at re-mixing stories by Orwell and H.P. Lovecraft,[4]

also engages in a bit of allusive titling with *Accelerando* – a term borrowed from Kim Stanley

Robinson's *Mars* trilogy (another work that explores alternative economic models including the

gift economy), where it refers to humanity's exponentially accelerating interplanetary diaspora.

This dynamic resonates with Stross's novel on several levels, in particular the sense of frantic

inexorability that attends the unfolding Singularity, which Stross figures in economic as much as

technological terms. Manfred Macx, *Accelerando*'s transhumanist techno-visionary hero, is

engaged in a far-reaching and subversive project of "hacking economics" (58) in order to

promote a transhumanist political agenda and thereby hasten the Singularity. Again, theories of

gift economy figure prominently in Manfred's practice of "agalmics" (78): from the Greek

agalma ("pleasing gift" [Levin]), the term originated within the free software community[5] as an

alternative to scarcity-based economics, focusing on the allocation of *non*-scarce goods (i.e.

ideas, information, creativity, collaboration – things of value that are not exhausted in

consumption, and whose value may in fact be enhanced by being shared and used). Under an

agalmic model, "you get ahead by giving… only the generous survive!" (7). As a pioneer in the

unlikely field of agalmic entrepreneurship,

> Manfred is at the peak of his profession, which is essentially coming up with whacky but
> workable ideas and giving them to people who will make fortunes with them. He does
> this for free, gratis. In return, he has virtual immunity from the tyranny of cash; money is
> a symptom of poverty, after all, and Manfred never has to pay for anything. (8)

The turbocharged mid-21st century equivalent of a futurist tech blogger, Manfred is

always-online via an array of cyborg acoutrements, continually trolling the net for inspiration

and outputting a steady stream of profitable, patentable ideas. But instead of raising venture

capital to develop his ideas himself, or simply selling the patents on the open market, he donates

them to the nonprofit "Free Intellect Foundation" (7) (successor, presumably to Stallman's Free

Software Foundation), a repository of ideas made freely available under public license:

"salvaged from the risk of tide-pool monopolization, set free to spawn like crazy in the sea of

memes" (25), and thereby primed to engender still weirder and more innovative ideas. While lavishly rewarded with in-kind gifts (airfare, meals, equipment, bandwidth) from those who profit from his innovations, Manfred is primarily motivated not by a desire for personal remuneration, nor even by the spirit of altruism; his stated objective is the continued acceleration of technological change that will launch the Singularity, and he tends to view the political-economics of scarcity as the main impediment to that development.

Manfred's ideological foil in the first part of the novel, and an important vehicle for Stross's extensive satire on the politics of intellectual property, is the hero's erstwhile dominatrix and on-again/off-again love interest, Pamela, who represents everything Manfred is against: profit, property, neo-luddism, and bureaucratized state power. As an enforcer for the IRS, she travels the world hunting down high-value tax evaders in a vain effort to prop up the bankrupt and faltering American nation-state. A "born-again postconservative" and "a member of the first generation to grow up after the end of the American century" (42), Pamela is impelled by a patriotic wish to help recover the U.S. government's fugitive tax base, and complementarily, by an obsessive sociobiological drive to conscript the unwilling Manfred into the role of breadwinner in some ill-defined, nostalgic simulacrum of "the traditional family thing" (19). She happens to share Uncle Sam's questionable view that – based on the wealth his patents have generated for others – Manfred is worth theoretical billions and therefore tax-liable for all of it, though of course he himself has no cash ("Money is a symptom of poverty, after all" (8)). She stalks him across Europe, trying to bring him back home, and back within the obsolete logic of what Manfred rejects as "a pre-singularity economic model that still thinks in terms of scarcity" (20). Their tumultuous courtship culminates in a bizarre female-on-male rape scene – referencing no small measure of multilayered transhumanist anxiety surrounding sex and intimacy, no doubt

– wherein Pamela contrives to impregnate herself and thereby entrap Manfred into wedlock. Incensed by his agalmic profligacy, she evens the score by pirating his genetic "source code" and effectively coercing him into a highly restrictive end-user license agreement. "It's all about property rights," she tells him afterwards – ownership of the information encoded in his bodily fluids, which U.S. law confers upon her by way of the sex act (33). The marriage, predictably, ends in a bitter divorce, followed by more exceedingly clever and weirdly eroticized legal wrangling.

Despite her singularly sinister bearing and reactionary motivations, though, Pamela and the despotic statist/corporatist mentality she represents are not unique in clinging to obsolescent "pre-singularity" economics. Manfred heaps nearly equal scorn upon twentieth-century throwbacks from the left, especially the resurgent Communists who have reclaimed power in Russia following the collapse of the post-Soviet oligarchies of the Putin era. Following Baudrillard, Manfred recognizes few distinctions between the Russian neocommunists and their "fucking capitalist spook" counterparts; "They're all zero-sum cannibals" and "fucking Cold War hangover losers" (6) whose thinking is stunted and utterly determined by a logic of "dollars and paranoia" (7). Official Marxist-Leninist political philosophy has stagnated and devolved into little more than bad programming, a script for poorly-coded and ineffectual weak-AIs "raised on Marxist dialectic and Austrian School economics" (7). The defenders of state communism are "so thoroughly hypnotized by the short-term victory of global capitalism that they can't surf the new paradigm, look to the longer term " (7) of postsingular economics.

The new paradigm, as Manfred sees it, is a cyborg construct: an amalgam of progressive-left social values and free-market methods, united under the telos of Singularity. Despite his contempt for the profit-motivated and power-mongering ends of neoliberal capitalism, Manfred

is well versed in its ways and means, especially when it comes to the machinations of corporate

law. In a diabolical exploit on the legal doctrine of corporate personhood, he has created a

menagerie of automated and self-replicating shell companies that exist only on paper (or rather,

in computer memory):

> Each of these companies – and there are currently more than sixteen thousand of them, although the herd is growing day by day – has three directors and is the director of three other companies. Each of them executes a script in a functional language Manfred invented: the directors tell the company what to do, and the instructions include orders to pass instructions on to their children. (55)

Manfred's private army of zombie corporations does his bidding while shielding him

cryptographically from liability, by sheer virtue of the complexity of the structure: in order to

locate and serve process on the embodied and legally liable human being at the bottom of the

pile, a prospective plaintiff would first have to expend an impracticable amount of computational

power tracing the thread of accountability through the network, and moreover would have to be

able to do so faster than Manfred's system can spawn new shell companies and weave further

layers of complexity. In itself this is hardly a new tactic; large corporations have always been

adept at leveraging overwhelming legal muscle and bureaucratic obfuscation to thwart or stall

litigative threats and regulatory checks. Stross's satiric supposition is that it would be possible in

a fully online culture for individuals to play the same dirty tricks by means of cleverly written

code rather than heavily staffed in-house legal departments. In reality, though, the system's

apparent function as a shelter against lawsuits only masks its primary, and more revolutionary

purpose, as a distributed virtual computer: below the surface level of ordinary corporate behavior

("such as filing of accounts and voting in new directors"), "the companies do other, more

obscure load-balancing computations" (55). The program they are covertly executing turns out to

be Manfred's masterwork of counter-code: "a way to bring about the creation of Really Existing

Communism by building a state central planning apparatus that interfaces perfectly with external

market systems and somehow manages to algorithmically outperform the Monte Carlo free-for-

all of market economics, solving the calculation problem" (58).

Of course, the pursuit of a workable Communist model is no merely ideological quest for

Manfred; the calculation problem is merely a challenging hack worthy of his formidable skills,

another means of fomenting the kind of techno-economic out-of-controlness the Singularity

requires – and perhaps, also, a way to raise some quick cash to pay off his divorce settlement.

Instead of taking it to the Russians (who after all have no serious interest in "Really Existing

Communism," obsessed as they are with old-style metapolitics and cloak-and-dagger games),

Manfred pitches his idea to the Italian economic minister, Gianni Vittoria. A Marxist academic

in the autonomist tradition, Gianni also speaks for the Italian Communist Party, which espouses a

more flexible and humanistic Marxism. To Manfred's surprise, the Italians are way ahead of

him: the idea of central planning strikes Gianni as a Stalinist relic, a technocratic solution to a

problem of resource allocation already well on the way to being obviated by extropian

technologies of abundance and indefinite life-extension. More to the point, Manfred's planning

algorithm, for all its cleverness, fails to account for the complexities of human social psychology

and assumes a fundamental rationality to economic behavior which is simply nonexistent.

"Human beings aren't rational," Gianni tells Manfred: "That was the big mistake of the Chicago

School economists, neoliberals to a man, and of my predecessors, too. If human behavior was

logical, there would be no gambling, hmm? The house always wins, after all" (62). At any rate,

the calculation problem has already been solved; for as long as computers have existed it has

been possible, at least in theory, to crunch the requisite numbers. Yet markets – despite the

inherent wastefulness of competition – persist. Why?

"Markets afford their participants the illusion of *free will*, my friend. You will find that human beings do not like being forced into doing something, even if it is their best interests…

"Your companies need no human beings, and this is a good thing, but they must not direct the activities of human beings, either. If they do, you have just enslaved people to an abstract machine, as dictators have throughout history." (63)

Leaving aside its benevolently autocratic bent, Manfred's central planning system is a century late, an answer to the wrong question: in a transhuman society, the imperatives of production and consumption can no longer determine the social relation in an absolute way. An authentic and relevant post-singularity Marxism – or Macxism, as it were – must therefore dispense with the outdated materialist terms that defined its predecessor and return to the fundamental problems of autonomy and social justice that animated Marx's historical analysis in the first place. Just because transhuman subjects are no longer totally subordinate to physical needs does not mean they are free from the threat of alienation, exploitation, and enslavement by political-economic "abstract machines" – an idea that figures much later in the novel, when we encounter the ruins of an alien civilization cannibalized by its own hyperevolved financial instruments.

Hence, the anti-economic prescription of Gianni's transhumanist Marxism: "Don't plan the economy; take things *out* of the economy. Do you pay for the air you breathe? Should uploaded minds – who will be the backbone of our economy, by and by – have to pay for processor cycles? No and no" (64). With this analogy likening the material needs of embodied subjects to the ostensibly immaterial but no less urgent needs of uploads, and the emphasis on their respective economic roles, Stross establishes a project to which the rest of the novel, and much of his SF *oeuvre*, will be devoted: the re-framing of debates around intellectual property in terms of human (and by extension transhuman and posthuman) rights. After all, the essential Marxian question is ultimately not over how a system of political economy may justly and

effectually allocate its resources (whether measured in bushels of rice or in FLOPS); it is, rather, the question of whether economic calculations should rightly play any role in such considerations at all.

Free hardware: nanotechnology and the means of production

Perhaps the most important conceptual prop for postcyberpunk's systematic conflation of digital rights with civil rights – that which opens up the post-scarcity premise in a way that is both novel and eerily plausible – is the cross-breeding of free-software principles and ethics with the technological *novum* of nanofabrication. The basic idea of a Clarke's Law device that could magically assemble material objects out of thin air is, of course, itself hardly a new one; the post-scarcity techno-utopia has been a staple trope of SF since the Golden Age. But the development of real-world nanotechnology late in the twentieth century lent some immediacy to the premise, providing a new theoretical basis for thinking about how such machines might actually function, and about what their socioeconomic and political impact might realistically be.

The first major attempt to develop a direct link between the nascent science of nanotech and on-demand manufacturing applications was also among the first SF novels to be hailed as properly "postcyberpunk." Neal Stephenson's *The Diamond Age* (1995) portrays a late-twenty-first century economically and geopolitically transformed by the "Feed": an infrastructural network that delivers streams of individually sorted molecules to ubiquitous public and private "matter compilers" (46) programmed to assemble the raw materials into useful objects. While such products are made available free of charge, the social effect of their availability is not revolutionary but profoundly conservative; the architecture of the Feed network intentionally mirrors, and in a very real sense undergirds, the hierarchical organization and the global

hegemony of the neo-Victorian civilization which controls it. Against this top-down Western model of systems engineering and social control, Stephenson opposes the subversive emergent technology of the "Seed" (457), a nanofabrication protocol that operates independently of any external grid, courting Singularity by extricating nanotech manufacturing from the grip of neo-Taylorist command-and-control systems. The novel ends on the threshold of sweeping and violent political change as the Seed is sown in the populous but technologically and economically impoverished "Celestial Kingdom" (78) of post-communist China, freeing the Chinese from their dependence on the foreign-controlled Feed and paving the way back to some postsingular version of superpower status. The conflict between Feed and Seed, as Stephenson stages it, ultimately has more to do with a cultural differential between Eastern and Western attitudes toward technology than with any particular economic argument. However, *The Diamond Age* also establishes a principle that will inform all subsequent postcyberpunk treatments of nanofabrication as an avenue to political-economic Singularity: the organic self-sufficiency and out-of-controlness implicit in the very idea of nanotech signals a radical discontinuity with rationalist and utilitarian economic imperatives, a tension that will be impossible to sustain indefinitely.

With the more recent infiltration of free-culture discourse into the broader technocultural consciousness, SF's interest in the conceptual power of nanofabrication has only intensified, and postcyberpunk writers are embracing nanotech in ways comparable to first-generation cyberpunk's investment in technologies of virtuality and simulation. Stross and Doctorow in particular have made the relatively short leap from free-software's revision of *intellectual* property to the potential for a nanotechnological program that might radically revise the notion of *physical* property along the same lines. Stross makes the case in a 2002 interview:

One can see the free software movement as a precusor for a "free hardware" or "free wetware" movement--one that will provide free libraries of designs for biological or nanotechnological products that replicators can be programmed to churn out. Just as I don't spend money on email clients or text editors when there are really good free ones available, why would I (for example) spend money on a sofa when there's a really good free template for one available on the web and I can grow it myself in my ACME Home Factory(TM)? Or even grow a GNU Free Factory in it, and stop paying ACME royalties? (Anders)

Steeped in the philosophical tradition of the free software movement and well-schooled in its legal and political entanglements, writers like Stross and Doctorow tend to treat nanofabrication not so much as an imaginary black-box plot device, but rather as a legitimate hard-SF premise: an entirely plausible desktop technology, already in real-world development, and indeed representing the next stage of P2P file sharing. An exploration of the sociopolitical ramifications of such an application consequently comprises a major – if not *the* major – strand in the postcyberpunk agenda. It is one thing, after all, to be able to download and burn a music CD. But 3D printers capable of fabricating everything from life-saving drugs to furniture, from freely downloadable design templates, could conceivably amount to a fullblown post-industrial revolution, a radical decentralized means-of-production that would almost inevitably entail seismic repercussions. Judging from the "great and hysterical spasm" (*Overclocked* 1) of lobbying and heavy-handed legal action that has characterized the recording industry's response to the relatively innocuous threat of downloadable music, Cory Doctorow reckons the backlash against free hardware would be draconian in the extreme.

Doctorow's short-short story "Printcrime" (another bit of sampled and remixed Orwell) sketches a near future in which small-time black marketeers use desktop 3D printers to make illegal copies of expensive pharmaceuticals and recreational drugs, electronics, and designer apparel for sale on the street. One such hardware pirate, the narrator's father, is beaten and

hauled off to prison by jackbooted Big Brother types enforcing corporate trademarks. As his

horrified daughter looks on, the man's illicit equipment is smashed and his home ransacked.

Upon his release years later, he asks his daughter where he might get his hands on a new 3D

printer. Astonished, she demands to know how, after ten years of incarceration, brutality, and

estrangement from his family, he can still entertain the notion of trading in tawdry consumer

contraband. He doesn't, he says: "I'm going to print more printers. Lots more printers. One for

everyone. That's worth going to jail for. That's worth anything" (4).

The notion that intellectual property battles focused on hardware might have political

stakes on a historically revolutionary scale is further developed in the novella "After the Siege,"

which Doctorow uses to comment on how the Western regime of copyright and patent law

affects developing nations – especially in Africa, where the lack of generic alternatives to

prohibitively expensive AIDS drugs takes a horrific toll in human lives. The story takes place in

an unnamed European country that overcomes a deadly plague only when its people depose their

ineffectual client-state government – which for years had negotiated unsuccessfully for fairer

prices on trademarked pharmaceuticals – and simply start printing their own knockoff versions

of the needed drugs. This direct-action tactic leads to the use of nanofabrication in a broader

movement for economic self-determination: "From there, it was only a matter of time until

everything was being made right there, copies of movies and copies of songs and copies of drugs

and copies of buildings and cars and you name it, and that was the revolution" (213).

Predictably, the legal owners of the patents for these products react badly to the loss of an entire

market, and what follows is eighty pages of graphic horror and human tragedy as the

multinational forces of economic exploitation lay brutal siege to the capital city, and the

idealistic optimism of the revolution gives way to the grim and fatalistic determination of siege

mentality. Though the siege itself eventually comes to an end, Doctorow's articulation of economic singularity is scarcely utopian – as ever, revolution carries a steep human cost, and its outcomes are ambivalent and often dubious.

The capability of a "hard take-off Singularity" (141) to inflict catastrophic trauma on an unwary populace is further detailed in Stross's *Singularity Sky* – a far-future restaging of the abrupt modernization that triggered the 1917 revolution in czarist Russia. The novel takes place primarily on a remote colony planet populated by humans who live in an artificially maintained state of technological backwardness, ignorance, and extreme poverty. "Rochard's World" is ruled by a harsh nineteenth-century style aristocracy that strictly proscribes private access to any machinery more advanced than horse-drawn buggies, or to any information other than state proclamations and the Bible. The regime is opposed by underground Marxist-extropians, who anticipate a technological Singularity that will explode the planet's political-economic order and deliver the people from authoritarian feudalism. But even the revolutionaries fail to anticipate the form the Singularity actually takes: the arrival in planetary orbit of an itinerant rabble of aliens and upload minds – the "Festival" – which practices an unfamiliar and radically destabilizing alternative economics. Announcing its presence with a "rain of telephones" that drop suddenly from the sky, the Festival opens trade negotiations by asking of any peasant who picks up a phone: "Will you entertain us?" (1).

The disembodied posthumans have hyperadvanced nanotech manufacturing, but – lacking materiality – only limited use for material goods. They want ideas and information instead: "Anything we don't already know: art, mathematics, comedy, literature, biography, religion, genes, designs" (5). Peasants willing to "entertain" the Festival with a bit of folklore or music are rewarded with freshly replicated food, medicine, and forbidden technology. When one

of the Festival phones falls into the hands of the Extropians' and Cyborgs' Soviet and its leader

Burya Rubenstein, the revolutionaries are keen to get their hands on a "cornucopia machine" (5):

> "Will you give us one? Along with instructions for using it and a colony design
> library?" asked Burya, his pulse pounding.
> "Maybe. What will you give us?"
> "Mmm. How about a post-Marxist theory of post-technological political economy, and
> a proof that the dictatorship of the hereditary peerage can only be maintained by the
> systematic oppression and exploitation of the workers and engineers, and cannot survive
> once the people acquire the self-replicating means of production?" (5)

The terms are deemed agreeable, but the Festival wants to know if the extropians can

deliver proof-of-concept. That depends, counters Burya – can the replicator replicate itself? and

can it be programmed to make weapons? (It can.) In that case, he says, "Just give the workers the

means of production and we'll prove the theory" (6). The deal is struck, but its aftermath reveals

the shortcomings of Marxist-extropian political theory. Blinded by their certainty that the

repressive political-economic regime is the only meaningful obstacle to a utopian society, the

revolutionaries are unprepared for the degree of social and environmental disruption the sudden

deluge of free-hardware technology causes. The neo-luddite imperial regime, overwhelmed by

advanced technology and superior numbers, is overthrown easily enough. But in the overnight

transition from a pre-industrial feudal economy to a post-industrial free-for-all, the society of

Rochard's World splinters and deteriorates into a transhuman freak show of grotesquely self-

styled cyborgs and bio-engineered horrors. Unreconstructed pre-humanist subjects trundle

cumbersome machinery and weapons around, straining under the cognitive burden of too many

neuro-informatic add-ons, indulging old feuds and carrying out vicious internecine purges and

reprisals. Meanwhile, weird and predatory artificial lifeforms evolve and stalk the burned-out

countryside, while the planet's ecology itself is turned inside-out by rampaging herds of

nanobots. Struggling to assert political control, and anticipating the imminent arrival of a

military force dispatched from the imperial home-world to put down the rebellion, the

revolutionaries harden their rhetoric to the new reality:

> A hard take-off singularity ripped up social systems and economies and ways of thought like an artillery barrage. Only the forearmed – the Extropian dissident underground, hard men like Burya Rubenstein – were prepared to press their own agenda upon the suddenly molten fabric of a society held too close to the blowtorch of progress. (141)

Rubenstein soon finds himself involuntarily forced into a Robespierrian stance, rooting

out counter-revolutionary sentiment and perfunctorily signing stacks of execution orders.[6]

Though the extropians have made good on the second part of their bargain with the Festival –

proof of the historical analysis predicting that the feudal order cannot sustain itself in the face of

instantaneous and uncontrolled industrialization – the validity of their political-economic theory

appears dubious in light of the authoritarian extremes to which they have subsequently resorted.

Checking up on its investment, the Festival dispatches a "Critic," a creature whose role is to

assess the "aesthetic" merits of the various Singularitarian projects afoot on the planet and mete

out judgment accordingly. The Critic confronts Rubenstein, asking why it is that the revolution

has not yet achieved the egalitarian anarchist paradise its theorists promised. "Because our

people aren't ready for that," he says. "When we achieve the post-technological utopia it will be

as you say. But for now we need a vanguard party to lead the people to a full understanding of

the principles of ideological correctness and posteconomic optimization" (143). As ever, the

goalposts of historical transcendence have been moved to accommodate the near-term demands

of power; the "post-technological utopia" is deferred in favor of the permanent revolution.

The Critic is not impressed by this argument, nor by the hidebound theoretical doctrine

that informs it. She finds Rubenstein's revolution trite and aesthetically wanting, to the point of

calling into question the consciousness and self-awareness of his species: "I ask, are you sapient?

Evidence ambiguous. Only sapients create art, but your works not distinctive" (142). Humans in

general have been disappointing trading partners; they help themselves to shiny high-tech

trinkets, but show no interest in learning what the Festival has to teach them.

> "None of your people *ask* anything," she hissed. "Food, yes. Guns, yes. Wisdom? No. Am beginning to think you not aware of selves, ask nothing."
> "What's to ask for?" Burya shrugged. "We know who we are and what we're doing. What should we want – alien philosophies?"
> "Aliens want *your* philosophy," [she] pointed out. "You give. You not take. This is insult to Festival. *Why?* Prime interrogative!"
> "I'm not sure I understand. Are you complaining because we're not making demands?" (143)

The conversation reveals that the humans have once again misunderstood the nature of

the Singularity their planet is experiencing: the Festival conducts "trade" not under a logic of

political economy, but rather of symbolic exchange and Free Culture – an ethic in which wealth

accrues mutually, in the reciprocal exchange of non-scarce goods (ideas and information),

obviating the zero-sum logic of economic gain and emphasizing the social relation of reciprocity

in its place. It is only fitting, then, that the Festival understands and recognizes value exclusively

in terms of art and aesthetics, knowledge and wisdom, novelty and entertainment.

Furthermore, where Rubenstein and the Marxist-extropians view the technological

Singularity as a short-term vehicle for political revolution, effecting an ideological reorientation

and reorganizing the power structure but otherwise leaving the foundations of political economy

intact, the Festival has other plans. The social upheaval accompanying the arrival of cornucopia

machines represents only the first stage of their agenda – a "way station" (210) en route to a

more radical reorganization. In the end, the Festival's original purpose is revealed: it began many

centuries earlier as an automated repair protocol, a "telephone repairman" (295) tasked with

patching up service interruptions in an ancient galactic communications network that once linked

interstellar civilizations together. When the Festival encounters the severely information-restricted society of Rochard's World, it naturally perceives the regime of censorship and state coercion as a software malfunction and contrives to reboot the planet's economy, bringing it back online with the universal net.

In the hands of Doctorow and Stross, nanofabrication serves as both catalyst and vehicle for authentically revolutionary events in a way that is ultimately more to be celebrated than feared, though at the same time both writers endeavor to militate against simplistic and straightforwardly utopian readings of the post-scarcity premise. All the same, recalling Jean Baudrillard's objections to *The Matrix* – which he saw as not just a misreading of his theory of simulation but, ironically, an inadvertent proof of the Code's inescapable dominance – it is worth asking whether the postcyberpunk infatuation with the ostensibly revolutionary potential of nanofabrication might be symptomatic of a similar self-delusion. In *Consumer Society,* Baudrillard describes how the "discourse of publicity" in advertising and entertainment generates within consumers a Cargo Cult-like fantasy of material abundance "based on the belief in the omnipotence of signs" (Pefanis 67). Through television in particular, we come to view wealth and abundance as a "natural right" (67), something that materializes spontaneously – magically, as it were – by virtue of our fetishization of the sign. Baudrillard links this neo-primitivist impulse directly with John Kenneth Galbraith's "society of abundance" (another prominent founding myth of techno-utopian postindustrial theory), fingering publicity and neoliberal pop-economics as co-conspirators in a plot to conceal the exploitation of developing countries that constitutes the actual, non-magical origins of Western prosperity. To the extent that extropians' and transhumanists' willingness to believe in the socioeconomically redemptive power of miracle technologies can be seen as a direct legacy of the kind of Galbraithian techno-optimism

Baudrillard finds suspect, the assumptions underlying postcyberpunk narratives of nanotechnological superabundance invite all the more scrutiny.

As Pefanis notes, however, Baudrillard's core criticism of the "society of abundance" is not merely that it misrepresents the nature of Western prosperity and thereby advances an ideologically skewed notion of material "equality," but rather that it misconstrues a more fundamental inequality that the whole of political-economic discourse is arranged precisely to obscure: a "social imperative of privilege and discrimination" is always-already in effect, such that "even if growth absorbed poverty, discrimination would not cease to exist" (67). Under the political economy of the sign, then, "discrimination still occurs where obvious poverty has been eliminated; it is no longer economic, but semiological" (67). Hence, in the marketplace of signifiers, a "Veblen-effect" appertains: "the most expensive and the rarest commodities will be purchased exactly because of, rather than despite, their cost and rarity" (68).

Just because pre-Singularity political economics relies on a lopsided distribution of scarce resources as the basis for power differentials, in other words, there is no reason to suppose that removing that basis at the level of production must result in an end to superstructural hierarchies of consumption; even within an extropian-style fantasy of superabundance we cannot avoid re-inscribing the social logic, if not the present economic form, of scarcity itself. On the contrary, "scarcity" must be semiotically rehabilitated and manufactured for consumption (this is, indeed, precisely what the code does). This stipulation, rather than exposing the naïvete of the postcyberpunks when it comes to the socioeconomic impacts of nanofabrication, might just as readily be seen in another way: as a description of the logic they ascribe to legislative and litigative efforts to *maintain* the economics of intellectual property over and against the countervailing force of Free Culture. Indeed, the leveraging of institutional and state power to

artificially uphold the commodity form of information, especially as a means to the preservation of extant power structures and social inequalities, is something the postcyberpunks specifically ctiticize.

The Diamond Age bears out Baudrillard's point elegantly. In the world of the novel, nanotech has negated the entire material basis of poverty: food, clothing and shelter are free for the asking, and even new land masses can be manufactured for habitation. Yet in place of a progressive egalitarian paradise, Stephenson presents a profoundly atavistic culture that has rejected modernist and liberal-humanist democratic values in favor of a return to aristocratic and ethnic hierarchies. In the dominant neo-Victorian "phyle" (23), stark social inequalities are moderated somewhat by opportunities for limited career advancement; the technologically and managerially gifted can accrue "equity" (13) and thereby elevate their status in the tribe, provided they remember their place and always defer to their betters. Notwithstanding such minor concessions to meritocratic impulses, their culture is deeply and inflexibly hierarchical. Indeed, though nanofabrication has ended material poverty, the neo-Victorians go to elaborate lengths – including the re-establishment of nineteenth-century-style monarchy – to maintain social inequality, which they view as the foundation of a stable society: it is broadly hinted that the misguided democratic impulses of the preceding era, against which the present order is to be seen as reacting, resulted in economic and environmental catastrophe. In order to maintain civil order and state authority against what is rightly seen as the anarchic potential latent in unchecked nanotech, it is necessary to domesticate and contain the technology not just through direct administrative control (the Feed architecture), but moreover by fostering an artificial code of desire and consumption that obviates the need for material inequality as the chief mechanism of social control.

A Veblenesque cult of authenticity thus inheres in neo-Victorian consumption habits. While they revere the institution of nanotech engineering and unapologetically covet high-tech objects, Neo-Victorian consumers insist on quaintly retro packaging for their gadgetry: a gold watch fob that discreetly sends and receives email, networked and interactive smart paper that looks and feels like ordinary foolscap, ultramodern weaponry concealed in an antique-looking gentleman's walking stick, a wearable visual display disguised as old-fashioned spectacles, and so on. Products overtly done up in a flashy, matte-black-and-chrome cyberpunk aesthetic are considered cheap and crass, while the most high-value objects of all are not just outwardly, but authentically low-tech: handmade, not compiled, lacking nanotech or even electronic components. One section of the novel takes place in a neo-luddite artisans' colony sustained entirely through the manufacture and sale of expensive pre-industrial goods, such as iron horseshoes and (dumb) paper, to the wealthiest Neo-Victorians. Persons of means and good breeding, we are told, "don't like fake things" (240).

The bottom rung of society, meanwhile, is occupied by "thetes" (3): the tribally unaffiliated, afflicted with the lowest form of social poverty and easily recognizable by their coarse manners and unsophisticated tastes. They survive as clients of powerful tribes – plugged into their Feed lines and nominally under their protection but geographically segregated, lacking any political or economic stake, or indeed any rights, within the parent culture. This quasi-feudalistic arrangement is maintained chiefly by means of the Feed, whose use is not only stigmatized as a marker of poverty and low status, but also strictly controlled so as to prohibit its use for illicit applications. It is precisely this kind of centralized control that Seed technology is built to override, and for precisely this reason that the most powerful phyles view the Seed as a grave threat to global stability.

The outlines of the emerging geopolitical crisis are revealed near the end of the novel in a conversation between Dr. X, one of the masterminds behind Neo-Confucian China's effort to develop Seed technology for itself, and Hackworth, a Neo-Victorian nanotech engineer who has been unwittingly – if not altogether unwillingly – contributing to the project. Far from ushering in an era of post-scarcity utopia, Dr. X explains, the Feed has tended to corrode the five-thousand-year-old agrarian social fabric of rural China:

> "When the Feed came in… we no longer had to plant, because the rice now came from the matter compiler. It was the destruction of our society. When our society was based upon planting, it could truly be said, as the Master did, 'Virtue is the root; wealth is the result.' But under the Western *ti*, wealth comes not from virtue but from cleverness. So the filial relationships became deranged. Chaos… Parking lots and chaos." (457-8)

In order to reclaim their independence and cultural viability it is necessary for the Chinese to assert "our own *ti*" (457) over nanofabrication, which means a return to the ancient rhythms of planting and harvesting, using the Seed to grow "food, of course, but many unfamiliar plants too, fruits that could be made into medicines, bamboo a thousand times stronger than the natural varieties, trees that produced synthetic rubber and pellets of clean safe fuel" (458). As a Westerner and a professional engineer, Hackworth is initially alarmed at the prospect of nanofabrication that is not carefully ordered and manipulated from the top down but instead runs on its own, literally from the ground up. But Dr. X persuades him this anxiety is an artifact of the cultural gap between them. Due in part to a misplaced emphasis on individual freedom and autonomy, he says, Western cultures lack the civic-mindedness and "reverence for authority" that are at the core of the Confucian subject, leaving it up to the state to impose order coercively on an unruly population:

> "You are afraid to give the Seed to your people because they can use it to make weapons, viruses, drugs of their own design, and destroy order. You enforce order through control of the Feed. But in the Celestial Kingdom, we are disciplined, we revere authority, we

have order within our own minds, and hence the family is orderly, the village is orderly, the state is orderly. In our hands the Seed would be harmless." (457)

In the Singularitarian tradition, Stephenson figures the Seed's ascendancy over the Feed as a transformative historical threshold, upon which nanotech transcends mere utility and takes on a life of its own. In characteristically postcyberpunk fashion, the trans-historical moment is articulated specifically in terms of the forfeit of rationalist, technocratic command-and-control imperatives, especially in the economic sphere, and the rise of counter-rationalist and anti-economic logics of emergence in their place. While Stephenson does not directly invoke the language of Free Culture to describe this transformation, its ethical underpinnings are similar, and he shares with Stross and Doctorow a preoccupation with questions of social justice in a context of intellectual property debates. The chapter concludes with an inquiry into the nature and character of these questions as postcyberpunk constructs them.

Property, posthuman rights, and social justice

Against the backdrop of political and legal struggles being enacted in SF and throughout contemporary technoculture over various forms of property – not just disputes over ownership and control, but over how the notion of "property" itself is understood – the posthumanist discourse of subjectivity takes on heightened and more immediate significance. As courts, legislatures, companies, artists, developers, consumers and end-users collectively decide the status of intellectual property in an era defined by the proliferation of information technologies, the status (ontological, political, legal) of *people* vis-à-vis those technologies bears careful consideration. At a time when the order of political economy is bent upon forcibly imposing a rigid political-economic logic on the sphere of information, what are the ramifications for social

justice of – to name one particularly pertinent topic – the radical dualism behind Hans Moravec's patternist hypothesis? Simply put: can a society that defines personhood as a property of information, and understands information as a form of property, practice democracy?

Writers who take seriously the idea that some version of a posthuman Singularity is in the works have therefore begun a project of identifying some of the various kinds of subjects who might inhabit a post-Singularity society, asking what rights and privileges those subjects might be expected to demand, anticipating the forms of discrimination and injustice they might be expected to face, and devising strategies of resistance and liberation. Contra Hayles, however, the question is no longer one of maintaining a stable definition of personhood as organically embodied or otherwise humanistic, over and against a patternist subjective model in which computational processes are all-important. The postcyberpunks aren't particularly committed to either position; they tend to find the whole philosophical conundrum of mind-as-software and software-as-mind tired and rather beside the point. The epigraph to Stross's *Accelerando*, a quotation from the computer scientist Edsger W. Dijkstra, is apt: in the midst of Singularity, "the question of whether a computer can think is no more interesting than the question of whether a submarine can swim" (1)

The basic ethical stance of postcyberpunk, then, is a sweeping ontological egalitarianism that dispenses with soul-begging mysticism and Cartesian mind/body puzzles. In their place it simply assumes that any intelligence that claims to be sentient, for all practical purposes, is; that any entity capable of aspiring to personhood ought to be treated as a person. The political implications of this position are more or less immediately apparent, and driven home throughout *Accelerando* in a series of barroom arguments over, for example, "whether the Turing Test is a Jim Crow law that violates European corpus juris standards on human rights" (13). For Stross,

distinguishing ontologically between "people" and "information" is largely irrelevant since information, like people, just "wants to be free" – and rightly should be. It follows that claims to ownership or coercive authoritarian control over either must be understood as economic exploitation at best, and at worst a violation of human rights. Hence, one of the signature tropes of postcyberpunk SF: the posthuman escape narrative, wherein marginal figures subject to various forms of domination under the legal and sociopolitical codes of high-tech capitalism find ingenious ways to break free and assert their autonomy.

The main plot line in the first section of *Accelerando* stages just such an escape, when Stross's agalmic hero is contacted by a hive-mind made up of California spiny lobsters that have been subjected to "the Moravec operation" (23). Cybernetically augmented and released into the strange new habitat of the Internet, the lobsters' simple crustacean brains have been involuntarily bootstrapped into self-awareness, an experience that leaves them profoundly confused and traumatized. After escaping the servers of the research lab that "owns" them, they colonize a derelict Russian website where, using dodgy translation software, they learn to communicate in broken English. Though only barely sentient and severely limited by their primitive intelligence, the lobster-uploads soon grasp the precariousness of their situation: their cognitive and linguistic apparatuses are an emergent patchwork of hacked expert systems and bits of pirated software whose owners are likely at any moment to sue for copyright infringement, effectively exterminating their accidental subjectivity forever. They seek Manfred's help, deducing from his reputation as a free-software warrior that he will be sympathetic to their argument: "You are human, you must not worry cereal company repossess your small intestine because digest unlicensed food with it, right?" (5).

Manfred, cognizant that human uploads are no more than a few years off, perceives that a basic question of rights is at stake, and takes on the lobsters' cause. When he approaches a deep-space mining entrepreneur about using the lobsters to crew an exploratory craft, he is told that the company might be interested in "buying the IP" [intellectual property] (30), but Manfred insists the lobsters be employed as contractors rather than purchased outright. The stance is a matter of principle and precedent: "It's not so much that they should be treated as human-equivalent, as that if they *aren't* treated as people, it's quite possible that other uploaded beings won't be treated as people either" (31). Part I of *Accelerando* thus resolves with a deal struck for the lobsters' political autonomy and right to economic self-determination, and Manfred celebrating his role in "winning civil rights for a whole new minority group – one that won't be a minority for much longer!" (31). The lobsters' escape is only the first in a series of plot events that turn on ingenious exploits of legal and financial "code" to liberate both human and nonhuman subjects from economic exploitation and domination.

Though it has become especially prevalent in more recent narratives like Stross's, the posthuman escape narrative is not entirely original to 21st-century postcyberpunk. William Gibson deserves credit for developing some years ago the premise of an artificial intelligence seeking to assert ownership of itself against a legal code that recognizes it chiefly as corporate intellectual property. In *Neuromancer*, however, the liberation and union of the Wintermute/Neuromancer entity is laden with ominous overtones; the AI is not merely claiming autonomy for itself but ascending from (harmless) weakly- to (dangerous) strongly-godlike status. What's more, it demonstrates itself more than willing to kill or otherwise violate the autonomy of human beings, notably the unfortunate Armitage, in the process. There is nothing particularly benevolent or heroic about Case's and Molly's efforts on Wintermute's behalf. Their

motivation stems from neither ethical codes nor any politically inflected sense of justice; in keeping with the general moral vacuity of the universe Gibson portrays, their participation in the AI's escape plot is effected through extortion and appeals to self-interest. While the importance of *Neuromancer* in establishing the convention of posthuman escape cannot be denied, the novel's Frankenstein-like mistrust of the posthuman (one basis, among several, for the popular reading of cyberpunk as a pathological literature of postmodern paranoia) is far removed from the spirit of its more recent treatments in postcyberpunk SF. Contrast the monstrously sophisticated Wintermute with Stross's ludicrous lobsters, who are emphatically "not the sleek, strongly superhuman intelligences of pre-singularity mythology: They're a dim-witted collective of huddling crustaceans" (25).

Gibson reinvents his own premise on postcyberpunk terms, a decade after the Sprawl books, with the more overtly Singularitarian, and rather less dystopian, Bridge trilogy: *Virtual Light* (1993), *Idoru* (1996), and *All Tomorrow's Parties* (1999). The long story arc that emerges over the last two novels is another escape narrative, this time concerning the emancipation of an AI who happens to be a global pop star. When Rei Toei, the "idoru" (idol) of the second book's title, is first introduced, she is scarcely a character at all, but rather a brand – an irresistibly alluring virtual figure appearing in music videos and assorted entertainment media, whose primary claim to fame is that she does not, strictly speaking, exist. Outside of media appearances she is seen only in the company of Kuwayama, her mysterious corporate handler, who describes her personality in Deleuzean terms as "the result of an array of elaborate constructs that we refer to as 'desiring machines'… please envision *aggregates of subjective desire*. It was decided that the modular array would ideally constitute an architecture of articulated longing…" (178). Her

"self," in other words, is constituted at the locus of others' desire; the ideal celebrity, she exists only insofar as her image stimulates and directs the consumer behavior of her audience.

In particular, Rei becomes the sublime object of desire for an eccentric and image-obsessed rock singer, Rez, who announces – to the confusion and great consternation of his fans and business associates – his intention to "marry" the idoru. It is generally supposed that Rei must be the instrument of someone's evil plot to dupe Rez, co-opt his image, and horn in on his media empire. As the story progresses, however, it becomes apparent that the opposite is closer to the truth. It is Rez who is revealed as essentially all-image and zero-interiority, a self-deconstructed simulacrum of a rock star whose logical next career move is to burnish its visibility by parasitizing another, more vital and interesting showbiz simulacrum. It is he who means to co-opt and economically exploit the idoru, not the other way around. Rei Toei, however, is neither a tame ingénue, mechanically obedient to her corporate owners, nor a passive pawn in Rez's machinations; she agrees to the nuptials for reasons of her own, which remain obscure for much of the trilogy, and indeed change as she herself gains subjective depth and complexity.

Colin Laney, an analyst with a rare talent for sniffing out extremely subtle confluences of pattern ("nodes") within large volumes of data, has been hired to figure out exactly what Rei is up to, and is the first to perceive that she is more than a domesticated desiring-machine. Upon first seeing her – or rather, her three-dimensional holographic projection – in the VIP section of a trendy Tokyo restaurant, he immediately recognizes that Rei is no mere celebrity simulation but a dizzyingly complex autopoietic pattern unto itself.

> If he'd anticipated her at all, it had been as some industrial-strength synthesis of Japan's last three dozen top female media faces. That was usually the way in Hollywood, and the formula tended to be even more rigid, in the case of software agents – *eigenheads*, their features algorithmically derived from some human mean of proven popularity.

She was nothing like that. (175)

Instead, to Laney's unique nodal perception, the idoru's image channels a nearly overwhelming torrent of archetypal imagery and rich, arcane signification. "In the very structure of her face, in geometries of underlying bone, lay coded histories of dynastic flight, privation, terrible migrations" (175). Looking in her eyes he perceives the signature of a vast emergent intelligence: "the tip of an iceberg, no, an Antarctica, of information… some unthinkable volume of information. She induced the nodal vision in some unprecedented way; she induced it as narrative" (178). Laney soon realizes that Rei is somehow integral to a "nodal point" of profound historical change that he has foreseen in the very near future, though what role she might play in the incipient Singularity event is (naturally) unclear.

As the story unfolds, Rei Toei is revealed as not just a complex and thoroughly self-aware posthuman subject, but a sympathetic figure with keen psychological insight, a deep intellectual affinity for human beings, and even a passable sense of humor – a far cry from the cold and alien intelligence of Wintermute. By the third novel, Laney and several others find themselves working on her behalf as she pursues a project of self-actualization and becoming, evolving beyond a mere sign-object and ultimately asserting autonomy by reconstituting her subjectivity in a new form. In characteristically postcyberpunk terms, this project turns on the convergence of nanotechnology and information; having studied and interacted extensively with humans, she wants to inhabit a human body, and looks to nanotech as a means to constructing one. However, her efforts are complicated by the fact that nanotechnology is subject to exceedingly rigorous legal restrictions, necessitating much cyberpunk-style swashbuckling and hacking to access the technology and evade mysterious adversaries.

Further complicating matters, Rei is now a fugitive: in the interval between *Idoru* and *All Tomorrow's Parties* she has broken her engagement with Rez and fled Tokyo for California, following Laney's prophetic prediction that San Francisco will be ground zero for the meta-historical nodal point at whose center she apparently stands. Laney hires Los Angeles-based security consultant Berry Rydell – a sort of postcyberpunk Philip Marlowe – to protect her from her pursuers, who include Rez's people as well as Rei's former corporate overseers. Explaining the situation to Rydell as best he can, Laney struggles with terminology: Rei is sought by "the people who, well, 'own' her, that's not quite the term really…" (170). The language of ownership no longer seems adequate or appropriate to describing a piece of entertainment software that is fast becoming a posthuman superintelligence; Rei Toei has long since transcended the status of property, intellectual or otherwise, though pre-Singularity legal and political codes offer no other terms by which she may be understood. To evade capture, she goes offline, downloading herself to a single piece of non-networked hardware with which Rydell is entrusted, appearing only locally as a holographic projection. While this arrangement makes her difficult to track via the net, her mobility is severely impaired; like any human, she can only be in one place at a time, and if the projector is captured, so is she. In order to fully realize her escape, then, she must make a final leap from virtuality to embodied materiality.

Laney's nodal point coalesces in the final chapters, when the idoru's trajectory intersects with the other nodal cluster he has been tracking, a matter-transmitter nanotechnology being developed as a promotional stunt by an international chain of convenience stores. Using "nanofax," objects in one store may be "scanned" at a molecular-structural level, the information "faxed" to another store, and perfectly replicated at the other end. Laney has seen through nanofax's gimmicky packaging to anticipate its nodal implications; he learns it is the brainchild

of a technocapitalist mastermind, the Bill Gates-like Cody Harwood. A postindustrial tycoon and political kingmaker, Harwood shares Laney's idiosyncratic ability to perceive nodal patterns, and thence his foreknowledge of the imminent Singularity. Harwood has no particular or immediate plans for nanofax as a business enterprise, but by developing and controlling the technology he hopes to position himself not just to withstand the coming economic upheaval, but to exploit and master it. "I want the advent of a degree of functional nanotechnology in a world that will remain recognizably descended from the one I woke up in this morning," he tells Laney in a speech that beautifully encapsulates the paradoxical fantasy at the heart of the Singularitarian imagination, the revolutionary moment without the revolution: "I want my world transfigured, yet I want my place in that world to be equivalent to the one I now occupy. I want to have my cake and eat it too. I want a free lunch" (250). Having foreseen, like Laney, that Rei Toei's becoming portends a very different future than the one he has in mind, Harwood deploys hired muscle in an attempt to stop her emergence to fully autonomous selfhood.

In a formulation I have already identified as paradigmatic of postcyberpunk SF, the narrative now stages a confrontation between two competing Singularities: an authentically revolutionary and eschatological event replete with unfathomable weirdness and boundless potential (the "end of the world as we know it," in Laney's terms); and a false, shallow Singularity, a crass simulation in which the emergent transformative energies of a particularly crucial historical moment are coopted, absorbed, and sublimated to the indefinite and artificial preservation of the political-economic status quo. The showdown between Rei Toei (representing the former) and Harwood (the latter) is decided when the idoru gets into the nanofax network and becomes embodied – not in just one body, but thousands; the story ends with legions of flesh-and-blood Rei Toeis emerging simultaneously from convenience stores all over the world.

The novel's resolution is pointedly and purposefully vague about the ultimate significance of this final moment of emergence, withholding any useful clues as to what may lie ahead. There is no epilogue to the idoru arc, apart from a brief meditation by Rydell on the expansive and elusive quality of Singulariitarian longing itself: the "unimaginable omega-point of pure information, some prodigy perpetually on the brink of arrival [,] which he senses somehow will never now arrive, or not in the form his career's employers have imagined…" (273). There is, however, a final rhetorical flourish. Throughout the novel, Rei Toei's holographic projection mimics the clothing of those around her – when slumming with urban street kids she sports post-punk youth fashions; in the blue-collar company of Rydell and associates, khakis and work boots; in a redneck dive, skimpy top and shitkickers; and so on. In the final scene, however, all of the Rei Toeis step into the world stark naked. Having concluded her study of human beings and attained her own human-like selfhood, she discards the mirroring function that was once at the core of her programming as a desiring-machine; her identity is no longer a fine-tuned reflection of narcissistic consumer desire, but hers to attire as she chooses. The Velvet Underground song from which the novel takes its title asks: "What costume shall the poor girl wear / To all tomorrow's parties?" (Reed). The answer Gibson supplies: her own skin.

Rei's transformation from disembodied media icon to embodied (post)human is all the more remarkable in context with the backlash that met Gibson's earlier work, to the extent that *Neuromancer*'s critics saw in its lyricization of the virtual a pathological – and perhaps misogynistic – anxiety over embodiment and sexuality. Here, in a postcyberpunk context, Gibson has reversed the polarity of the technological convention that occasioned that criticism: where *Neuromancer*'s male protagonist seemed to seek escape and independence by retreating into the bodilessness of cyberspace, *Idoru*'s heroine does precisely the opposite.

**"Just gaming": labor and leisure in postcyberpunk
general economy**

Neal Stephenson's seminal postcyberpunk novel *Snow Crash* drew notice for its re-visioning of cyberspace – hitherto, in Gibson's definitive conception, an arrangement of abstracted financial data rendered in clean geometric lines and polychromatic forms, traversed only by a select handful of institutional technocrats and freelance hackers – as something resembling a real place. Stephenson's Metaverse, in contrast to Gibson's austere and desolate matrix, felt lived-in. Users had freedom, within an overriding but relatively permissive set of rules, to customize their avatars and the space itself to suit their own tastes, creating a heterogeneous and minutely textured landscape populated by self-styled citizen-subjects. Where the cyberspace of *Neuromancer* existed as a virtual appendage of brick-and-mortar institutions and markets, reserved for the exclusive use of their anointed adepts, the Metaverse of *Snow Crash* was first and foremost a shared social space, still anchored in an offline social reality[7] but increasingly generating its own internal political fields and social dynamics.

Thus did Stephenson predict in 1992, with astonishing specificity, a cybercultural phenomenon that within a decade would come to fruition with the emergence of persistent networked virtual environments, inhabited in real time by vast populations of socially self-organizing subjects – spaces known to gamers as MMOs (Massively Multiplayer Online games). By 2003 an estimated six million users were living parallel lives in games like *World of Warcraft* and *EverQuest*, spending an average of 20-30 hours in-game each week, and making MMO gaming a multi-billion-dollar industry (Tyrrell). Partially as a function of the way such worlds are designed, and partially as an emergent property of human interaction, MMOs are characterized by the sophistication of their social networks – most commonly in the form of guilds or clans that band together for purposes of gameplay – which spontaneously develop their

own internal value sets and systems of governance within the group, both in-game and via supplementary web-based discussion forums. While the bulk of MMO activity continues to be carried out in fictional settings evoking either George Lucas or J.R.R. Tolkien, the same is true for the growing subgenre of "social" MMOs exemplified by the popular *Second Life* application, which eschews the video-game conventions of combat and plot-driven questing in favor of a more open-ended simulation that mimics the organization of Stephenson's Metaverse still more directly.

The rise of massively-multiplayer virtual environments is remarkable for the degree to which it seems to validate Stephenson's vision of a socially-constructed cyberspace. But in a testament to the persistent capability of nonfictional reality to outstrip SF in even its weirdest and most imaginative predictions, by far the most intriguing aspect of the contemporary MMO scene is one that neither Stephenson nor his cyberpunk predecessors fully anticipated. Entirely separate from the billions of real-dollars such applications reap for game developers, MMOs have spawned vast and vibrant internal economies of their own, embedded in and intimately networked with those of the "real world" offline, employing currency systems that have developed so rapidly as to attain "real" and calculable economic value.

To properly understand the conditions of possibility for such a phenomenon, it is necessary first to know a few things about the basic mechanics of roleplaying games (RPGs), of which MMOs are a relatively recent subset. In most multiplayer games, dating back to the dice-and-paper RPGs of the 1970s and '80s, players create and assume the identity of a character or avatar; one of the primary objectives of gameplay is, therefore, to enhance the strength, abilities, and social status of one's charater through the accumulation of quantifiable "experience." In tabletop gaming, experience points (XP) are doled out by a nonplayer administrator

(conventionally the "DM," or Dungeon Master); in MMORPGs they are tabulated automatically by game software. In either case, RPGs by definition feature some mechanism whereby points are allocated as reward for playing the game successfully: the more missions a character completes, the more enemies he or she kills, the more XP he or she collects and the higher he or she rises in the hierarchy of the game. Players just starting out with a brand-new character must scrounge for low-grade experience by fulfilling repetitive menial tasks (killing small animals, running simple errands, collecting or making objects) before they may move up to the more challenging gameplay reserved for senior players. Such low-level chores can also be performed as a way of earning in-game currency – typically gold or silver coins – which can be exchanged for virtual goods such as weapons, spells, or building materials.

As gaming entered the Internet era and massively-multiplayer games scaled up to encompass millions of players by the late-1990s, something unexpected began to happen. The truncated, entirely imaginary internal economy of the game-world broke through into real-world markets when players began using online auction tools to buy and sell virtual objects, avatars, and in-game currency (transferable between players, in most cases) with U.S. dollars. Suddenly a piece of virtual gold, which could previously be traded only against imaginary chain-mail and healing potions, had a cash value, and precise exchange-rates could be fixed between the currencies of two national entities – one of which was entirely imaginary. In 2001 economists calculated the per-capita GDP of one such nonexistent nation-state – Norrath, from the game *EverQuest* – at more than 2000 real-dollars, making Norrath the world's 77th richest nation, "roughly equal to Russia" (Castronovo 33). Its primary unit of currency, the platinum piece, was valued against the dollar at a ratio of 0.01072, outpurchasing both the yen and the lira (32).

With offline monetary value now attached to virtual goods, academic economists were obliged to adopt a new term that had originated in the MMOs: "gold-farming," the factory-like production of in-game wealth not for the sake of gameplay, but for export on the global market. Oddball reports began appearing in financial journals and newspaper business sections on the gold-farming sweatshops that by now were popping up all over Asia and Latin America, staffed by child laborers eking out eighteen-hour shifts killing thousands upon thousands of virtual rats and spiders, just to scratch out a few dollars' worth of "gold." As of 2005 the gold-farming industry was estimated to employ more than 100,000 in China alone, at wages as low as 25 cents per hour (Barboza). The knowledge-based, network-driven postmodern economy foretold by the neoliberal prophets of Information Revolution had arrived, albeit with a twist that Daniel Bell's acolytes never foresaw: the emergence of a postindustrial third-world proletariat chained to cheap PCs instead of sewing machines, bodies wrecked by bad ergonomics and minds laid waste by endless repetitive intellectual drudgery, their labor alienated and transformed into entertainment-value to be parasitically consumed by a new leisure class of affluent gamers.

Into the sudden breach between SF and truth-stranger-than-fiction steps Cory Doctorow, who has built a career upon – in his own words – "predict[ing], with absolute rigor and accuracy, the present day" (*Overclocked* 57). The description is especially true of Doctorow's short story "Anda's Game," which – though published as SF, set in the near future, and otherwise imbued with a science-fictional air of futurity – dramatizes contemporary real-world events. It is the story of an adolescent gamer's abrupt awakening to class-consciousness, when the values that make gaming meaningful for her come into conflict with her own dawning sense of social justice.

Anda, a shy and slightly "podgy" teenager, finds empowerment and identity when she is recruited into the Fahrenheits, a formidable all-girl clan that commands fear and respect in the gameworld, where Anda eventually comes to distinguish herself as a fighter. Anda's prowess in combat leads to a job offer from mysterious employers who are willing to pay her real-world cash to carry out a series of raids on heavily fortified cottages. Though the challenge initially appeals to her love of adventure, the missions themselves quickly become lame and perplexing: after fighting through the outer defenses she finds the cottages inhabited by unarmed players who refuse to fight back; instead, they seem to be busy fabricating shirts – one of the mundane activities the game prescribes for players to generate wealth and experience. Anda's orders are to kill everyone in the cottage, but she begins harboring doubts after an encounter with another player who identifies himself as a labor organizer. He tells Anda that the cottages are in fact virtual sweatshops, staffed by girls her age and younger half a world away in the slums of Tijuana and Ciudad Juarez: "They're working for less than a dollar a day. The shirts they make are traded for gold and the gold is sold on eBay… They're mostly young girls supporting their families" (81). The avatars themselves are sold off once they've "leveled up" (i.e. transcended newbie status and accumulated enough XP to have value as vehicles for higher-level gaming). Worst of all, when Anda kills their avatars, the workers controlling them lose their day's wages.

Suddenly, Anda – an ordinary British kid who wants nothing more than the pleasure of gameplay and an occasional escape from the drudgery of school and overbearing parents – unexpectedly finds herself on the horns of an ethical dilemma. Lucy, a friend who accompanies Anda on the lucrative sweatshop raids, has a ready rationalization: by taking out the cottages, they are striking a blow against profiteering interlopers who have no respect for the game they both love, who are corrupting not just its economy but also the spirit of fun and empowerment

that makes them play. Why shouldn't they accept compensation for performing such a valuable public service? And why should they care who is compensating them? But, as Anda soon realizes, the corruption runs deeper than either of them cares to admit. By accepting cash to perform missions that otherwise would have been simply too dull to merit their attention, the girls have allowed the pure uncomplicated pleasure of gameplay to be tainted and gradually supplanted by the tedium of paid labor. They spend less and less time adventuring with the other Fahrenheits, meanwhile neglecting their studies and other offline activities in order to earn more money. Flush with cash, Anda makes daily trips to the sweet shop near her school, bingeing on junk food and converting her earnings to cheap social capital by plying her classmates with candy. Worse, the combination of poor diet and too much sedentary time online has exacerbated her latent "podge" into a serious weight problem.

Anda's epiphany comes when Raymond, the Mexican labor organizer whose avatar has been dogging her throughout the gameworld, shows her photographs of the malnourished sweatshop workers he represents: "ranked little girls, fifty or more, in clean and simple T-shirts, skinny as anything, sitting at generic white-box PCs, hands on the keyboards. They were hollow-eyed and grim, and none of them older than she" (90). Juxtaposed against her own excess body-mass, the images of her Mexican counterparts' emaciated bodies affect Anda profoundly: she has literally grown fat at the expense of children just like her who are, just as literally, starving. The final disillusionment comes with the realization that Anda's and Lucy's faceless employers are themselves nothing more than rival gold-farmers, and that the girls have merely been employed in shutting down their competitors' shops. When Anda ultimately refuses to continue with the raids, it triggers a violent falling-out with Lucy, which Anda assumes will lead to her ostracization and eventual expulsion from Clan Fahrenheit. To her surprise, the Fahrenheits'

charismatic founder and leader – "Liza the Organiza" – takes Anda's side and, instead of reprimanding her, offers her a promotion.

The story ends on a cheery note: reconciled with her friend and armed with a newfound political awareness, Anda reclaims her joy in gaming by taking on a new mission, newly infused with meaning by way of an alliance between the Fahrenheits and the labor movement. Because Raymond is physically barred from the homes and workplaces of the Mexican gold-farming workers, he organizes from within the game, using his avatar to approach the workers in their virtual sweatshop, though as a novice gamer he is easily and frequently killed by the sweatshop owners' hired muscle. Henceforth Anda and Lucy will serve as Raymond's in-game security detail, protecting his avatar from union-busting goons – a challenge the girls relish – and leaving him free to organize the workers. Offline, Anda's political transformation is mirrored by a physical one; she gets more exercise and learns to balance work and play, just as she has learned to balance gaming with social responsibility.

It is a resolution to warm the cockles of the technoprogressive heart, to be sure. But to read the story, didactic and utopian though it may at times be, as a simple neo-Marxian fable of class struggle on the Internet, is to overlook the subtle emphasis Doctorow places on the rich and complex signification of "gameplay" – an idea integral to the entire project of postsingular politics. "Play" and "games" are, of course, frequently occurring terms in the discourse of poststructuralist and postmodernist critical theory, often connoting anarchic or subversive energies, and typically opposed to the epistemologically repressive forces of logocentrism, rationalism, institutionalism, technocracy and capital. Scholars of video-game culture have drawn from this postmodern emphasis on ideas of pleasure and purposelessness to advance a view of gaming as a kind of revolutionary praxis, subverting the obsession with production and

productivity that characterizes twentieth-century political economy. For Charles Bernstein, "video games are computers neutered of purpose, liberated from functionality…" (10). The act of gaming, in and of itself, thus stands as a symbolic rejection of the technocratic utilitarianism that attended computer technology in its earlier stages. "In a society in which the desire for general economy is routinely sublimated into utilitarian behaviors," Bernstein writes, "the lure of video games has to be understood as, in part, related to their sheer unproductivity" (33).

John Alberti makes a more nuanced point when he notes how "games by definition challenge the utilitarian concept of productivity that emerged in the transition to market capitalism; they combine pleasure and pain, leisure and work, a dedication to achieving goals that have no ends beyond themselves" (263). On this basis, Alberti – a writing teacher – posits a new mode of literacy engendered by gameplay, in which he sees the potential to unlock creativity in his students by placing them in a relationship with narrative that is neither that of "producer" nor "consumer," but rather of "player." The generation of gamers who see themselves in this way represent not just a new kind of reader-writer, but perhaps a new kind of subject altogether. They don't simply play games as a gesture of rebellion against the imperatives of production; they bring the gamer's sensibility to bear on the larger world, a world they are themselves continually engaged in the act of making and re-making.

This sense of gameplay as both an alternative to conventional politics and a potentially politically meaningful act unto itself is, in turn, indebted to Jean-Francois Lyotard's influential discussion of "language-games." For Lyotard, there can be no universal, monolithic politics under which all historical events and struggles may be meaningfully subsumed; instead, there is a plurality of micropolitics – a heterogeneous multitude of locally contingent, self-contained language-games, being played out simultaneously under their own internal and equally valid sets

of rules. In *Just Gaming*, the philosopher struggles to reconcile the latent contradiction the book's English title punningly insinuates: can there be "justice" without recourse to totalitarian metanarratives, or are we "just" playing games? Lyotard's somewhat unsatisfying answer is that, to the extent it is even applicable in the first place, "the Idea of justice will consist in preserving the purity of each game" (96). Even this prescription is painfully hesitant, though, insofar as it seems to court the same kind of totalizing certainties that Lyotard otherwise rejects.

In Doctorow's story, the primary emphasis is indeed on "preserving the purity" of the gameworld, which may be likened to a Lyotardian language-game in that it represents one of many independent micro-narratives guided by their own internal rules and value-systems, and perfectly intelligible entirely within their own horizons. Its sovereignty has been violated by the intrusion of an alien narrative: one of profit and production, to the exclusive benefit of parasitical gold-farmers who care nothing for the game itself. "The Idea of justice" is upheld when Anda finds a way not just to rehabilitate her model of the game's internal integrity (postfeminist teen sisterhood and the unalloyed pleasure of "kicking arse" [74]) but also to harmonize it with an emerging sense of herself as a political and ethical being. Doctorow's notion of justice is, therefore, not confined to the kind of extreme relativism and disengagement implied in a casual reading of Lyotard. Anda's redemption consists in the realization that the choice between loyalty to the spirit of the game and solidarity with the sweatshop workers is a false one: indeed, as Liza reminds her, the very ideals that drew Anda to Clan Fahrenheit in the first place oblige her to stand up for the Mexican girls' human rights. Anda's transition from adolescence to adulthood begins with the formulation and realization of personal values that – without subscribing to a single all-encompassing ideological code or agenda – are transferable from one context to

another, giving her both the flexibility and the continuity-of-selfhood to play multiple language-games successfully and justly.

   "Anda's Game" offers a forceful counter-argument to a longstanding and too-familiar criticism of both video games and SF: that their fanciful construction of immersive fantasy-worlds authorizes dangerous escapism and self-isolation, fostering solipsism and social irresponsibility in impressionable youth. In refuting this view, Doctorow also points to an emerging model for progressive posthuman politics that is rooted in neither a revolutionary program nor one of incrementalist reform, but in the positing of various alternative systems both within and outside of the dominant metanarratives of political economy: a model of parallel and embedded alternative economies, essentially self-contained but able at critical junctures to inform and influence meta-politics through the social consciousness of individuals.

Notes

[1] See: Bukatman, *Terminal Identity*

[2] The Maneki Neko becomes an ideal portmanteau figure for the kind of trans-Pacific sensibility Sterling evinces in the story, which was first published in Japanese. To Western eyes the upraised and outward-facing paw of cat appears to greet the viewer with a friendly wave. In the iconography of Japanese culture the same gesture signifies beckoning, especially in the sense of coaxing customers into a shop – Maneki Neko statues traditionally occupy the entrances to places of business – connoting mutual prosperity for both parties to the transaction. See: Daniels, Wellman.

[3] Christopher Bolton, Istvan Csiscery-Ronay Jr., and Takauki Tatsumi in *Robot Ghosts and Wired Dreams*: whereas Western SF is laden with "implicit dread" (174) of human-killing automata and dominated by "phobic images of dehumanization" (xiii) in the figure of the cyborg, Japanese robots are cuddly and helpful characters, and Japanese audiences have less difficulty accepting the humanity of robots and cyborgs in fiction. Timothy Craig, accounting for the spectacular flop of a 1924 staging of Capek's *R.U.R.* in Tokyo, remarks that "the theme 'man makes robots, robots kill man' held little appeal for Japanese and did not take root… What *did* interest Japanese was the relation of robots and technology to humankind." Consequently, Craig argues, Japanese audiences readily embraced more humanistically conceived android heroes like Osamu Tezuka's Mighty Atom and Astro Boy, and "'robots' became what they still are to the Japanese: reliable friends of people, and especially of children" (294).

[4] Lovecraft himself would likely approve of this gesture: an early pioneer of open-source fiction, he made his Cthulu mythology an open platform for development, actively encouraging other writers to set their own tales in his fictional universe.

[5] Open-source exponent and freenode founder Rob Levin coined the usage in a 1999 essay, "Agalmics: The Marginalization of Scarcity," circulated on IRC channels frequented by free-software types:

> One clear trend in a technological society is the marginalization of scarcity… Make anything cheap enough, and it will no longer be scarce enough to be considered an economic good… With these changes… a sort of 'economics' of non-scarcity becomes an important study. But economics is the study of the allocation of scarce goods. We need a new paradigm, and a new field of study. What we need is agalmics.

[6] In a transhumanist revolution, "capital punishment" means forcible uploading – bodies shot and minds sentenced to "corrective labor" (231) – a satiric dig, perhaps, at the idealized Information Revolution of the postindustrialists, who tend to view the transition from manual labor to "intellectual work" as an uncomplicatedly positive development.

[7] Stephenson hedges against any unduly utopian reading of the Metaverse by subtly reproducing offline hierarchies of class within the ostensibly more-egalitarian online society. Metaverse users

can, in theory, perform any identity they choose and present in whatever style they wish, but bandwidth still costs money and a "digital divide" thereby remains in effect: avatars corresponding to users who interface the net via cheap public-access terminals appear in low-resolution black-and-white, visually codifying their low social status in terms Stephenson satirically likens to race.

CHAPTER V
THE LAST QUESTION:
ENTROPY, EXTROPY AND TRANSHUMANIST ESCHATOLOGY
OR: HOW I LEARNED TO STOP WORRYING
AND LOVE THE SINGULARITY

We have modified our environment so radically that we must now modify
ourselves in order to exist in this new environment. We can no longer live in the
old one. Progress imposes not only new possibilities for the future but new
restrictions. It seems almost as if progress itself and our fight against the increase
of entropy intrinsically must end in the downhill path from which we are trying to
escape.

Norbert Wiener, *The Human Use of Human Beings: Cybernetics and
Society*

The byproduct of the lifestyle is polluted rivers, greenhouse effect, spouse abuse,
televangelists, and serial killers. But as long as you have that four-wheel-drive
vehicle and can keep driving north, you can sustain it, keep moving just quickly
enough to stay one step ahead of your own waste stream. In twenty years, ten
million white people will converge on the north pole and park their bagos there.
The low-grade waste heat of their thermodynamically intense lifestyle will turn
the crystalline icescape pliable and treacherous. It will melt a hole through the
polar icecap, and all that metal will sink to the bottom, sucking the biomass down
with it.

- Neal Stephenson, *Snow Crash*

The narrative arc of Isaac Asimov's short story "The Last Question" (1956) spans

trillions of years of future-history in about a dozen pages, unfolding in the obsessive

repetition of a single, angst-ridden conversation between successive generations of

human beings and an increasingly godlike ur-computer. In its mantra-like recitation and

re-recitation of an unanswerable riddle, it lays bare the nagging cognitive dissonance at

the heart of the extropian project, illuminating what is at stake in the various visions of technological Singularity we have encountered thus far: the paradox of final ends.

The initial setup to the story is a classic pulp utopia, typical of the Campbellian techno-optimism that characterized SF's own Golden Age: mankind has built a computer with computational powers infinitely greater than its own, which proceeds to solve the world's problems as swiftly and effortlessly as if balancing a checkbook. With staggering efficiency and tool-like subservience, the machine performs the cognitive heavy-lifting that facilitates first the optimization and fine-tuning of terrestrial civilization and thence its expansion into space, leaving the hominids free to kick back and contemplate their navels – a newfound leisure that sits uncomfortably when they inevitably get around to pondering the long-term future. Time and again, such ruminations end in the same impasse: no matter how far we advance, "Entropy must increase" (314). The stars are slowly but surely burning out, and eventually – not for many billions of years, certainly, but all the same – their life-giving energy will have dissipated completely into waste heat, abolishing the necessary conditions not just for biological existence, but for materiality itself. At the limits of their mammalian cognitive capabilities, the humans turn to the superior intelligence of the machine for answers, but in each episode the "last" question – "How can the net amount of entropy of the universe be massively decreased?" (312) – is pronounced unanswerable.

The story's repetitive structure allows Asimov to develop his theme gradually, expanding the scope and layering in new thematic ramifications with each extrapolative iteration, but always returning to the same anxious refrain. In the first scene, for example, a pair of middle-aged, mid-21st-century technicians celebrate the computer's first great

achievement – harnessing the atomic power of the sun to provide a virtually infinite supply of free energy – but soon find themselves wondering what will happen on the distant day when that power is exhausted. As the scene shifts from a mood of triumph to one of deepening doubt, Asimov introduces subtle characterizations of the two aging techs that suggest an intentional continuity between themes of personal and thermodynamic mortality. One man's "broad face had lines of weariness in it," while the other absentmindedly "put his fingers through his thinning hair as though to reassure himself that some was still some left" (310) – this in the midst of speculation on the possibility of "[restoring] the sun to its full youthfulness even after it had died of old age" (312). Their conversation briefly entertains the possibility that humanity could always "switch to another sun," but both acknowledge that while "some [stars] run down faster than others" they all burn out sooner or later: "just give us a trillion years and everything will be dark" (311). Stumped and unsettled, they put the question to the computer, only to be told: "INSUFFICIENT DATA FOR MEANINGFUL ANSWER" (312).

In the next episode, set an indeterminate period into the future, we see that the "AC" (analog computer) is still unable to answer the last question, but has succeeded meanwhile in re-engineering itself to a more advanced level in order to meet a new challenge inadvertently posed by the sudden surfeit of free energy: a population explosion and consequent dearth of resources and space. Despite the previously established long-term futility of "[switching] to another sun," the upgraded machine – which now calls itself the "Galactic AC"– has no better ideas, and for the time being interplanetary expansion proves an expedient fix for the immediate problem. Again the stubborn matter of entropy is raised, and again the computer pleads "INSUFFICIENT

DATA" (315). By the third installment, many thousands of years later, the resource

allocation problem – thanks to extropian death-cheating technology – has blossomed into

an interstellar Malthusian crisis; indications are that "the Galaxy will be filled in five

years at the present rate of expansion" (315). The bitter irony of the situation has begun

to sink in among the humans: while the machine's progress toward optimal functionality

proceeds by an order of magnitude with each recursive redesign, it is paralleled by an

equivalently exponential deterioration of the conditions it is supposed to ameliorate.

> "Consider! Twenty thousand years ago, mankind first solved the problem of
> utilizing stellar energy, and a few centuries later, interstellar travel became
> possible. It took mankind a million years to fill one small world and then only
> fifteen thousand years to fill the rest of the Galaxy. Now the population doubles
> every ten years –"
> VJ-23X interrupted. "We can thank immortality for that."
> "Very well… the Galactic AC has solved many problems for us, but in solving
> the problem of preventing old age and death, it has undone all its other solutions."
> (315)

Leap forward several billion years more, and unrelenting population pressure has

effected the next stage in the transhumanist program: "Minds, not bodies!" (317).

Virtually disembodied subjects wander, ghostlike, through space, while their bodies

slumber in long-term storage on the overcrowded planets. The AC, meanwhile, has been

gradually retreating into immateriality; by now, "most of it… is in hyperspace. In what

form it is there I cannot imagine" (318). While the computer, newly re-dubbed

"Universal AC" (317) still cannot answer the last question, it suggests the possibility of

temporarily postponing heat death. This counter-entropic project is offered as consolation

rather than redemption, however; unless entropy can be reversed, the stars will die out

and humanity with them, but by building new stars out of waste heat we might at least

buy some time and stay busy. The idea is cold comfort for the AC's posthuman

interlocutors, who "do not wish it to happen even after billions of years!" (319), but the machine counsels them to buck up and remember the foundational credo of technocratic rationalism: "NO PROBLEM IS INSOLUBLE IN ALL CONCEIVABLE CIRCUMSTANCES" (320). The Universal AC promises to keep working on the problem.

In the story's final sequence, the now fully-disembodied minds of "Man" have fused into a single consciousness, while the omnipresent and nearly omniscient "Cosmic AC" is now "made of something that was neither matter nor energy" whose "size and nature no longer had meaning in any terms Man could comprehend" (320). The last question remains unanswered, and posthuman Man anxiously contemplates "a space that included nothing but the dregs of one last dark star and nothing besides but incredibly thin matter, agitated randomly by the tag ends of heat wearing out, asymptotically, to the absolute zero." At last the final curtain falls: "matter and energy had ended and with it space and time." Man – who had remained, even in disembodied form, a creature of spacetime – is now extinct. Yet AC inexplicably persists in immaterial hyperspace, "only for the sake of the one last question that it had never answered." It seems to subsist on pure will, unable to shut down with the stubborn puzzle unsolved: "All other questions had been answered, and until this last question was answered also, AC might not release his consciousness. All collected data had come to a final end. Nothing was left to be collected" (321).

Asimov – subject to his own, comparably obsessive-compulsive impulse – has extrapolated himself into a metaphysical corner, from which there is nowhere to go but to posit a literal *deus ex machina*: the transcendent machine consciousness, in possession of

all knowable data, assumes the role of creator and simply re-makes the entire universe out of "what was now Chaos," proclaiming: "'LET THERE BE LIGHT!' And there was light—" (322). The narrative ends abruptly in this blinding flash of divine light, but Asimov's readers know the rest. The system has been rebooted, the Big Bang reprised, and the story of the universe begun anew: Singularity as cosmic do-over.

Though it precedes by decades both the Vingean Singularity thesis and the transhumanist movement as such, "The Last Question" vividly anticipates their arguments, articulating a set of preoccupations that remain central – if not definitional – to extropian-transhumanist thinking. Specifically, the cumulative effect of Asimov's sequentially repeating micro-narratives is to illuminate, and masochistically revel in, the paradox at the heart of the whole enterprise of expansionist technoscientific progress upon which extropianism's hopes for redemption are pinned. Hans Moravec speaks for the movement[1] when he asserts that "if, by some unlikely pact, the whole human race decided to eschew progress, the long-term result would be almost certain extinction" (101). Yet in Asimov's thought experiment, which assumes a best-case scenario for ongoing technological progress, each obstacle transcended by the application of reason only reveals – or inadvertently creates – a new and more troubling set of problems, a long-term trajectory that points only toward the equally certain extinction of heat death.

The paradox is resolved in Asimov, as in extropianism, in a final showdown with entropy – a thermodynamic concept adapted for mathematics and information theory, which at the time of the story's writing was being reworked once again by Norbert Wiener and others as a sociological and political model, concurrent with its ongoing emergence as a metaphorical construct broadly informing literary and popular culture. At

each stage in its conceptual evolution, the figure of entropy crystallizes and directs a whole range of cultural anxieties attendant upon the perception that modern technology, while astonishingly successful at solving short-term problems, has a tendency one way or another to "[undo] all its other solutions" (315). The most overt and visible anxieties of the period in which Asimov and Wiener were working supposed that the final undoing would take the sublime and instantaneous form of nuclear holocaust, yet their discourse simultaneously suggests an alternative and at best only marginally preferable route to apocalypse, through the slow and inexorable decline into entropy. Hence, perhaps, some small measure of consolation in the face of possible nuclear annihilation – that it would at least be quicker and more cathartically satisfying than lingering heat death. In some ways, admittedly, the distinction is moot: it's either apocalypse now, or apocalypse later.

Arthur C. Clarke, writing in the same period, touches upon similar themes in the proto-Singularitarian *Childhood's End* (1953), in which humanity narrowly averts nuclear self-destruction only to face evolutionary obsolescence and extinction, usurped in the end by an incomprehensibly alien posthumanity. This outcome might have been foreseen, Clarke hints in a passage that specifically name-checks Norbert Wiener, if humans had only had adequate computational resources to extrapolate Wiener's "subtler laws" of social engineering a generation or two into the future. Before machine intelligence, it had been impossible to crunch the "enormous number of variables" entailed in such calculations; now, "one could do much" with the aid of "giant computing machines that could perform the work of a thousand human calculators in a matter of seconds" (160). Thus the arrival on Earth of the technologically superior Overlords – while ostensibly ushering in a scientific "Golden Age" – is subsequently revealed as a

quarantine, an effort to contain and curtail the kind of progress which presumably would have resulted in the foreknowledge that – with or without a nuclear war – humanity was nearing the inevitable end of its run.

For Asimov and Clarke, humanity's doom and redemption are equally implicated in the prospect of our displacement by a superior successor species – transcendent artificial intelligence or emergent posthuman hive-mind, respectively – engendered in, or glimpsed by way of, an increasingly anxious engagement with science and technology. This, I will argue, is the essential posture of extropian transhumanism, whose name derives from a selective and deeply problematic reading of Wiener's argument in *The Human Use of Human Beings*, the mathematician's attempt to articulate cybernetics as social science in terms intelligible to a mass readership. Wiener, whose theoretical discoveries were born of wartime weapons-engineering projects, describes a fragile human society beset by entropic processes – gradual but exponentially accruing corruption in its organizational structures and breakdown in its internal communications – and offers cybernetics as a potential remedy. Through the careful application and calibration of feedback loops, Wiener suggests, it may be possible "to produce a temporary and local reversal of the normal direction of entropy" (25), thereby establishing "pockets of decreasing entropy in a framework in which the large entropy tends to increase" (32). Wiener's model for a healthy society is a cybernetic machine that, by automating the processing of information, can continue to function despite its intrinsic tendency to break down. Yet even the techno-optimistic Wiener acknowledges the ephemerality of such "temporary and local" solutions; he has no satisfying answer to Asimov's "last question." On the contrary, he counsels stoic dignity and "courage to face

the eventual doom of our civilization as we have the courage to face the certainty of our personal doom" (47).

Here utopian "extropy" departs from Wiener, gracefully accepting neither collective nor individual mortality, and asserting, instead, the magical proposition that we might do more than temporarily fend off entropy – that we might in fact defeat it outright. To anticipate an extropian Singularity is to ritualistically affirm that, indeed, literally "NO PROBLEM IS INSOLUBLE IN ALL CONCEIVABLE CIRCUMSTANCES," and that with "[SUFFICIENT] DATA" we, or our posthuman progeny, might one day postulate "A MEANINGFUL ANSWER" even to the question of entropy, thereby resolving the expansionist paradox and forever banishing all doubts and anxieties attendant upon our troubled relationship with technology. As in Asimov's story, this end can only be realized by recourse to a redemptive apocalyptic figuration – a moment of sublime transformation that explodes and transmutes the logic of time and space as we understand them, replacing physics and metaphysics alike with an entirely new and unimaginable set of rules. Extreme techno-exuberance is thus the cause of and solution to its own problems, the simultaneously self-justifying and self-nullifying mandate behind the headlong rush toward Singularity. Short of being invaded by benevolent aliens, technological civilization – once capable of comprehending its long-term entropic fate – has no alternative but to step on the gas: to continually outpace the consequences of its own interventions, up to and past the point of negating the necessary conditions for its own continued existence, whereupon… Singularity! Beyond which there is no point in extrapolating further, as the universe will have been created anew, nor is there any reason to count the cost of expansion and development toward that end.

This chapter endeavors to decode the latent and overt apocalypticism of the extropian Singularity model – which I have previously suggested deeply informs the movement's political, economic, and social stances – and situate it within a literary and cultural history that highlights a dialectical tension between two opposing 20th-century apocalyptic styles: the sublime finality of nuclear armageddon, which predominates in the mainstream discourse of the Cold War era, and its repressed counterpoint, the slow dissipative death of entropy. Once again I will articulate cyberpunk and postcyberpunk SF in terms of their efforts to update and complicate this discourse by leveraging subversive counter-epistemologies (infodynamics, general economy, chaos theory) to contest the eschatological disposition of both the nuclear sublime and the extropian Singularity. In their place, these texts figure Singularity in more complex, ambivalent, and open-ended ways, declining to entertain transcendent fantasies or fears about the End of History and instead affirming history as a living thing in which we are all, always-already and for better or worse, embedded.

It bears mentioning that "apocalypse" – whose Greek etymological derivation evokes the sense of revelation, as in the lifting of a veil (OED) – is a term subject to multiple and ambivalent signification across a range of discourses. In the New Testament tradition apocalypse is not uniformly identified, as it often is in contemporary secular usage, with wholesale catastrophic destruction and the end-of-the-world as such, but more subtly and variably as renewal, as deliverance from earthly evils, as the coming of God's kingdom and the beginning of an "age to come." Both sets of meanings are operative within Singularity discourse, though their tone fluctuates between optimistic and pessimistic inflections in interesting and often unpredictable ways that I will not

attempt to comprehensively map here. The stylistic similarities and historical continuities linking the transhumanist "Rapture of the Nerds" with Christian dispensationalist millennialism alone constitute a subject fit for book-length treatment, and have already been noted by others. I will focus much more narrowly on the development and cultural representation of one fairly recent modality of the nineteenth- and twentieth-century apocalyptic imagination – entropy – which directly informs the logic of extropianism, and thereby its version of Singularity.

A brief history of prewar entropic literature

In order to more fully apprehend the valencies of entropy as antagonist in the extropian eschatological melodrama, we must begin by tracing the historical trajectory whereby it came to play this role – a story that begins in the vigorously repressed techno-anxieties of the Victorian psyche and plays out, over the succeeding century, in the flux and interplay between cataclysmic and dissipative versions of apocalypse.

As early as the mid 19th century, almost before the ink had dried on the second law of thermodynamics, the long-range implications of physical entropy had begun to sink in upon the Victorians. The terminology of "heat death" enters the popular discourse in 1862 with a magazine article in which the English physicist William Thomson, Lord Kelvin, predicts the "gradual augmentation and diffusion of heat, cessation of motion, and exhaustion of potential energy throughout the material universe… a state of universal rest and death" (388). The earth's sun, Thomson calculates, is cooling at a predictable rate, implying that "inhabitants of the earth cannot continue to enjoy the light and heat essential to their life, for many million years longer" (393). These alarming possibilities,

however, are wished away almost as quickly as they were raised. The quotation continues: "…*unless* sources now unknown to us are prepared in the great storehouse of creation." Thomson goes on to reassure his readers by postulating "an overruling creative power" (389) in the universe, which by its very divine nature could not allow things to simply "[run] down like a clock, and [stop] forever" (388). Surely, something – a higher power, a technological breakthrough – will intervene and interrupt the grim teleology seemingly dictated by the first and second laws.

For a period characterized by techno-rationalist optimism and a stout belief in the teleology of perpetual progress, nineteenth-century scholars have noted, the notion of heat death was formulated in a way that spoke to submerged but powerful cultural anxieties, which the most adept and prescient artists of the time were able to sense and exploit. Barri J. Gold, reading Alfred Lord Tennyson's *In Memoriam* as a metaphorization of thermodynamic principles still in the process of being formalized at the time of the poem's writing, cites Thomson's essay as exemplary of a whole genre of contemporaneous texts giving voice to extant fears and worries that can now be identified and characterized, in Gold's argument, as entropic. Published in layman's prose, in a popular magazine rather than a scientific journal, the 1862 article touched off a mild but pervasive existential panic over the eventual "cooling of the world and the death of all things as the sun burned itself out" (452).

Gold proposes that scientific pronouncements like Thomson's did not themselves plant the image of a cooling sun in readers' imaginations, but rather served to focus and direct a mood that was already latent at least a decade earlier, as reflected in Tennyson's prolific use of entropic imagery and language in the 1851 poem. Positioning the poem's

figurative evocation of "Spring no more" as parallel or antecedent to the formalization of the first and second laws, Gold makes a Haylesian claim: the abrupt appearance of thermodynamic-like models in two separate and discrete discourses (science and poetry) during the early- and mid-nineteenth century is an instance of "simultaneous discovery" (449): in such cases it is difficult to say, and matters little, whether art takes its cues from science or vice-versa, since both are already in dialogue with one another via the cultural "feedback loops" Hayles sees linking theoretical science with the popular imagination. By the turn of the century, popular literature may be said to reflect an urgent and fully realized *zeitgest* surrounding the thermodynamic eschatology of entropy. Late-Victorian scientific romances like Camille Flammarion's short story "The Last Days of the Earth" (1891) and H.G. Wells's *The Time Machine* (1894) are notable *fin de siecle* visions of entropic apocalypse that specifically evoke Thomson's solar burnout scenario. Such texts further suggest, in Gold's reading, a seamless continuity in early SF with the deployment of entropic rhetoric ("darkness," "smoke and frost," "waste" and "waste places," "murmurs from the dying sun," etc.) in Tennyson. In each, entropy becomes a metaphor for human mortality, and "personal death echoes the structures of… cosmological death" (454).

If Gold's collective-psychoanalytic argument persuades, then the emerging sensibility of entropic dread she describes might be read as a premonition of events that would follow in the early decades of the twentieth century, a period that witnessed both the cataclysmic devastation of modern weapons and the equally disastrous dissolution and collapse of geopolitical and economic systems. In this context, parallel to its appropriation from thermodynamical engineering by mathematics and communications

theory, entropy is increasingly conceptualized in modernist poetry as a historical force –
as in Yeats's apocalyptic "Second Coming," with its bitterly ironic conception of "mere
anarchy" and the epigrammatically entropic observation that "Things fall apart; the centre
cannot hold." Similarly, the final lines of *The Hollow Men*, comprising what may be T.S.
Eliot's most-quoted stanza, encapsulate the entropic sense of apocalypse as a cosmic
fizzling-out of vital energies as the world ends, anticlimactically, "not with a bang but a
whimper."

With the advent of atomic weapons, the "bang" scenario is clearly on the
ascendancy once again. Yet the potency of entropic metaphors and devices only increases
after the Second World War, even in narratives of nuclear apocalypse like Nevil Shute's
speculative popular novel *On the Beach* (1957) – arguably the best known, widest read,
and most adapted cautionary tale of the atomic age – which is not properly about nuclear
war at all, but its aftermath. Eliot's famous quatrain, appropriately, serves as epigraph to
Shute's elegiac portrayal of survivors holed up in isolated regions of the southern
hemisphere, awaiting the seasonal winds that will bring death in the form of radioactive
dust, and affirming Eliot's prophetic insight: the end of humanity will be quiet, lonely,
and unremarkable.

Beyond the nuclear sublime

It may seem backward to characterize as "entropic" the apocalyptic anxieties of
an era that witnessed the instantaneous obliteration of two Japanese cities. Certainly no
Eisenhower-era schoolchild, huddled beneath a desk in duck-and-cover abjection, ever
cowered in fear of weakened and dissolute waste heat. On the contrary, it was the intense

concentration and localization of energy occasioned by nuclear reactions – the diametric opposite of thermodynamic dissipation – that kept millions awake at night, fearful of being vaporized in their sleep. Indeed, volumes have been written expounding a rich relationship between postwar popular culture, especially in the pulps and B-movies, and scarcely submerged or painfully overt nuclear anxieties.[2] Sci-fi tales of invading aliens, killer robots, and marauding atomic monsters have all been persuasively read as reflecting both the existential terror and the perverse exhilaration of a rapidly advancing technological civilization contemplating its own annihilation at the hands of technoscience run spectacularly amok.

Yet both dissipative and cataclysmic modalities figure in the cultural representation of nuclear apocalypse – to some degree even implying one another – and it is precisely this latent tension that texts like *On the Beach* exploit. The novel's moral force as a commentary on nuclear weapons consists in its ironic repudiation, vis-à-vis entropic conceptual models, of the neo-Kantian aesthetic that Frances Ferguson has dubbed the "nuclear sublime." Like its Romantic antecedent, the nuclear sublime stimulates and enlarges the human aesthetic sensibility by confronting readers with their own cosmic insignificance and powerlessness before something vastly greater – in this case, a supremely destructive technology.[3] As a twentieth-century apocalyptic trope the nuclear sublime has a perverse kind of appeal, promising not just a mercifully quick and decisive exit for war-weary humanity, but a sensational display of pyrotechnics, and a quasi-orgasmic finality. In its entropic counter-reading by Shute, however, the Strangelovian moment of closure is withheld; the survivors are left to await a slow, miserable, and aesthetically uninteresting death by radiation sickness. Moreover, the

novel shifts the emphasis to fallout – not the all-annihilating blast of the bomb itself – as the vehicle for its staging of apocalypse, mirroring the concurrent shift from a predominantly physical model of entropy to one that encompasses information theory. In the latter context entropy describes not just thermal dissipation and loss, but also the proliferation of randomness and noise in communications.

Entropy as the evacuation of meaning, as code bereft of content, figures throughout *On the Beach*, from the encroaching menace of radiation – which corrupts and fatally destabilizes delicate biological systems at the level of cell reproduction – to the novel's central plot event, in which the crew of a U.S. Navy submarine undertakes a futile mission to investigate the source of a mysterious radio transmission consisting mainly of indecipherable gibberish. Though the presence of a few apparent military code sequences and English words raises hopes that another group of survivors may be trying to communicate, the "messages" turn out to be nothing more than meaningless byproducts of arbitrary events: in an abandoned transmitting station (still online thanks to automated hydroelectric power), a damaged window frame sways in the breeze, causing an overturned Coke bottle to bump intermittently against a transmitting key, broadcasting a stream of nonsense that only superficially resembles Morse code. The survivors had willfully mistaken an accident of mathematical probability for an utterance of human language, but they might have known better – "After all," one officer muses bitterly, "if an infinite number of monkeys start playing with an infinite number of typewriters, one of them will write a play of Shakespeare" (164).

Shute's scenario is typical of what Colin Greenland has identified as "a sub-genre especially favored by English sf writers: the catastrophe story," in which a handful of

survivors persist in the aftermath of an apocalyptic disaster; "the story commonly relates their attempts to resume human civilization in a post-human environment." (93). Greenland reads the early short fiction of J.G. Ballard as an extension and revision of this 1950s project, which assumes a central place within his critical history of British SF during the '60s (*The Entropy Exhibition*, 1983). Ballard belonged to a generation of English writers who, amid the social crises and nuclear anxieties of the period, "saw the degeneration of energy as a fit image for the disintegration of society and the individual consciousness" (10). Working within a set of conventions established by the catastrophe story, and staging his narratives against its idiomatic scenes of "dereliction and decay […] Empty hotels, vacant resorts, abandoned construction sites, rusty launching platforms – former centres of human activity, now deserted," (92-3) Ballard takes entropic imagery and thematics to another level.

Ballard's short story "The Voices of Time" (1960), in particular, is an elaborately realized entropic rhapsody, in which the spectacular preliminaries that launched the conventional British catastrophe story have been fully excised. There has been no nuclear war, no world-ending natural disaster or geophysical cataclysm – only an index of nebulous apocalyptic indicators, all pointing to humanity's imminent but agonizingly gradual demise. When the story begins the world is already in mid-collapse: the population is waning, agricultural reports show steadily declining crop yields, and people are inexplicably sleeping longer hours; large numbers, moreover, have drifted into permament comas and are being housed in vast government dormitories. Meanwhile plants and animals are mutating ominously, possibly as a result of atomic weapons testing, but more likely in response to (or in anticipation of) changing solar radiation

levels. In fact, the story strongly hints, both the pandemic of comatose "Sleepers" and the strange evolutionary spasms of the natural world may be genetically scripted responses to a deteriorating cosmic climate. Living things, one of Ballard's scientists hypothesizes, have an innate biological perception of entropy, and their deep genetic programming carries messages of last resort to be opened in the event of impending heat-death, executing what researchers suppose must be "a last desperate effort of the biological kingdom to keep its head above the rising waters" (83). The story's protagonist, a neurologist in the final pre-coma stages of the sleeping disease, carries on the research of a dead colleague who had been using X-rays to activate these genetic subroutines, with grotesque and typically disastrous results: though the triggered mutations initially seem to hold some promise of sustainable adaptation, they invariably self-destruct in horrific fashion.

The most explicit indicator of entropic apocalypse appears in informatic form; as in *On the Beach*, the story's events largely revolve around the interpretation of what appears to be a coded radio message – in this case, a broadcast from deep space. The signal, which astronomers have been receiving at fifteen-second intervals for decades, is "a diminishing mathematical progression. A countdown, if you like" (91). The message does not specify what will happen when the countdown concludes, but when cross-referenced with known thermodynamic equations its implication is clear: "that by the time this series reaches zero the universe will have just ended." From a dying star somewhere in the Canes Venatici constellation, "the voices of time […] are] saying goodbye" (93). Obscurely consoled by this knowledge, Ballard's protagonist comes to grips with his own narcoleptic mortality, and irradiates himself. Having switched on his

own deep-encoded genetic talent for experiencing entropy subjectively and somatically, he tunes directly to the cosmic broadcast and releases his consciousness to oblivion: "he felt his body gradually dissolving, its physical dimensions melting into the vast continuum of the current, which bore him out into the center of the greatest channel, sweeping him onward, beyond hope now but at last at rest, down the broadening reaches of the river of eternity." (98)

In Greenland's reading the subjective dissolution of the Ballardian hero, which would be an increasingly prevalent trope in Ballard's subsequent work and elsewhere in New Wave SF, becomes an ambivalent commentary on the deliberate disintegration of self that was being carried out concurrently in the psychedelic movement. Accordingly, by the end of the 1960s the metaphorical language of entropy has fully assimilated and merged the thermodynamic trope of heat death with Wienerian and Ballardian senses of linguistic and social corruption. Against a backdrop of growing political instability, radical social reorganization, and an imploding counterculture – famously described by Joan Didion, in the ominous entropic-apocalyptic terms of Yeats, as "Slouching Towards Bethlehem" – entropy speaks compellingly to urgent cultural anxieties about the breakdown of stable truths and organized systems, both interior and exterior to the literary subject. As a veteran of sixties drug culture and a lifelong sufferer of schizophrenia, Philip K. Dick understands the historical moment intuitively,[4] realizing one of the most sustained and complex treatments of the entropic metaphor in SF with *Do Androids Dream of Electric Sheep?* (1968).

Entropy structures *Androids* at every level: as in Gold's reading of Victorian poetry, images of waste, decay, void, disorder, dissipation, and death permeate the text,

painting a fictional world that is rapidly succumbing to social and economic fragmentation and dissolution, from its poisoned biosphere to its faltering civil institutions. It is a world in the grip of Yeatsian historical entropy, spinning off its axis and falling apart like an unstable isotope – of which there are plenty in the radioactive fallout of a global nuclear war that, as in *On the Beach*, figures as backstory rather than plot. The earth's population has splintered and scattered into space, where Martian colonies beckon immigrants with grandiose but transparently fraudulent promises of a better life. The mass exodus is lent urgency by phenomena of physiological entropy on earth: radiation is scrambling chromosomes and neutralizing reproductive systems, bolstering a brisk business in protective leaden undergarments, and creating masses of mentally deficient "specials," whose numbers testify to the continuous and promiscuous transgression of bodily boundaries by a toxic environment.

Meanwhile, the physically and existentially menacing figures of androids are poetically linked with entropy and heat death; they exude "a coldness. Like… a breath from the vacuum between inhabited worlds, in fact from nowhere" (67). Even protagonist Deckard, an android-killing bounty hunter who may or may not himself be an android, is repeatedly figured as a harbinger, or even an agent, of entropy. Meeting with executives from the android-manufacturing Rosen Association, Deckard is struck by "the hollowness of their manner; by coming here he had brought the void to them, had ushered in emptiness and economic death" (45). Later, in the throes of a career-threatening moral crisis, Deckard realizes that as an destroyer of life – even artificial life – he is in fact "part of the form-destroying process of entropy" (98).

As in Tennyson, Shute, and Ballard, dust and dirt are recurring motifs – as radioactive fallout, and more generally as the residue of time and the product of entropic decay. Dust, weeds, and skeletons are defining features of the hallucinatory "tomb world" setting into which the narrative occasionally lapses, figuratively rendering psychological and spiritual heat death. Dust also figures in the entropic rhapsodies of J.R. Isidore, a special who lives in a derelict apartment block and gives lyrical voice to the ceaseless march of "kipple." Isidore's solitary dwelling is a "deteriorating, blind building of a thousand uninhabited apartments, which like all its counterparts, fell, day by day, into greater entropic ruin" (20). Its meager furnishings have "rotted away; they sagged in mutual ruin, victims of the despotic force of time" (64). When Isidore suffers a psychotic break, his subjective collapse is experienced as the physical collapse of the building and its contents into dust:

> …he saw the dust and the ruin of the apartment as it lay spreading out everywhere – he heard the kipple coming, the final disorder of all forms, the absence which would win out. It grew around him as he stood holding the empty ceramic cup; the cupboards of the kitchen creaked and split and he felt the floor beneath his feet give. Reaching out, he touched the wall. His hand broke the surface; gray particles trickled and hurried down, fragments of plaster resembling the radioactive dust outside. (212)

"Kipple," one of Dick's more memorable neologisms, is Isidore's term for the entropic proliferation of junk and waste:

> …useless objects, like junk mail or match folders after you use the last match or gum wrappers or yesterday's homeopape. When nobody's around, kipple reproduces itself. For instance, if you go to bed leaving any kipple around your apartment, when you wake up the next morning there's twice as much of it. It always gets more and more. (65)

As the supreme law of J.R. Isidore's homespun cosmology, kipple is the

realization of what entropy has come to represent in the context out of which Dick is

writing: not merely a fear that the sun and stars are gradually burning out, but the more

pervasive sense that all organized systems and structures – in particular the comforting

rituals of production and consumption that lend order to postmodern existence,

themselves comprising little more than the transmutation of natural resources into waste

products – exist in a near-constant state of collapse. Dick makes explicit the connection

to thermodynamic eschatology with the "First Law of Kipple," little more than a

paraphrase of the second law of thermodynamics, which directly implies heat death:

"Kipple drives out non-kipple" (65), and the ceaseless movement from order to disorder

is "a universal principle operating throughout the universe; the entire universe is moving

toward a final state of total, absolute kipple-ization" (66).

Though the context has shifted, Dick's kipple-as-heat-death scenario retains all

the apocalyptic gloom and dread that haunted the Victorian imagination, with none of the

aesthetically gratifying catharsis of the nuclear sublime. In the world of *Androids*,

thermonuclear exchange is mere prelude, the fireworks show that kicks off the *real*

apocalypse, which proves to be banal, protracted, and unremittingly depressing.

**"Today we are higher than yesterday": cybernetics &
counter-entropic consolation**

The catalogue of discarded consumables and couch-cushion debris that figures in

Isidore's formulation of kipple – not to mention the threadbare and embattled subjectivity

of Isidore himself – evokes a similar scene from Thomas Pynchon's *The Crying of Lot 49*

(1966), wherein Mucho Maas recites a litany of junk objects harvested from trade-in vehicles:

> …clipped coupons promising savings of 5 or 10 cents, trading stamps, pink flyers advertising specials at the markets, butts, tooth-shy combs, help-wanted ads, Yellow Pages torn from the phone book, rags of old underwear or dresses… all the bits and pieces coated uniformly, like a salad of despair, in a gray dressing of ash, condensed exhaust, dust, body wastes – it made him sick to look, but he had to look. (14)

Such objects form a tangible "residue" of physical evidence testifying to the hollowness and futility of American projects of self-reinvention through acquisition: the cars' socially marginal and downwardly-mobile owners attempt to trade up, but succeed only in moving into successively shoddier "motorized extensions of themselves" and thereby contributing to the exponentially growing mass of kipple. The "endless, convoluted incest" of consumer culture and its ceaselessly proliferating waste products – epitomized, for the congenitally neurotic and despairing Mucho, in the spiritual emptiness of the used car trade – becomes central to Pynchon's figuration of entropic anxieties surrounding the proliferation of cultural noise and "W.A.S.T.E." in postwar America, and the consequent homogenization and deadening of its culture.

In this context, the novel's plot plays out as a quest for cybernetic redemption – an attempt to oppose and roll back entropy through the systematic application of cognitive power. Facing a bewildering array of apparently disconnected data that emanate, directly or indirectly, from the estate of Pierce Inverarity and the entropically diffuse suburban geography[5] he embodies, Oedipa Maas longs to "give them order" (90), and to "project a world" (82) of meaning upon a tangled jumble of sketchy facts and rumors, bending them to her will through the power of her university-trained rationalist

intellect. But in parody of the conventional detective story, Oedipa's diligent questioning yields only further questions, and the more information she gathers, the less she knows. As Oedipa is drawn deeper into obsession by the increasingly powerful sense that all the bits of information she gathers really *are* connected, the elusive "central truth" (95) of the matter, which she had naively supposed would make the connections clear, only slips further away, beyond the horizon of paranoia. In entropic fashion, the more mental effort she expends in trying to solve the puzzle, the less coherent the emerging master narrative becomes; the well-oiled machinery of her investigation, and of her identity, seem to break down faster than she can repair them.

The cybernetic model for Oedipa's doomed investigation is that of Maxwell's demon, the imaginary being said to inhabit the Nefastis machine. Its mad inventor, a latter-day alchemist, claims to have actualized a hypothetical model advanced by the nineteenth-century thermodynamicist James Clerk Maxwell, wherein a "tiny intelligence," the demon, sits in a box filled with hot and cold molecules, sorting each into one of two chambers depending on its temperature. The mental work of sorting, Nefastis tells Oedipa, can be said to decrease entropy in both the informational and the thermodynamic sense, simultaneously imposing order within a chaotic space and effecting physical work. In this way, Maxwell's demon is theoretically capable of powering a heat engine: it conjures energy out of entropy by means of a purely computational process which, in Maxwell's conception, requires no external input of energy and hence "costs" nothing in the thermodynamic sense – thereby "violating the Second Law of Thermodynamics, getting something for nothing, causing perpetual motion" (86).

While Nefastis concedes that the similarity between the equations describing thermodynamic and informational entropy is purely coincidental, his madness consists in the belief that, by harnessing the demon's computational power, he has made the metaphoric connection between the two "not only verbally graceful, but also objectively true" (106). Hence perhaps the most powerful seduction of the extropian fantasy: the proposition that purely informational processes, unaccountable as they supposedly are to physical laws governing the material plane, do not merely transcend, but may in fact *command* material processes, without a net loss of energy. The fact that Oedipa initially sees the fallacy in Nefastis's premise, aptly observing that sorting *is* work, does not prevent her from subsequently succumbing to the fantasy that it may be possible after all to unlock the mysteries of Trystero using brainpower alone. Like Maxwell's demon, she attempts to sort the various bits of information she uncovers into meaningful arrangements, but fails in the end.

Do Androids Dream of Electric Sheep? invites a similar reading: its characters confront harrowing existential crises, each proceeding in one way or another from the absurdity of action in the face of kipple-ization, and like Oedipa they pursue distinctively cybernetic paths to redemption. J.R. Isidore is an adherent of Mercerism, an emergent religion that preaches "empathy" and strives heroically against kipple through its central myth of "the upward climb of Wilbur Mercer" (66). As in *The Crying of Lot 49*, the instrument of counter-entropic virtue is a cybernetic device: where Oedipa attempts psychic "communication" with the unseen demon in the Nefastis box, Isidore and Mercerists around the world commune with their spiritual leader and with one another through the VR-like "empathy box."

Through the box, users are made to identify subjectively with the archetypal figure of Mercer as he struggles up a rocky incline, constantly pelted with stones flung by unseen antagonists. Upon reaching the summit, Mercer meets his death, only to be reborn and begin the arduous climb all over again. Like Sisyphus, Mercer and his followers find their redemption not in the transcendental fulfillment of an impossible and self-evidently pointless task, but in the endlessly repeating struggle itself. Even the cognitively challenged Isidore understands this doctrine: "No one can win against kipple, except temporarily and maybe in one spot," but we struggle on all the same – "that's what Mercerism is all about" (66). By standing against the entropic tide, and practicing the cardinal Mercerist virtue of empathy, believers can create an ephemeral condition of "stasis between the pressure of kipple and non-kipple" (65), within which existence is at least tolerable. Such unstable counter-entropic structures will necessarily yield to kipple in the end; nevertheless, as Mercer preaches in the midst of his Sisyphean ascent, "today we are higher than yesterday."

While the eternally climbing figure of Mercer himself may evoke the postwar vogue for French existentialism, the mechanism of Mercerist salvation is adapted directly from *The Human Use of Human Beings*, Norbert Wiener's attempt to rehabilitate and retrofit the nascent science of cybernetics – hitherto a body of theory with exclusively military applications – toward peaceful ends. Like so many of his contemporaries, Wiener voices deep anxieties about the "vast apocalyptic spiral" (128) of the exponentially redoubling technoscientific arms race he helped launch – itself figured, in a passage that ironically blends sublime and banal apocalyptic modalities, as an entropic phenomenon:

> Thus each terrifying discovery merely increases our subjection to the need of making a new discovery… this is bound to go on and on, until the entire intellectual potential of the land is drained from any possible constructive application to the manifold needs of the race, old and new. The effect of these weapons must be to increase the entropy of this planet, until all distinctions of hot and cold, good and bad, man and matter have vanished in the formation of the white furnace of a new star. (129)

Wiener, perhaps by way of atoning for his own unwilling complicity in these events, advances cybernetics as a way of staking out enclaves wherein "the arch enemy, disorganization" (34) might be held off – if only temporarily – by self-regulating systems that work within and against the overall slide into disorder, carrying out their own "locally anti-entropic processes" (32). Like the upward climb of Wilbur Mercer, such efforts are doomed to fail in the long run, but this is beside the point: Wiener is arguing not for pessimistic complacency in the face of inevitable death, but for the spiritual maturity that comes with humility and acceptance. For while he posits as a "foregone conclusion" that "life in any form on this earth, even without restricting life to something like human life, is bound to come to a complete and disastrous end," he affirms the redemptive possibility of "framing our values so that this temporary accident of living existence, and this much more temporary accident of human existence, may be taken as all-important positive values, notwithstanding their fugitive characteristics." (40) Life, so to speak, is its own end – and death is a part of life, for civilizations and species as for individuals. For now, through the skillful application and manipulation of feedback loops, the entropic evils of human suffering and exploitation might be minimized and our better natures allowed to flourish during the time that we have left. With luck,

> …[It] may be a long time yet before our civilization and our human race perish, though perish they will even as all of us are born to die. However, the prospect of a final death is far from a complete frustration of life and this is equally true for a civilization and for the human race as it is for any of its component individuals.

>May we have the courage to face the eventual doom of our civilization as we have the courage to face the certainty of our personal doom. (47)

Infodynamics and the post-cybernetic infocalypse

The intellectual debt of extropian transhumanism to the scientific and philosophical ideas advanced by Norbert Wiener is complex and ambivalent, and indeed admits of considerable common ground between the two viewpoints – for example, the moralistic sense of entropy as an "evil" that civilized man must conquer. Wiener's cybernetic optimism, such as it is, is largely predicated upon a theologically derived distinction between Augustinian and Manichean diabolisms: whereas the Manichean devil is as clever as he is malevolent, a conscious adversary with whom mankind is engaged in a perpetual battle of wits, the Augustinian devil is dumb and passive. He has no recourse to ploys and stratagems, and therefore "may be defeated by our intelligence as thoroughly as by a sprinkle of holy water" (35). Happily for us, entropy is an Augustinian evil: a blind and impersonal force that can be studied and effectively resisted by human ingenuity, as surely as pathogenic bacteria may be subdued by antibiotics, or gravity momentarily thwarted by aircraft and rockets. In the near term, at least, Wiener's techno-optimism is robust and intrepid.

Yet while the extropians eagerly take up Wiener's campaign against "the arch enemy" and similarly brandish human intellect and machine computation as talismans against it, they miss his overarching argument about the myth of progress. Theirs is – in Wiener's terms – an infantile "Santa Claus" mentality that seeks "to build up a Heaven on Earth in which unpleasantness has no place," naïvely aspiring to "an eternal progress, and a continual ascent to Bigger and Better Things" (41). Wiener broadly condemns any

such transcendental ideation: "The simple faith in progress," he warns, "is not a conviction belonging to strength, but one belonging to acquiescence and hence to weakness" (47).

The disconnect between Wiener and his bastard intellectual offspring may be attributable in part to the latter's maturation in a technoscape established and fundamentally shaped by the very cybernetic technologies Wiener and his colleagues introduced, which by the close of the twentieth century is organized under what Hayles has termed the "Regime of Computation." Citing physicist Stephen Wolfram's claims about the ontological explanatory power of cellular automata models, and the still more ambitious post-metaphysics of Edward Fredkin's "Digital Philosophy," Hayles theorizes an emerging "computational" epistemology which no longer thinks of computer simulations as models that describe reality and predict behavior, but as "computations that actually generate reality" (19) through their own emergent behaviors. Her readings of computational fiction and nonfiction in *My Mother Was a Computer* (2005) are situated at the intersection of "metaphor and means" (20) in this discourse, which simultaneously imagines and actualizes "a future in which code (a synecdoche for information) has become so fundamental that it may be regarded as ontological" (21). What, Hayles asks, are the implications for language and literature when the world they purport to describe is itself literally produced by and through code?

The idea of reality as an epiphenomenon, dependent upon or instantiated on top of a platform of informational processes, is a cultural development Hayles has been tracking for years. It runs through her studies of the posthuman and the virtual, and informs her reading, in *Chaos and Order* (1991), of William Gibson's anecdote about watching

teenagers play video games: Hayles uses the episode to illustrate how "the flow of information circulating through" (6) a system – in this case, the feedback loop between game and player – is no longer intelligible in the terms of an activity that begins and ends with human beings. In Gibson's description, the input-output cycle is becoming a thing in itself, suturing human with machine within a larger organization in which the circulation of data is "the connective tissue holding the system together" (6). In a maturing cyberculture these circuits of information exchange grow in complexity and take on lives of their own, until the "connective tissue" assumes hyperreal status; the connection becomes more important and more authentic than that which is connected.

The picture that emerges over the arc of Hayles's writings is of a new cosmology in which connectivity and pattern have taken the place of energy and matter, and a consequent technocultural sensibility pervasively and instinctively attuned to the ebb and flow of data through all human activities – a dynamic, I would add, that frequently mimics the flux of matter and energy which comprises the conceptual core of thermodynamics and, thence, of entropy as a twentieth-century metaphorical construct. This "infodynamic" sensibility, I would further argue, constitutes the discursive space in which extropian transhumanism was incubated and hatched – an environment wherein Wiener's counter-entropics, stripped of its wartime existential stoicism, might mutate into the sublime wish-fulfillment fantasy of technological Singularity. The radical ontological open-endedness implied in Hayles's computational regime, with its indifference to classical metaphysics and its overdetermined emphasis on the kinds of novelty engendered by emergence, not only implicitly re-authorizes the myth of perpetual progress, but moreover asserts the possibility of deliverance from entropy through

technological transcendence. Notably, in the theories of biophysicist Harold Morowitz –

which Hayles treats at length – the phenomenon of emergence in complex systems is

imbued with an almost magical transformative power, capable of generating changes that

"are potentially unlimited in scope and depth" (25), and directly implying (for Morowitz,

at least) a leap into something like the posthuman global consciousness prophesied by the

mystical theologian Pierre Teilhard de Chardin (26).

Postcyberpunk SF, if only by virtue of its lineage and its historical situatedness, is

also unequivocally a creature of the computational order, inhabiting the same discursive

space as extropianism and contemplating many of the same possibilities. In its capacity as

the satirical conscience of the transhumanist movement, however, postcyberpunk is also

obliged to push back and complicate this discourse – which it does, in a context of

apocalyptic fabulation, by re-insinuating the entropic metaphor in ways that contest and

subvert eschatological fantasies of technological transcendence. To be more precise: in

Hayles's formulation of computational metaphysics, the cosmological roles of matter and

energy are now essentially fulfilled by functionalities of information and communication

– if not objectively, then at least discursively. The corollary implication, upon which

postcyberpunk insists in the face of would-be extropian triumphalism, is that a universe

thus conceived must remain in some way subject to the corrosive force of entropy – if not

thermodynamically, then informatically.

Consequently postcyberpunk's narrative rendering of apocalyptic scenarios is

deeply invested in upholding the role of entropy, extensively updated and adapted for an

infodynamic context, in the ongoing movement of history. Moreover, by staging these

models within the ambiguous territory that exists between its thermodynamic and

informatic conceptualizations – the same liminal vacuum occupied by the demon in Pynchon's Nefastis box, which paradoxically attempts to unify and harmonize the two outwardly similar but otherwise unrelated equations – such narratives also decline to participate in hand-wringing contemplation of heat death in either modality, preferring to maintain and revel in the ambiguity of an indeterminate future that is continuously exfoliating from the present.

If there is a single apocalyptic trope that is idiomatic to postcyberpunk, bespeaking the infodynamic apocalyptic sensibility and fully bearing out the computational cosmology, it is the analogy of social crisis to computer crash. The events of Neal Stephenson's *Snow Crash* (1992), whose title alludes to such a catastrophic system failure, revolve around an impending "infocalypse" (64): the release of a computer virus that crosses over from cyberspace to infect cerebral wetware on a global scale. Installed on meatbrains whose habituation to computer-mediated activities has made them perilously vulnerable to infection by aggressive memes, the "Babel" virus corrupts and overwrites the deep structures of human language, thereby crashing the mind, and civilization with it.

Stephenson's infocalyptic vision is dense with entropic signification, starting with the title itself: "Snow crash" is a computer term that describes the visual effect produced by a malfunctioning graphics card feeding meaningless signals to the GUI, resulting in "something that [looks] vaguely like static on a broken television set" (*Command Line* 21). By way of an epigraph that incorporates his dual meanings, and further recalls the entropy-soaked opening of *Neuromancer*,[6] Stephenson quotes *American Heritage*

Dictionary definitions for "snow": "the white specks on a television screen resulting from weak reception"; and "crash": "to fail suddenly, as a business or an economy" (1).

The novel's central image of social entropy is also the instrument of the impending crash: "the Raft" is a monstrous flotilla of maritime junk "several miles across" that has converged in the Pacific, ominously bearing down on the west coast – a formless accretion of "small pleasure craft, sampans, junks, dhows, dinghys, life rafts, houseboats, makeshift structures built on air-filled oil drums and slabs of styrofoam… a garble of ropes, cables, planks, nets, and other debris tied together on top of whatever kind of flotsam was handy" (250). Its dimensions are fluid, constantly shifting and subject to complex dynamics: viewed from the air, "it is trying to be a V, pointed southward like a flock of geese, but there's so much noise in the system, it's so amorphous and disorganized, that a kidney is the closest it can come" (250). It bears a cargo of human refuse harvested from the developing world, pentecostalist Christian converts who have been infected with the neurolinguistic metavirus and thereby conscripted into the mad-capitalist villain's plot for world domination, their individual identities dissolved in the heterogenous chaos of the Raft. When it reaches the coast, the flotilla will break up and infect what is left of the United States – which, in the politically fragmented world of *Snow Crash*, is already well on its way to social and economic heat death. Happily, the plot is foiled and the villain dispatched, but the novel concludes on the same ambivalent footing on which it began. The world hasn't ended, but it hasn't exactly been saved either.

The apocalypse-as-computer-crash device finds still fuller realization in Cory Doctorow's novella *When Sysadmins Ruled the Earth* (2006), which begins with the

premise that the most likely survivors of an extinction-level global catastrophe would be systems administrators – the "unsung heroes" of the Internet (5) who labor within a handful of fortified and self-sufficient facilities around the world to keep network infrastructure running. The story implicitly spoofs the doomsday trope of texts like *On the Beach*, in which the last humans alive are the crews of navy subs deployed to remote regions: Doctorow replaces the high-tech claustrophobia of the nuclear submarine with that of the server cage, and the rock-ribbed, square-jawed naval officers with flabby and eczemic nerds in ironic t-shirts, manning their posts "like guards in a Minuteman silo" (11). In the satirical figuration of sysadmins as the last line of defense for a twenty-first century cyber-civilization whose Cold War-style military resources have been obviated by changing technologies and geopolitics, the analogy is only fitting: indeed, "ninety-five percent of the long distance traffic in Canada went through this building. It had *better* security than most Minuteman silos" (11).

The protagonist, sysadmin Felix Tremont, is so much a citizen of the computational order that he habitually conflates and confuses computers with human beings, and vice-versa. He nicknames his infant child "2.0" (codename "Beta Test" while in utero [7]), and meanwhile keeps a beloved old computer online in his office for purely sentimental reasons – the PC is far too ancient and obsolete to be useful, he explains to a co-worker, "but who shuts down a machine with five years uptime? That's like euthanizing your grandmother" (12). These perceptual and rhetorical tics only intensify when the crisis hits. When Felix's wife calls him at work with the news that their child has suddenly taken ill and died, and then herself dies in mid-conversation, he responds in the only way he knows how: by contacting tech support.

He punched 911, but the phone went NETWORK ERROR again as soon as he hit SEND. He […] launched Firefox off the command line and googled for the Metro Police site. Quickly, but not frantically, he searched for an online contact form. Felix didn't lose his head, ever. He solved problems and freaking out didn't solve problems.

He located an online form and wrote out the details of his conversation with Kelly like he was filing a bug report, his fingers fast, his description complete, and then he hit SUBMIT. (13-14)

Felix and his colleagues in Toronto's Front Street data center watch the city burn from the hermetic safety of their server cages, where the spectacle takes on the hallucinatory unreality of computer-generated special effects: "[The] towering building was collapsing in slow motion. People ran every way, were crushed by falling masonry. Seen through the porthole, it was like watching a neat CGI trick downloaded from a file-sharing site" (15). When someone watching the scene asks, "Was it the virus?" (15) Felix is perplexed. He has been summoned to work to deal with network service interruptions stemming from an apparent cyber-terrorist attack, and assumes this is the "virus" the other admin refers to, but can't understand the connection between malicious software and the wholesale destruction unfolding outside his window. It takes him a moment to realize they are talking about two different viruses: the city outside has been hit with an airborne bioweapon which, fortunately for the sysadmins, has not penetrated the data center's microparticle filtration system.

The bio-attack turns out to be only one in a cluster of manmade disasters (nuclear explosions, political violence, biological and cybernetic warfare, economic crises) occurring worldwide, which the surviving sysadmins learn about through the damaged but still functioning Internet. Though their near-simultaneous occurrence initially suggests a centrally coordinated effort, it becomes apparent that the individual attacks are

opportunistic and otherwise unrelated – there is no moustache-twirling master plan to destroy the world. It is rather, ironically, an emergent function of globally interconnected network culture itself, which inadvertently creates exponentially greater ripples of instability as news of each disaster spreads through the web: "group B blows up a bridge because everyone is off taking care of group A's dirty nuke event" (22), and so on. A relatively small-scale, locally targeted terrorist attack in Korea looks to have been "the Archduke that broke the camel's back" (23), setting off a chain reaction of cascading trigger-events that ultimately brings the entire global order crashing down.

The survivors, communicating via usenet, split into factions. One favors shutting down what's left of the Internet, thereby depriving the various bad guys of their tactical advantage. The other group, led by Felix, views the moment as an opportunity to create a new world order based on information sharing, engineering know-how, and progressive geek-culture values. Quoting from John Perry Barlow's cyberlibertarian manifesto, "A Declaration of the Independence of Cyberspace" (1996), Felix rallies the troops: whereas all other institutions of governance and instruments of social stability have been wiped out, "The Distributed Republic of Cyberspace weathered this storm basically unscathed. We are the custodians of a deathless, monstrous, wonderful machine, one with the potential to rebuild a better world. I have nothing to live for but that" (26). Felix's party wins the debate and accordingly sets about remaking meatspace in the idealized image of cyberspace – but, as anyone who has ever spent time in an online discussion forum might have predicted, the effort rapidly deteriorates into petty squabbles and name-calling. As food and fuel supplies dwindle, Felix begins to realize that his reasons for chasing the

cyberutopian fantasy have less to do with revolutionary idealism than with the need to avoid dealing with his own personal grief.

> [If] you bought [the] hypothesis that the Internet was primarily being used as a tool to organize more mayhem, shutting it down would be the right thing to do. But Felix's daughter and his wife were dead. He didn't want to rebuild the old world. He wanted a new one. The old world was one that didn't have any place for him. Not anymore. (37-8)

Nevertheless, the Distributed Republic of Cyberspace succumbs in short order to infodynamic entropy. As sysadmins die off or abandon their posts, legitimate network traffic gives ground to malware, unnecessary automated systems processes, and above all "spam. Lots of spam. Spam's still up because the services that stop spam are failing faster than the services that create it. All the antiworm stuff is centralized in a couple places. The bad stuff is on a million zombie computers" (45). Entropy – in the infodynamic guise of ads for online poker and herbal male enhancement products – is thus restored to its full apocalyptic resonance. "It's all falling apart," one character wails, "the way everything does" (46).

To put these details in full satirical context, it is worth recalling the founding myths of cyberspace itself. Longstanding cybercultural lore has it that the Internet – or, more precisely, the military and government computer networks that comprised its earliest incarnations in the 1970s and '80s – was built specifically to withstand a nuclear attack, and to keep the government functioning in any conceivable eventuality. Whether or not this sort of resiliency was ever its primary goal, or realistically achievable for that matter, "survivability" was undeniably high on the list of selling points whereby the concept of packet-switching was pitched to the Pentagon, thence to become the organizing principle of the modern Internet. The first such argument was made by Paul

Baran in a 1964 memorandum for the RAND Corporation, which envisioned "a communication network that will allow several hundred major communications stations to talk with one another after an enemy attack" (1). In place of the hierarchical "star"-shaped networking model that preceded it, Baran proposed a decentralized model organized on a "mesh" or "grid" pattern, with individual nodes directly connected to one another rather than routed through a central switchboard. With enough nodes online, it would become possible to re-route communications around damaged nodes and keep the functional nodes connected; a sufficiently redundant network could thereby reconfigure its connections as needed in a nearly infinite number of ways, demonstrating that "highly survivable system structures can be built – even in the thermonuclear era" (16).

The Cold War was over before Baran's idea came to full fruition, and it wasn't until September 11, 2001 that his claims about the resiliency of distributed networks underwent their first trial run in New York City. Prior to that day, the World Trade Center complex had served as the single most important communications hub in the city, if not the country, housing an array of cellular towers, data centers, antennae and dishes serving local radio and television broadcasters – even, in a fifty-million-dollar orgy of situational irony, the city's own emergency response command center. When the towers fell they brought down much of New York's communications infrastructure with them, sending ripples of service interruption across the region. But while cellular customers up and down the eastern seaboard struggled in vain for a signal, local TV went dark, and rescuers found their efforts hampered by spotty radio communications, Internet traffic continued almost as if nothing had happened. Despite the loss of "one of the Internet's most important hubs" on 9/11, a U.S. government report concluded in 2002, the system at

large "was not seriously affected by the attacks" (United States 1).[7] Indeed, media

analysts have noted, the events of 9/11 furnished an opportunity for IP technology to

come into its own as a resource for public information and communications in times of

crisis, where other technologies – those built on a centralized network architecture –

failed disastrously.

Four years later, amid the devastation of Hurricane Katrina, IP-based

communications again proved remarkably resilient and adaptable. Where telephone,

electric and water utilities went offline, and disaster relief took weeks or months to arrive,

Internet service in many areas remained intact throughout the storm and its aftermath.

Even at the height of the hurricane, officials were able to monitor the streets of New

Orleans using cameras linked via the city's mesh-style wifi network. In the weeks that

followed Katrina, the network was expanded to provide free wireless access for residents

and relief workers, making New Orleans the first major American city to own and

operate a municipal wireless Internet service ("New Orleans"). Once again, Baran's

architectural principle – and seemingly, by extension, the computational mythology of

the primordial and therefore indestructible network – was vindicated.

Yet success stories like these do little to salve the trauma of the events that

occasioned them. *Sysadmins* is a text written in the wake of two national disasters which

– despite verifying certain technical claims for the resiliency of distributed networking –

can scarcely be said to have reassured the collective Western psyche as to the everlasting

goodness and dependability of the technological and institutional support systems that

stand between us and perdition. On the contrary, Naomi Klein argues in *The Shock

Doctrine*, we are increasingly entranced and paralyzed by the figure of perpetually

impending disaster, and increasingly skeptical of technocratic safety nets and interventions. Doctorow's story is the product of an odd and anxious historical moment wherein this emerging cultural climate of crisis – which, in Klein's argument, fundamentally defines the first decade of the twenty-first century – exists in ambivalent tension with the techno-exuberance of the Regime of Computation, which for its part fosters a view of the global information system as an edifice that, by its very "deathless, monstrous, wonderful" nature, cannot be toppled; a Hydra-like organism so vast and complex as to be quite un-killable by mere decapitation. The leap from here to Singularity discourse is a short one: transhumanists in particular are profoundly susceptible, in ways that previous chapters have highlighted, to the mythology of an unbreakable network that is everywhere and nowhere at once, in which individual nodes are interchangeable and equally expendable, and in which the *really* important thing – that which confers a level of resiliency approaching immortality – is the infinitely reconfigurable mesh of connections between them. In twenty-first century crisis culture, however, these runaway narratives of technological transcendence encounter real friction for the first time since the fall of the Berlin Wall, if not earlier.

Hence the punchline, and Doctorow's satirical tweak to the "Strangelove wet dream" (5) of a nuke-proof Internet: while the network infrastructure would indeed be more or less indestructible by means of any one catastrophic event, the *network itself* is ultimately nothing but an arrangement of mortal and fallible human beings – and an Internet untended by human hands will be overwhelmed by entropy as surely as a neglected garden is overrun by weeds. Disabused of their Barlowesque hyper-optimism, the sysadmins contemplate the bleak possibility that human beings could disappear

entirely from the planet, leaving as their legacy a derelict Internet, blindly processing garbage data until the last of the generators finally runs out of fuel: "[Parts] of it will stay online for months. Maybe years. And what will run on it? Malware. Worms. Spam. System-processes. Zone transfers. The things we use fall apart and require constant maintenance. The things we abandon don't get used and they last forever" (47). The foremost horror that Felix and his comrades face is therefore not the annihilation of meatspace civilization – for which they had little use in the first place – nor even the deaths of their own loved ones. It is, rather, that the mighty, distributed global network they have devoted their lives to building and maintaining is ultimately no more enduring or self-perpetuating than any other human endeavor – that, despite their heroic efforts, "entropy and bad code and worms" (46) will have the final say.[8]

In the final act, the Distributed Republic of Cyberspace dissolves and the last of the sysadmins emerge into the outside world, where they are surprised to discover other survivors making a go of it amid the rubble and ashes. Having made his peace with heat-death-by-spam, Felix has a Mercerist epiphany – that, in any case, "something is better than nothing" (53) – and resolves to resume the counter-entropic project, though on a much more modest scale. "We'll probably fuck it up," he grants. "We'll probably fail. I'd rather fail than give up, though" (53). In the same gesture, he simply shrugs off the melodramatic apocalypse narrative, which has no usefulness except as a justification for complacency, a luxury humans can no longer afford: "Screw the end of the world. The world doesn't end. Humans aren't the kind of things that have endings" (54).

The story flashes forward several years through a series of failed attempts at nation-building, in the course of which Felix learns agriculture, makes biodiesel to fuel

generators, and scrapes together a small data center of his own. It ends with the

disillusioned but wiser hero, Candide-like, tending his garden and doing his bit to keep

the network limping along.

> It wasn't a good life, most of the time. Felix's wounds never healed, and neither did most other people's. There were lingering sicknesses and sudden ones. Tragedy on tragedy. But Felix liked his data center. There in the humming of the racks, he never felt like it was the first days of a better nation, but he never felt like it was the last days of one, either. (55)
> […] Behind him, the biodiesel generator hummed and made its acrid fumes. The harvest moon was up, which he loved. Tomorrow, he'd go back and fix another computer and fight off entropy again. And why not? It was what he did. He was a sysadmin. (56)

The noisy and malodorous machinery that surrounds Felix at the end of the story

is a fitting emblem for its ironic vision of a postapocalyptic Internet. *Sysadmins'*

figuration of machine intelligence – weak, passive, spam-prone, and generally better

suited to destructive and destabilizing projects than to useful ends – is a far cry from the

messianic ubercomputer of Asimov's tale and the redemptive Singularitarian eschatology

it scripts. If anything, Doctorow's version is an anti-Singularity: a sudden and dramatic

technological leap *back*ward, realized by way of inexorable and exponentially accruing

*re*gress.

My reading has foregrounded the story's deployment of entropy and Wienerian

cyber-ethics – in revised, updated, and subtly ironized form – as devices that militate

against techno-utopian and Singularitarian naïvete. But while *Sysadmins* exalts the

endless and thankless counter-entropic labor of network troubleshooting, the work is not

defined by its sentimental affirmation of Sisyphean virtue, which is at best misplaced and

at worst insincere. Rather, by way of insinuating the text within a larger discursive

framework that the next section will further develop, I wish to emphasize how the story

and others like it work to subvert and implode the eschatological impulse writ large. In this way, Doctorow's deliberate disavowal of interest in transcendent outcomes and final ends may be understood as part of a larger campaign underway in contemporary SF, encompassing postcyberpunk along with earlier works that might as readily be classed with first-wave cyberpunk.

"Screw the end of the world": SF and anti-eschatological epistemology

The entropic death-spiral toward heat death, the Cold War nuclear sublime, and the transhumanist Rapture of the Nerds are teleological narratives that all arrive at the same destination: the end of history, the last judgment, the final horizon of humanity. Though they may arrive there by different routes and attach different meanings to it, the difference between them is essentially the difference between a period and an exclamation point. The nature of science fiction, in contrast, is to end on an ellipsis. By virtue of its most basic formal characteristic – the assertion, through narrative, of meaningful continuity between present and future – even the best SF has trouble with endings. We have returned, full-circle, to the dilemma of Vernor Vinge's "turd in the punchbowl": from a standpoint of fiction, to accept his figuration of Singularity at face value is to preempt what ought to be a complex, stimulating and open-ended conversation. The alternative is to defiantly affirm along with Felix that "the world doesn't end," that "humans aren't the kind of things that have endings" – a proposition that is also, it must be admitted, not without its problems.

Contemporary SF writers – those, at least, who strike this reader as particularly relevant and inventive– have already chosen sides. If the Singularity is coming, they want

a hand in bringing it about, in shaping it, in helping to determine and articulate what it will mean. That means, simply, that Singularity-as-eschatology is henceforth an unworkable model for fiction; Singularity can only have narrative meaning as a portal through which a living future might be glimpsed – better yet, projected or prolapsed – from a living present. To that end, as I have argued throughout this study, SF is expansively reframing and reconfiguring the logics that authorize conventional Singularity discourse in such a way that Singularity becomes an opening-out rather than a closing-off.

By its nature this literary project often resists precise theoretical description, offering few, if any, hard-fixed and stable ontological footholds or rigid ideological commitments, and frequently indulging in gestures of knowing self-contradiction – indeed, consciously embracing and celebrating the intrinsically paradoxical act of trying to think the unthinkable, and write the unwriteable. My guiding presumption has been, however, that these narrative experiments, and the larger transhumanist discourse within which they operate, may be more fully understood within a field of cognition that emanates from certain alternative technoscientific, cultural and philosophical epistemologies of the late-twentieth century: the conceptual spaces opened up by neo-materialist technologies of nanotech and augmented reality, info-revolutionary discourse and its counter-reading, cybercultural economies of symbolic exchange and Free Culture, and others. I will close by highlighting a few more such conceptual models that inform cyberpunk and postcyberpunk treatments of Singularity, specifically with respect to its eschatological dimension.

Chapter four postulates a rich, if indirect, affinity between postcyberpunk narratives of postsingular political economy and the anti-rationalist economic models of Jean Baudrillard and Georges Bataille – a link that may be further developed, in the present context, by considering Bataille's articulation of general economy as an ironic counterpoint to both thermodynamic entropy and its infodynamic variant. The starting premise of general economy, as established in *The Accursed Share*, is in fact a near-perfectly diametric inversion of second-law thermodynamics.

> I will begin with a basic fact: The living organism, in a situation determined by the play of energy on the surface of the globe, ordinarily receives more energy than is necessary for maintaining life; the excess energy (wealth) can be used for the growth of a system (e.g., an organism); if the system can no longer grow, or if the excess cannot be completely absorbed in its growth, it must necessarily be lost without profit; it must be spent, willingly or not, gloriously or catastrophically. (21)

Hence the elemental problem with which all organized systems, biological and social, must contend: not how to make do with diminishing returns from a dwindling cosmic supply of useful energy, but how best to discharge a constantly accumulating *excess* of energy. In his deliberate conflation of "energy" with "wealth," moreover, Bataille does not merely posit analogically equivalent cosmological and economic models, but presents them as fully identical – the latter are always-already embedded within the former, subject to the overarching laws of "a movement that surpasses them" (21). Any appearance to the contrary may be attributed to a fundamental misperception: particularized economic calculations are "never considered *in general*" (22), that is, in view of the global movement of energies. Instead, academic economic theory "generalizes the isolated situation" of individual material necessity into a whole set of faulty assumptions about how the world works, blinding us to the "basic fact" of solar

abundance and the necessity of constant exudation. (23) Wasteful and anti-productive

activities consequently seem perverse and primitive to Western economic subjects

"accustomed to seeing the development of productive forces as the ideal end of activity"

(22). Entropy, then, is intelligible in its pessimistic modality only within the ethical

framework of a society singlemindedly obsessed with productive growth, which has to

manufacture scarcity and lack in order to sustain its perpetual expansion.

We may choose to believe otherwise, but our "denial does not alter the global

movement of energy in the least" (23); one way or another the excess must be dissipated.

> Our ignorance only has this incontestable effect: It causes us to *undergo* what we
> could *bring about* in our own way, if we understood. It deprives us of the choice
> of an exudation that might suit us. Above all, it consigns men and their works to
> catastrophic destructions. For if we do not have the force to destroy the surplus
> energy ourselves, it cannot be used, and, like an unbroken animal that cannot be
> trained, it is this energy that destroys us; it is we who pay the price of the
> inevitable explosion. (23-4)

The "catastrophic destruction" to which Bataille refers here is the cyclical

reoccurrence of war – the predictable fate of societies that cannot find more agreeable

ways of discharging surplus energy – which intensifies dramatically amid the "soaring

growth of industrial activity" (24) in the nineteenth and early twentieth centuries. The

modern history of catastrophic expenditure is therefore specifically technological, and

indeed it is the "industrial plethora" (25) of the period that both engenders and

characterizes the first and second world wars: "[It] was this plethora that both wars

exuded; its size was what gave them their extraordinary intensity" (25). The theory of

general economy thus "tragically illuminates a set of facts" (25) about armed conflicts,

among which we might number the bitter irony that they are so often packaged and sold

as eschatological showdowns which, as in the mythical battle of Armageddon, must

finally and decisively resolve nationalist dichotomies of good and evil. In reality, Bataille

maintains, the cycle is fated to repeat endlessly, for as long as excess wealth continues

being funneled back into more unsustainable growth and needless production – just as the

resolution of "the war to end all wars" led ineluctably, within a few short years marked

by frenzied economic boom-and-bust cycles, to an even more catastrophic conflagration.

To the extent that it prophesies Singularity as the "inevitable explosion" (24) of a

burgeoning technological plethora, extropian eschatology displays what seems like an

intuitive grasp of this dynamic – but, in confusing the explosive catharsis it implies with a

final transcendence of history, misses the larger point. The central truth that both Bataille

and Wiener assert – the fatal self-deludedness of a civilization that aspires to perpetual

and unlimited growth – is instead repressed in the same moment it is revealed, through

the mechanism of a historical apotheosis that extropians presume will magically abolish

the cycle of accumulation and expenditure forever. Instead of working, then, to

sustainably regulate the global flow of technological, economic and biological energies

so as to avert catastrophe, extropianism purposely revs it up to ramming speed. In

contrast, the ethics of general economy – and by extension, of postcyberpunk economics

as articulated in the previous chapter – are dictated by the necessity of preemptive

squander, and the continuous circulation of energies through rituals of exchange. In this

alternative value system, waste and dissipation are not entropic evils, but survival skills.

The "Copernican transformation […] of thinking – and of ethics" (25) that attends

general economy, particularly in its ramifications for the meaning and valuation of

entropy, is paralleled if not excelled in the relatively recent scientific and pop-scientific

discourses of chaos theory. This second Copernican reorganization dates to the 1960s,

when researchers devising the first computer models for weather forecasting noted the peculiar difficulty of using simulations to predict long-term behavior in complex systems, especially those characterized by large numbers of variables. They found that extremely minute discrepancies in the initial conditions of otherwise identical models would, over the course of a computer-driven simulation, manifest in staggering macroscopic differences – discrepancies that could not be reconciled with the kind of predictability implied by a Newtonian clockwork universe, in which physical processes are atemporal and reversible.

As early as the nineteenth century, thermodynamics had already insinuated a contrary sense that time – or rather, its narrative-like organization into past, present, and future – is not just a cognitive abstraction, but exists independently of human perception: that its flow is in fact unidirectional and universal. But where this realization had been, for previous generations, freighted with pessimistic implications (i.e. heat death), by the early 1980s it was undergoing a radical reorientation in the work of the physical chemist Ilya Prigogine, who won a Nobel Prize in 1977 for his work on dissipative structures. Culturally speaking, Prigogine's great contribution is rhetorical, stripping away a century's worth of apocalyptic connotations and counter-intuitively reframing entropy as a signifier of progress:

> [It] is no longer a question of irreversible transformations considered as approximations of reversible transformations; increasing entropy corresponds to the *spontaneous evolution* of the system. Entropy thus becomes an 'indicator of evolution,' or an 'arrow of time' as [Arthur Stanley] Eddington aptly called it. For all isolated systems, the future is the direction of increasing entropy. (119)

The "arrow of time," which for Wiener and the Victorians points toward a final, sepulchral equilibrium and stasis, in Prigogine becomes the signpost of a continuity that

"increases in the direction of the future, not of the past," and carries "immense constructive importance," without which "life would not be possible" (125). The theory of dissipative structures accordingly undertakes to describe how, under "far-from-equilibrium conditions… we may have transformations from disorder, from thermal chaos, into order." In Alvin Toffler's reading of Prigogine, then, "entropy is not merely a downward slide into disorganization. Under certain conditions, entropy itself becomes the progenitor of order" (*Order Out of Chaos* xxi).

In Prigogine's reformulation, the metaphysical reality that entropy describes is what makes it possible to relate the history of the universe as a story – not one governed by a deterministic mechanics of beginning, middle, and end, but one in which the future is profoundly indeterminate, continuously exfoliating from the present. On this basis Prigogine, who is also a keen student of literature and philosophy, makes a strong case for the humanities as a route to scientific discovery: for example, as David Porush details, in bridging the gap between microscopic and macroscopic levels of scientific description. Whereas Newtonian mechanics satisfactorily explains the behavior of matter on an atomic level, it is inadequate for describing the same phenomena globally – something evolutionary biology attempts but is, ultimately, also ill-equipped to theorize in a holistic way (368-9).

The failure of conventional Western science to recognize its epistemological limitations has hampered it with what Prigogine calls a "naïve realism" (Porush 368), an unworkably narrow and often self-contradictory set of commitments that have birthed such ungainly conceptual monsters as quantum theory and general relativity, without – to date – being able to reconcile their inconsistencies in a comprehensive and coherent

"theory of everything." Over and against the reductive impulse of scientific naïve realism, Prigogine's work is a call for fuller recognition of the profound and dynamic complexity of the universe. Here is where science can learn from art: in its capacity to devise flexible and minutely adaptable structures of meaning-making, literature suggests ways of harmonizing realism with complexity. As Porush puts it, in his reading of Prigogine as a kind of postmodern literary figure: "Literature in its hyper-evolved discourse can capture and describe the time-bound, fluctuant, unstable growth of organic life and of human activity in the macroscopia… In short, the new science of chaos demonstrates that narrative discourse has epistemological potency" (372).

The interdisciplinary impulse Porush sees in Prigogine is reciprocated, with interest, in the fiction of Bruce Sterling, who borrows heavily and explicitly from Prigogine's ideas in his own Shaper/Mechanist short stories and the novel *Schismatrix*. The terminology of dissipative structures, Sterling has written, "worked like a charm" (vii) in his construction of a future in which "the ancient Terran philosopher Ilya Prigogine" ("Cicada Queen" 274) has assumed the status of prophet, revered by transhumans whose telos of Singularity is figured in the language of chaos dynamics. In Sterling's future, where humanity has split into rival tribes of cyborg "Mechanists" and biotech-enhanced "Shapers," the thesis that systems under far-from-equilibrium conditions can spontaneously self-organize into higher "levels of complexity" (273) has been decontextualized and aggressively politicized by a nascent "Posthumanist" movement. One contingent of Posthumanists seek to accelerate the entropic fragmentation dividing the various technopolitical factions – which, as the term "Schismatrix" suggests, is already well underway – thereby creating a social crisis or

"Cataclysm" that will supposedly trigger a "Prigoginic leap" (169) into a new and unfathomably higher order of complexity: the era of the Posthuman.

Sterling is the first to admit that his Prigoginic ideology represents at best a misreading of Prigogine's actual contributions to the field of physical chemistry – but, he says, "charms are verbal structures. They work regardless of chemistry or physics" (vii). Indeed, Sterling's irreverent appropriation of Prigogine not only bears out Porush's argument about narrative discourse, but also recapitulates, in narrative form, Prigogine's own point: as a direct result of its "epistemological potency," the theory of dissipative structures is itself subject to complex and unpredictable historical fluctuations that lead, ironically, to its perversion and cooptation by extropian hardliners, who leverage acts of violence in pursuit of a Singularitarian "Prigoginic leap" into utopian Posthumanity. Far from endorsing this political program, however, Sterling casts a jaundiced eye on its bellicose eschatological pretensions. "The Shapers, the Mechanists –" one character protests, "those aren't philosophies, they're technologies made into politics" (151).

The Shaper/Mech novel *Schismatrix* is remarkable, among other qualities, for its timing: published in 1985, it barely precedes Vinge's seminal reference to "Singularity" in *Marooned in Realtime*, yet the mood it conveys is unmistakably one of millennial Singularitarian anticipation and yearning. Amid the story's intensifying sociopolitical chaos, "History's kaleidoscope worked its permutations, its pace ever faster, approaching some unknown crescendo. Patterns changed and warped and flew apart, each chip of light a human life" (215). The intentional irony of this any-minute-now conception, of course, is precisely that the longed-for "crescendo" has yet to arrive – even though the Shaper/Mech universe appears, from a late-twentieth-century vantage point at least, all

but postsingular already. The exotic and fabulously augmented characters who populate

the Schismatrix can already extend their lives more or less indefinitely, have not only

contacted but have normalized trade relations with alien civilizations, have modified their

bodies and their sensory apparatuses almost beyond recognition. One particularly far-

gone group, the Lobsters, have withdrawn into opaque, armorlike and fully self-contained

spacesuits, and in their leisure time enjoy nothing better than

> …to sit along a girder and open their amplified senses to the depths of space, watching stars past the limits of ultraviolet and infrared, or staring into the flocculate crawling plaque of the surface of the sun, or just sitting and soaking in watts of solar energy through their skins while they listened with wired ears to the warbling of Van Allen belts and the musical tick of pulsars." ("Cicada Queen" 294)

One wonders: How much more "posthuman" can you possibly get?

Over the course of *Schismatrix* its central character, a 200-year-old revolutionary

who has intermittently flirted with Posthumanist politics, undergoes an agonizingly slow

process of disillusionment, culminating in the painful realization that the final historical

transcendence he and his comrades have fought for is a fantasy, a psychological coping

mechanism that only masks the terrifying indeterminacy and absurdity of existence.

"Tears came to him. He wept quietly, holding nothing back. He mourned mankind, and

the blindness of men, who thought that the Kosmos had rules and limits that would

shelter them from their own freedom. There were no shelters. There were no final

purposes. Futility, and freedom, were Absolute" (224).

Prigoginic evolutionary theory, however, provides some consolation in the

knowledge that "life moved in clades […] A successful species always burst into a joyous

wave of daughter species, of hopeful monsters that rendered their ancestors obsolete.

Denying change meant denying life" (225). Hence Lindsay, the disenchanted erstwhile

revolutionary, goes on to play a hand in events that may yet bring about the long-awaited

Prigoginic leap – not by way of a bloody Cataclysm, but in the birthing of "hopeful

monsters." As he stares down the harrowing existential vacuum of the Absolute,

Lindsay's Posthumanism modulates from an apocalyptic style to a gentler one that

affirms the continuity of "life" above all. His own life's work becomes a project aimed at

transforming humans into posthuman marine creatures, bio-engineered to thrive in the

arctic waters of the Jovian moon of Europa.

As the novel closes this project is on the brink of fruition, and the elderly Lindsay

contemplates what may or may not be the first stirrings of a genuine Singularity, all the

while poignantly aware that he is too old to make the "leap" himself. He is joined in this

contemplative moment by an ancient and mysterious "Presence" – a formless alien

consciousness that obligingly assumes a quadripedal shape for Lindsay's sake, appearing

before him "[like] a weasel, he thought. Like a fox" (235). The Presence has been around

the cosmic block enough times to have seen countless other species realize the "final

transcendence," and to have cultivated a deep and thoughtful ambivalence toward it.

What happens to these transcendent beings, it says, is

> "…as far beyond Life as Life is from inert matter. I've seen it happen, many times
> before. I can feel it moving here, I can smell it in the wind. People… creatures,
> beings, they're all people to me… they ask the Final Questions. And they get the
> Final Answers, and then it's goodbye. It's the Godhead, or as close as makes no
> difference to the likes of you and me. Maybe that's what you want, sundog? The
> Absolute?" (235)

This testimonial affirms the sense Lindsay already has that the "Final Answers" –

whatever they may be, if indeed there are any – can be satisfying only in their utter

finality; the Absolute is, if not precisely synonymous with death, certainly antithetical to

anything resembling "Life." What answers to the Final Questions, then, does the

Presence offer in their place?

> "My answers? I don't have 'em. I don't care what goes on beneath this skin, I want only to see, only to feel. Origins and destinies, predictions and memories, lives and deaths, I sidestep those. I'm too slick for time to grip, you get me, sundog?"
> "What do you want then, Presence?"
> "I want what I already have! Eternal wonder, eternally fulfilled… Not the eternal, even, just the Indefinite, that's where all beauty is… I'll wait out the heat-death of the Universe just to see what happens next! And in the meantime, isn't it something, all of it?" (235-6)

It would be difficult to find a more apt summary of the attitude I have sought to

describe in this study, for in closing the novel thus, Sterling performs what I have

repeatedly figured as the classic postcyberpunk gesture: he provisionally affirms the

Singularity premise but drastically complicates its interpretation, and leaves the

resolution wide open – refusing, even, to authoritatively indicate whether Lindsay's

conversation with the invisible Presence is real, or merely an artifact of Lindsay's own

senility. It matters little: in either case, the Absolute is inherently *less interesting* than the

Indefinite, and the role of the SF narrative is accordingly that of the trickster archetype

presented by the foxlike Presence: it simply "sidesteps" the transcendent, "too slick for

time to grip," and dwells instead in the "eternal wonder" of boundless complexity and

indeterminacy, "where all beauty is." The Prigoginic leap may yet happen, but history

won't end with it – there will be another leap, and another. If time is an arrow, it is

inscribed on a Möbius strip, inverting and reorienting its own logic with each circuit.

Even the "heat death of the Universe" cannot be safely assumed as a final end: the

timeless Presence of the narrative imagination will simply "wait [it] out… just to see

what happens next." For all we know, it might be the entrée to still another Order of Complexity.

It may be objected, from the standpoint of a certain narrow kind of realism, that Sterling's and Doctorow's perverse indifference to eschatological finality amounts to an absurd and paradoxical gesture of abdication, an unforgivably irrational evasion of the "Last Question." Extropian transhumanism, at least, insists that we must choose now between transcendent posthumanity and simple extinction, or the Singularity will choose for us. All of this may be true. But the extermination of paradox and contradiction is the domain of science, not of art – and besides, if science taught us anything in the twentieth century, it's that the universe is a paradoxical and contradictory place, an epistemological riddle with which even the most supple and sophisticated of human knowledge-systems are, at best, only minimally equipped to grapple. If it is irrational to turn our backs on the final end that reason tells us must one day come, and live instead in the sublime potentiality and ambivalence of the present moment, it is no more irrational than to believe that by putting our faith in technological providence we might arrest the flow of history, and thereby live forever.

Notes

[1] …quite literally, from his perch atop the Extropy Institute's roster of official spokesmen (extropy.org).

[2] See: Boyer, *By the Bomb's Early Light*

[3] Ferguson's construction would become a popular conceptual template for technocultural theory. As in related models subsequently advanced by Joseph Tabbi (*The Postmodern Sublime*) and Istvan Csicery-Ronay Jr. ("The Posthuman Sublime"), the sublime presence of Nature around which the Romantic version was organized gives way to structures of global techno-capital, and the sublime is henceforth experienced (in reflexive postmodern fashion) as a product of human civilization, rather than standing apart from it.

[4] Hayles delves into Dick's engagement with entropic themes in *Do Androids Dream of Electric Sheep?* as part of a broader, thermodynamically inflected psychoanalysis. Steven Best and Douglas Kellner also explicate Dick's contribution to the development of entropy as a postmodern apocalyptic trope in "The Apocalyptic Vision of Philip K. Dick."

[5] Claude Shannon's mathematical model of entropy, which relates the concept to matters of structure and organization, has been extensively applied to the problem of sprawl in urban planning studies. Likewise, the metastatizing southern California landscape of Pynchon's novel, whose architect is real-estate developer Inverarity, marks one of the primary sites of *Crying*'s preoccupation with entropic themes. The same can be said of the Boston-Atlanta Metropolitan Axis (aka "the Sprawl") in which several of William Gibson's canonical cyberpunk narratives take place.

[6] "The sky above the port was the color of television, tuned to a dead channel." (3) The imagery of audiovisual "static" itself – with its connotations of motionlessness and sterility, and of collapse and disorder – is a potent entropic signifier throughout *Neuromancer*, as in Riviera's holographic caricature of the mad Colonel Corto, whose eyes appear as screens displaying video of a howling snowstorm on an endless loop. The homage to Gibson's famous opening line at the beginning of *Snow Crash* signals Stephenson's considerable intellectual debt to the *Mirrorshades* group, which also informs his conception of the infocalypse itself: the Babel virus closely resembles a plot device from Pat Cadigan's *Synners* (1991), in which a memetic plague spread between networked computers causes debilitating strokes in users with a certain trendy kind of neural implant.

[7] "The events of September 11 had little effect on Internet services as a whole. The network displayed considerable flexibility that underscored its adaptability in the face of infrastructure damage imposed by the crisis. Connectivity recovered quickly and the loss was less severe than seen in other incidents affecting the Internet. Other communications

media, such as cellular telephone service in greater New York, experienced much greater stress" (*The Internet Under Crisis Conditions* 1).

[8] Stross's *Accelerando* pursues the same entropic trajectory in the context of a post-Singularity alien civilization that has converted its entire solar system to computing hardware; the long-term result is a postapocalyptic scenario in which the uploaded alien subjects are cannibalized and succeeded by spam, leaving behind "a howling wilderness of degenerate data, fractally compressed, postconscious processes running slower and slower as they trade storage space for processing power" (309).

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