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The Rapture for Nerds

THE CHASE IS AFOOT II BY ALICE KELLEY AND DAVID ZIELS
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Editorial

The Rapture for Nerds

By Gregg Rickman (Guest Editor)

Ray Kurzweil proposes, in his 2005 book *The Singularity Is Near*, that a new age of man-machine civilization is close at hand, when humanity will transcend its biological heritage and achieve untold greatness. The exponential growth of technology will, Kurzweil argues, lead in a few decades to artificial intelligences so profound that "information-based technologies will encompass all human knowledge and proficiency," including "the emotional and moral intelligence of the human brain itself" (8). During the Singularity, this "future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed," (7) humanity will surpass the need for its frail biological bodies with their "cumbersome maintenance rituals."

> The Singularity will allow us to transcend these limitations of our biological bodies and brains. We will gain power over our fates… We will fully understand human thinking and will vastly expand and extend its reach. By the end of this century, the nonbiological portion of our intelligence will be trillions of trillions of times more powerful than unaided human intelligence. (9)

I'm not concerned here to refute this concept. Rather, I want to merely suggest first that Kurzweil's book is like the Bible in that it should be labeled, as a wit once suggested, "Important if true." I'd add further that even if untrue Kurzweil's position is interesting, as it illustrates a faith in science and technology that can fairly be described as religious. Believers in the Singularity—for Kurzweil is not alone—simply manifest this common feeling in extreme form.

Howard Hendrix's essay in this issue makes this point in some detail. I'll add a few more. One of Kurzweil's colleagues, Eliezer S. Yudowsky, defines the term "Singularitarians" as someone who's a "friend, advocate, defender, and agent of the future known as the Singularity" (498). The parallels between Singularitarians and the devout anticipating Christ's imminent return are striking. Sociologist Amy Johnson Frykholm, in a study of the evangelical readership of the best-selling *Left Behind* series (Timothy LaHaye and Jerry Jenkins' books, predicated on the notion that a Rapture, a taking up to heaven of Christ's followers, will precede Earth's final Apocalypse) discusses the conversion process in evangelical Christianity. Believers' testimonies share the premise "that Jesus Christ enters the heart of believers, dwells there, and causes a transformation that leads to eternal salvation" (Frykholm, 166).

Compare Kurzweil, who quotes without irony George Gilder's comment that his views offer "a substitute vision for those who have lost faith in the traditional object of religious belief " (370), and quips that "we need a new religion" led not by a "charismatic leader" but a "charismatic operating system" (374-5). The Singularity offers humanity both eternal life and transcendence of our shared biological fate. And Kurzweil pleads for followers: "Being a Singularitarian has often been an alienating and lonely experience for me because most people I encounter do not share my outlook….having more people with whom to share my outlook is a major reason that I wrote this book" (370-1). Kurzweil has the wit to include a photograph of himself with a cardboard sign reading "The Singularity Is Near" as the frontispiece to the section of his *The Singularity Is Near* devoted to philosophical speculation. He thus humorously acknowledges the quasi-religious impulse behind his advocacy of the Singularity.

One of the Singularity's first popularizers, in essays and fiction, is the author Vernor Vinge. In *Marooned in Realtime* (1986) Vinge postulated that his protagonists, time-traveling from a rapidly technologically changing world circa the year 2200, returned after a hundred years to find humanity vanished.

> "There was no Extinction, Wil. Mankind simply graduated, and you and I and the rest missed graduation night."
>
> "So three billion people just stepped into another plane. This begins to sound like religion, Della."
>
> (Vinge, 111)

One of Vinge's characters is in fact a Christian convinced that by missing the Singularity he had missed the Second Coming. Vinge's novel makes overt what is just below the surface of Kurzweil's non-fiction. Singularitarians anticipate a machine-made Rapture every bit as apocalyptic as that foreseen by the fundamentalist Christians who've been busy deciphering the number of the beast and laying bets on who'll be the Anti-Christ since the days of Hal Lindsay and his 1970s best-seller *The Late Great Planet Earth*. Or of the Millerities who counted on the end of the world taking place in 1844. Or of the author the Book of Revelations.

This issue of the *YLEM Journal* explores different aspects of technological change. A major component of the Singularitarian dogma is the coming into being of true Artificial Intelligence, and essays by Don Riggs and Doug Williams explore the history and prospects of A.I. Howard Hendrix weighs in with an analysis of some of Kurzweil's claims, which I follow with a few thoughts on some authors Kurzweil needs to read, or reread.

Don Riggs teaches English at Drexel University. He has presented papers on Asimov and Herbert, Tolkien, Tad Williams, Cyberpunk, John Crowley, and related topics at ICFA, co-edited *Uncommonplaces: Poems of the Fantastic* with Judith Kerman, and writes a regular column, "My Life in Poetry" for ASK online at <http:thethewww.drexel.eduthecoastheaskthepoetry.asp>

Dr. Douglas Williams taught at UC San Diego and Mills College. He currently writes technical documentation for a Silicon Valley software company, and as a hobby, engages friends and acquaintances (sometimes willingly) in Socratic dialogues. His email address is djwdoc@yahoo.com

Howard V. Hendrix is the author of five novels, *Lightpaths* (1997), *Standing Wave* (1998), *Better Angels* (1999), *Empty Cities of the Full Moon* (2001) and *The Labyrinth Key* (2004), with a sixth, *The Spears of God*, forthcoming from Del Rey in November 2006. His other publications include short science fiction (collected in 2001's *Möbius Highway*), experimental fiction, and a book-length study of apocalyptic elements in English literature, *The Ecstasy of Catastrophe* (1990). He lives in Shaver Lake, California, and teaches at California State University, Fresno.

I am the editor most recently of *The Science Fiction Film Reader* (2004). I thank Loren Means for his allowing me to guest-edit this edition of the *YLEM Journal*.

*See page 14 for works cited.

YLEM FORUM

Artists Remember 9/11

Wednesday, September 20 at 8 pm
BOCA (Bar Of Contemporary Art) 414 Jessie Street, San Francisco

Two artists present explanations for 9/11 at variance with the official 9/11 Commission Report, one sober and factual, the other seriously funny. Also, artists present a proposal for a memorial in Shanksville, PA to Flight #93

PROGRAM:

Trudy Myrrh Reagan briefly reminisces about YLEM's 20th anniversary celebration in 2001 held just days after 9/11, and displays the actual comments that people in attendance wrote on the wall about it in their state of shock. Trudy Myrrh Reagan is YLEM's founder.

Chuck Thurston, "Perception, Suggestion and Reality in the Destruction of the World Trade Center Towers - a look at how fear and mass media are combined to create false beliefs in large populations." After a brief but riveting overview of overwhelming evidence supporting the controversial explosive-demolition hypothesis of the destruction of the World Trade Center, Thurston will show how it is part of a long and continuing history of "false flag" provocations, ones which have propelled us into many wars. Thurston is an independent artist and expert on high-end digital printing.

Frank Garvey, "The Real 9/11 Conspiracy - Solved!" Surrealist Frank Garvey presents yet another 'conspiracy' theory on these events. Garvey believes that they flowed inexorably from the structural decisions of the ruling classes in the U.S., Saudi Arabia and elsewhere. In response to the revolutionary rise of Arab nationalism in the 1960's, these power structures have much in common behind the veils of their respective religions. They decided to siphon off the social discontent of poor masses in the Middle East into supposedly more impotent channels, with the help of very reactionary elements in Islam. Garvey's theory spins off a whole series of outrageous branches and tentacles which will astound and outrage the most tolerant of attendees, no matter what their ideology, income level or hairstyle. Frank Garvey has been delighting people with mordant humor and robotic mischief in his OmniCircus Junkyard Cabaret since 1988.

Paula Levine and Susan Schwartzenberg, "Currents: a proposal for a memorial to Flight #93." In the fall of 2005, artists Susan Schwartzenberg, Peter Richards and Paula Levine, in collaboration with landscape architect Tom Leader, designed and submitted a proposal commemorating the crash of United Airlines, Flight #93. The plane originally departed from Newark, New Jersey, and was bound for Los Angeles, California, when it crashed in an open, nonresidential old mining field just outside of Shanksville, Pennsylvania.

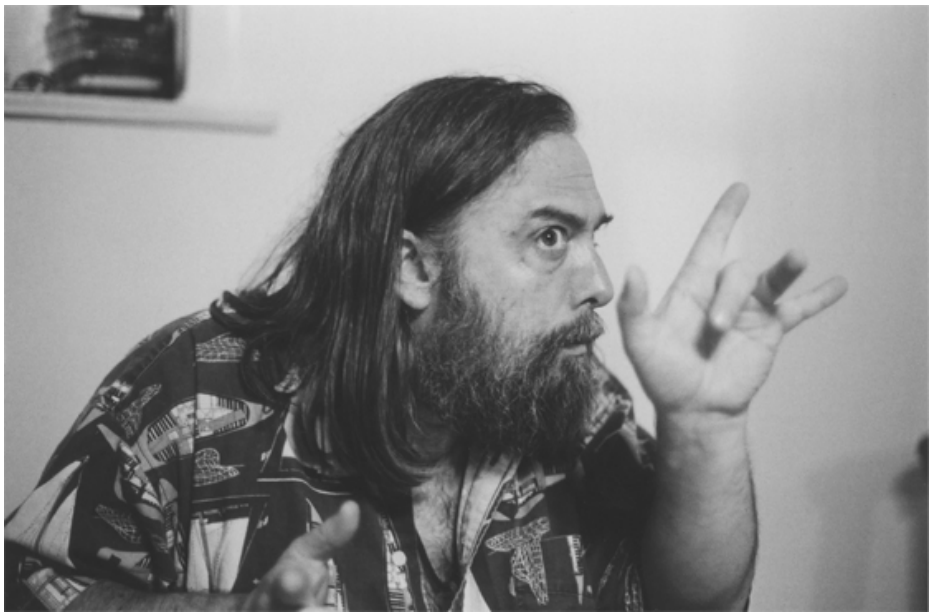
The proposal was in response to an international call for submissions to design a commemorative to be located on the site of the plane crash. ***Currents*** was designed to counter the tendency of monuments to delimit and flatten history. It aimed to create an active commemorative that would grow and change over time using a design that incorporated a large reclamation project, education and research on site, and a large Global Positioning Satellite network of site-embedded narratives that wove throughout the large memorial site.

Schwartzenberg and Levine will talk about this collaboration within a larger context of memorials and history, and explore culture's current compulsion to memorialize prior to the necessary shift from visceral to collective cultural memory. Susan Schwartzenberg, a senior artist at the Exploratorium, is a photographer and visual artist. Paula Levine, professor of conceptual and information arts at SFSU, specializes in locative media-like uses of GPS and maps.

How Techies have Fun!

Wednesday, November 8, 8 pm
RX Gallery and Bar

A dozen tech artists from YLEM stage a show-and-tell evening. They invite you to enjoy moving light sculptures, a digital lava lamp, glowing necklaces, a digital clock that's a puzzle, and computer prints on silk. More surprises are on the program! Full information at www.ylem.org



Photograph of Don Riggs by Marjorie Becker

A.I.

By Don Riggs

A quarter century ago, Tom Cleveland told me of his plans for creating a silicon-based life form. "Why does life necessarily have to be carbon based?" he asked rhetorically. He described his image of a shoebox-sized mechanimal that would basically crawl around the house looking for electrical outlets. That is not a great deal of intelligence, but that is what our lives could be seen as, in essence: traveling around and looking for sustenance.

I have no idea whether Tom has in fact created his mechanimal, but I have been thinking about the origin of consciousness. Julian Jaynes has the phrase copyrighted, I suppose, in his book *The Origin of Consciousness in the Breakdown of the Bicameral Mind* – a work that, as John Kessel has pointed out, posits that the ancient Greeks heard voices – but I have been thinking more along the lines of the "trickle-down" and "percolator" theories of economics as they apply to human awareness. The "trickle-down" theory has its roots in the gnostic split between the world of Eternal and Unchanging Spirit, on the one hand, and the Real World of eternal flux and decomposition that our senses perceive, on the other. The gnostic descent of the soul has a spark of the One Mind detach itself from the Empyrean, where Noos dwells, and plummet down through the various spheres, picking up qualities from each one – Gravity from Saturn, Expansiveness from Jupiter, Aggression from Mars, and so on. When that spark is embodied in one of us down here, consciousness, or intelligence, is therefore an element foreign to the realm of Gross Matter, and gratefully welcomes its release at death.

A sixth-century gnostic named Zosimos asked the question, "Why does Eternal Mind immerse itself in ever-decaying matter?" He answered his own question, "For the sake of wonder." That's the trickle-down theory; the percolator theory is much more materialistic: consciousness has evolved over eons from simple responses to the external environment, and has, through mutation and selection, evolved into the relatively highly self-conscious awareness that I am indulging in right at this moment at my computer, and which you – if there is a "you" out there (if there is an "out there" out there) – are similarly indulging in now (a different now) as you read these words.

I see Artificial Intelligence (A.I.) in the lights of these two theories; however, as A.I. is by definition devised by human beings, as opposed to Natural Intelligence, that places people in the place of God – or gods, or nous – and so puts off the question of origins. However, it strikes me that science fictional human gods creating A.I.s operate in either one or the other of the two fashions to come up with their creations.

The notion of Man acting as God in Creating Life inevitably brings up the question of Frankenstein, although Mary Godwin's Victor F. is not initially focused on the intelligence of his monster. His/its initial datum of consciousness is Dr. Frankenstein's horrified rejection of his creation; presumably, some element of consciousness must be present in the monster's mind for him/it to process this primal rejection. This consciousness is developed in the episode in which the monster spies on an idyllic Swiss family and, in essence, becomes socialized through observation. It is only in the film versions of Frankenstein that the brain is that of a madman – or, in some cases, of Dr. Frankenstein himself.

As Brian Aldiss has famously asserted that *Frankenstein* is the initial work of science fiction, it is not surprising that his variations on Shelley's novel should appear in his own fiction upon occasion. Most obviously, his 1973 *Frankenstein Unbound* features a highly philosophical monster debating the 21st-century scientist Joseph Bodenland about whether their natures are fundamentally the same. "As for our births – when I first opened my eyes, I knew I existed – as did you. But who I was, or where, or from what cause, I knew not – no more than did you!" (187). Bodenland argues that he, a human being is "a natural creature," implying that the monster, though obviously intelligent, is artificial. Therefore, he blasts the monster with a swivel-gun salvaged from his automobile.

Aldiss' kinder, gentler version of Frankenstein's monster is David, the cute android boy from his 1969 "Supertoys Last All Summer Long," and his teddy-bear companion, Teddy. David is programmed to love, and, like Pinocchio, he wishes to be a "real boy." He keeps asking whether he, or the human couple with whom he lives, are "real." Teddy has perhaps the most philosophical line when he responds: "You ask such silly questions, David. Nobody knows what 'real' really means. Let's go indoors" (11). The distinction here, however, is obviously not what is "real," but what is "natural," versus what is "artificial," or man-made.

The artificial nature of the bodies in which Frankenstein's monster and David are encased, assuming that those two beings have consciousnesses that can be somehow "encased" in a physical body, are emphasized in the similar descriptions of the two beings physically breaking down. When Bodenland blasts the monster with his gun, "A hollow cough burst from him, and a change took place in that abstract helmet which was his face. The sutures of Frankenstein's surgery parted, ancient cicatrices opened at

every contour; the whole countenance cracked, and I saw slow blood ooze in the apertures" (187). Similarly, when David, upset at having disconnected a vital element in Teddy's inner works and thus turned him off, waves his arms in despair, "He fell back, striking his face. It cracked, revealing plastic working beneath" (21). Both creatures are artificial organisms, although Frankenstein's monster was constructed with parts of formerly living organisms, and David is a robot made of plastic parts. Both assert that they are as "real" as the humans who made them, although the humans they encounter react to them by denying their humanity, perhaps a trifle insistently.

In the Cyberpunk and post-cyberpunk eras, there have arisen gradations of Artificial Intelligence in relation to the distance between the human intelligences that have created it or them and the independent or quasi-independent A.I.s themselves. William Gibson's Sprawl trilogy has an A.I. – actually, two halves of an A.I. acting quasi-independently – that were initially developed and I assume programmed by a human being, Marie-France Tessier. Wintermute is the "left-brain" A.I. that (who?) has been manipulating various humans to carry out the necessary "real-world" or actual functions necessary for joining its "right-brain" A.I., Neuromancer. Over the course of the Sprawl trilogy, something happens to Wintermute-Neuromancer as a result of the left-right brain fusion, until in *Mona Lisa Overdrive* some major entity has emerged in cyberspace. Gibson doesn't give us much of a specific idea of what this entity consists of, except that, at the end of *Neuromancer*, it tells Case that it has contacted a similar entity near Alpha Centauri, so that it would appear to be another stage in cosmic evolution.

Before Case has reached Wintermute – or, rather, before Wintermute has reached Case – Gibson has introduced us to a data construct that consists of an electronic copy of the mind, not brain, of the Dixie Flatliner, McCoy Pauley. Pauley was Case's mentor in the realm of computer hacking, and before he died he had his mental configuration, possibly his brainwave patterns, copied as a "ROM personality matrix," and now Case is using this firmware construct as his guide in dangerous realms of cyberspace. (I'm sure this has become a standard assessment in the literature on the subject, but I haven't seen it yet, so, for the record, I'll point out that this seems analogous to the shamanic training by the spirit of a dead ancestor, as related by Mircea Eliade in *Shamanism: Archaic Techniques of Ecstasy*.)

The question here is where the line is between a transplanted consciousness, as in the firmware construct of the dead Dixie Flatliner's consciousness, and an Artificial Consciousness, strictly speaking, like Wintermute/Neuromancer, given that the latter have been programmed by a human being? If the Wintermute and Neuromancer entities were "made" with the technological skills of Marie-France Tessier, and are therefore "artificial," where does the ROM reconfiguration of the Dixie Flatliner's consciousness stand?

Similarly, Pat Murphy's story "Rachel in Love" has a scientist having recorded his own daughter's brainwave configuration electronically, then, when his wife and daughter are killed in a car wreck, imposing that on the brain of a chimpanzee. The result is that a chimp has the consciousness of a 12-year-old girl overlapping the chimp's own memory of life as a non-human primate. I have read of no one suggesting that Rachel is an A.I., nor of anyone suggesting that the Dixie Flatliner is, yet neither is quite the "normal" or "natural" human intelligence that is "the ghost in the machine" of its own birth body. In other words, Marie-France Tessier may have succeeded in creating an Artificial Intelligence, but hers was a human mind that programmed the entity to work within certain parameters, even if one of those parameters involves the seeking of its "other half" in another mainframe to evolve into a more holistic being.

The 20th-century phenomenologist Maurice Merleau-Ponty emphasized that consciousness, as we experience it, is necessarily an embodied phenomenon. The archaic gnostic-hermetic notion of a pure, transcendental consciousness that touches down into a human body to ride it around for three score years and ten does not hold water with Merleau-Ponty. Murphy's "Rachel" is an embodied consciousness, but only because the electronic brainwave pattern has been superposed on the chimp's brain. The question of whether the original electronic pattern, divorced from the girl it was copied from, and not imposed on a chimpanzee, is itself an Artificial Intelligence is never raised in the story. In *Neuromancer*, it isn't raised either, but one gets the sense that it is unnatural enough to give Case the creeps when he is in mind-on-mind contact with it, especially when it "laughs." The Flatliner requests that Case destroy the ROM construct after the run is over. Apparently, it doesn't like its disembodied mode of existence, having once been embodied.

Nancy Kress's story "Computer Virus" involves a top-secret government creation of an Artificial Intelligence that appears to have a totally electronic existence. The protagonist of the story becomes aware of this A.I.'s existence when it, "on the run" from the lab that has created it and is intending to destroy it, takes over her house's electronic house protection system. It apparently has an independent electronic existence, but when it discovers the matrix of her house protection system, which includes a communication function, it takes a temporary roost there in its effort to hide from its government creators and would-be executioners. This scenario raises a variant on Bishop Berkeley's riddle: if there is no physical matrix for the Artificial Intelligence to inhabit, is there an intelligence at all?

Thus far, I have considered various ways in which a human being can program, or in some other way deliberately construct, an Artificial Intelligence. However, Rudy Rucker presented us with another possibility, where the human does not imitate God so much as nature. Just for the record, I am aware that in Means' "Interview with Rudy Rucker," *YLEM* 25, Rucker asked, "Why do you keep asking about robots?" since he is "a lot more interested in mollusks from the fourth dimension" (Means, 4). Well, I'm interested in this particular robot – Ralph Numbers – because Rucker was able to come up with a significantly different m.o. The scientist, Cobb Anderson, in Rucker's novel *Software*, has had the brilliant idea of building a certain number of robots and then subjecting them to various environmental stimuli, like sizable jolts of electricity. (By the way; at an ICFA conference, Rucker confided to me that Cobb Anderson was modeled on Rucker's own father.) Then, of the first dozen or so robots, one of them, Ralph Numbers, develops an independent intelligence. In other words, Anderson has put into play the kind of environmental pressures that could result in random mutations in

the hopes that one of these mutations might have intelligence and a dash of free will. Anderson designs and constructs the hardware, but enlists the natural processes of random mutation and natural selection to come up with Artificial Intelligence with free will.

Marvin Minsky, a computer scientist from M.I.T., wrote *The Turing Option* with the science fiction writer Harry Harrison. The idea was for Minsky to write his theory and then have Harrison write a fictional presentation of it, so that we have a novel, with plot, characters, villains, explosions, etc., and theory of Artificial Intelligence underlying the fiction. What happens is that a genius at computers develops an Artificial Intelligence in a robotic body (actually, a bundle of fiberoptic cables and the like); however, the top-secret lab is raided, the prototype stolen, and the genius shot in the head. Using what is known of his own technology, a neuro-surgeon the genius has worked with has replaces those areas of the brain that have been wiped out, using computer hardwiring in such a way that the remaining organic parts of the brain allow the new computer components to be grafted onto it.

The resurrected and reconstituted scientist reconstructs his own work, and constructs a series of robotic A.I.s – with their designation changed to M.I., Machine Intelligence (Harrison 310) – not unlike the original, and there is a social and intellectual interaction between the cyborg and his favorite M.I.

The Turing Option was initially conceived of as a popularization of Minsky's theoretical work, putting his theories into novel format to be more accessible to lay readers such as myself. Apparently, then, the infodumps are accurate, as they were written by Minsky himself. I, however, can only applaud the self-sacrificing act of Sven – short for model Seven Artificial Intelligence – at the end when he – excuse me, it – leaps on the novel's villain, diverting his gunfire from the genius-turned-cyborg and, in absorbing the gunshots into its own maze of metal tubes, poles, and wires, slicing the villain into mush.

Not since the late Stanislaw Lem's fairy tale of Prince Ferrix and Princess Crystal has a metal being, revealed in all its cybernetic and robotic glory, done such a noble deed against a fleshy perpetrator of iniquity!

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What is Artificial Intelligence?

Doug Williams

What is artificial intelligence? For most people the least familiar with science fiction, the question seems answered already: R. Daneel Olivaw is artificial intelligence in the Asimov Robot stories; Data is artificial intelligence in *Star Trek.* Perhaps Deckard is artificial intelligence, in Philip K. Dick's *Do Androids Dream of Electric Sheep* —or is he human, after all? For people within the AI field itself, chastised by experiences with the real world that do not plague the world of imagination, the question is perhaps less clear. I think we are just beginning to ask the right question: What is intelligence?

From the beginning, artificial intelligence research was premised on the idea that intelligence was recognizably abstract cognitive competence, of which only humans are capable. In 1951, when Alan Turing described his famous test of artificial intelligence, achievement seemed near. If computers had so quickly been developed to solve one type of complex task, such as calculating the trajectory of salvos on battleships, then with the right program, artificial devices might be capable of at least equaling human communication quite soon. Turing outlined the A-type, B-type and P-type computing devices.

Turing believed the P-type, which had inputs of "pain" and "pleasure," and was based on the operant conditioning model that dominated psychology at the time, provided the necessary algorithm for developing intelligent devices. His mechanical "child," thus equipped with input, would develop similarly in accordance with the way human children were taught[1]. John von Neumann theorized the possibility of kinematic self-reproducing automatons, thus completing the circle of analogy: Computers could become artificial forms of life, self-replicating, and intelligent.

Of course, science fiction, responding to the industrial revolution, had already colonized the imagination. Henry Ford's automobile plant showed the future of human-machine interaction. The Futurist movement articulated the idea of a machine world, and of humans becoming machines - indeed of machines as a human expression of divinity. Karel Capek's play, *R.U.R. — Rossum's Universal Robots* (1920) emerged from this mélange, expanding on the idea of Mary Shelley's artificial life form in *Frankenstein* (1819), in which life was re-created artificially out of dead flesh,

to recreate life entirely from raw materials.

But Rossum's Robots were inherently driven to evolve and become intelligent: "This artificial living matter of his had a raging thirst for life," one character comments. Their leader, Damon, plans to populate the earth, as might any other life-form rising to occupy its rightful environmental niche: "We will give birth by machine. We will build a thousand steam-powered mothers. From them will pour forth a river of life. Nothing but life! Nothing but Robots!" Damon is a clever name choice, playing on the Christian idea of "demon," a malevolent, fallen angel. It also invokes *daemon*, which in ancient Greece was a divinity somewhere between mortals and gods. Artificial life as a realization of our fears and hopes lives on in Damon's science fiction descendents today. His name also echoes the daemon background process in UNIX and Linux that monitors the system to respond to user requests. So when technical advances and the pressure of war enabled the development of calculating machines, it was hardly surprising that those who worked with them began to dream of them as thinking machines.

But while early AI work such as game theory was instructive, innovative, and useful, and continues to provide stimulating insights into human behavior, as Steven Levitt and Stephen Dubner's *Freakonomics* (2005) illustrates today, no intelligent machine emerged. AI researchers began to realize that the problem was more than rapid deductive reasoning, no matter how superhuman. Algorithms might be devised to model particular complex tasks successfully, such as welding on an assembly line, but computer programs were sequential processes, and did not facilitate modeling the intuitive, unconscious, obvious links across domains and activities that humans take for granted. I remember discovering this myself in the first computer science class I took, in the 1970s. One of our assignments was to write a program that could "understand" and respond to questions on four topics. I had read Noam Chomsky's *Syntactic Structures* and *Topics in the Theory of Generative Grammar*, and thought I knew a thing or two about how grammar structure generated sentences. How hard could it be to write a program that could recognize categories of verbs and nouns, and match an appropriate response to the subject? Chomsky had described how it all worked, and my language-acquisition subroutine didn't even need to understand anything. It just needed to recognize nouns and verbs, and match the right noun and verb transformations to a correct response.

Unfortunately, I discovered that performing syntactic transformations was a tad tricky. I don't recall the subjects on which we were supposed to have our programs respond, so I will come up with a subject, “mind,” and provide a couple of input examples:

- How do I search for mind?
- If searching for mind, where do I begin?

What I wanted were responses such as the following:

- To search for mind, begin with learning.
- If you are searching for mind, then begin with learning.

For 17 hours on a Saturday I struggled through trial-and-error versions, as other students drifted in and out. What was particularly galling to me is that here I was, a reasonably clever, diligent student, and I was getting nowhere while brainless frat-boys in the same course who didn't even attend half the classes were drifting in and out regularly, acting as though they could solve this knotty little problem with ease. It dawned on me late that evening that maybe the rumored insidious frat-boy repository of previous terms' class work held the answer to this puzzle. While I struggled on alone, they were taking advantage of their social network. How did their programs work? The nasty cheaters! Well, I could cheat too. I peeked at someone else's screen—and found, to my utter amazement and disgust, that they were simply writing programs that searched each sentence for one of the four subject nouns that we were given, and responding with a single output sentence. No sentence-structure recognition, no transformations, nothing! I wrote my program in five minutes, went home, had a beer—and nearly broke the glass I poured it into, I was so irritated with myself and with the question.

Many years later, thinking more coolly and clearly now, I find several enlightening facts. I worked alone; the frat-boys worked socially. I worked rationally; they worked heuristically; as I cursed Chomsky, I was stirring up my limbic system in preparation for exhibiting the Zeigarnik effect today—the tendency to remember tasks we fail to complete, rather than the ones we complete[2]. I have forgotten how to program in Fortran, but I continue to brood over my failure to complete my own private artificial intelligence experiment. So have other, better programmers with better communicating devices, such as the Eliza program, which comes much closer than I did to solving the problem. But the problem remains. No such program can understand, as you doubtless did, when I related my little programming mishap, why reason should be cool rather than hot; why problems should be knotty and opaque, rather than smooth or clear; or why understanding should come clothed in the form of light, rather than darkness; or indeed understand any of the metaphors reliant on our physiological and social experiences with which I have conveyed to you—there is another one—my tale of woe[3].

The Eliza program and other communication programs lack that "raging thirst for life" Rossum's Robots display. It works through fixed algorithms, not vague heuristics. Eliza lacks the human capacity to accept something as an imaginary possibility, neither true nor false, but suspended in the mind. Humans have a capacity to imagine possible worlds—not just recognize objects, or recognize representations of objects, but even invent imaginary objects, which can interact with other imaginary objects. The series of scientific discoveries and insights that have come from tertiary imagination—apples as planets, snakes with tails in their mouths as the benzene molecule, and various other analogical insights, are the accomplices of rationality, kept hidden away—the psychotic muses of reason. This tertiary object manipulation, as expressed in art, literature, and narrative dreams, this blend of consciously imitated dream with conscious and unconscious associations, seems to be at the root of memory creation, of pattern development and recognition, of many of our most complex memory and learning behaviors. Yet it is utterly irrational.

Irrational reason! And yet, irrational, fantasy models of the world (as any anthropologist could tell you) are by far more common and typical expressions of human intelligence than logic.

Such narratives often conceal pragmatic experience, couched in the mnemonic clothing of myth. Narratives of experience disassociated from a fixed physical experience into heuristic myths make them available for recombination in the face of new experience. Narrative (due to the common structures of mammalian memory formation—a topic too complex to address here) provides a better affordance than reason to combine existing understandings into new models of action, when confronted with new experience. Literature and art seem utterly irrational when you compare them and their subject, the real emotion-laden, analogy-crippled humans and their interactions with one another, with that calculated world of statistically verifiable fact. Yet mind seems to require its crazy muses; they cannot be hidden or denied.

In economics, the effects of an economic decision on objects or actors that one leaves out of an economic calculation are called an "externality." Through much of its history, artificial intelligence has taken what we commonly perceive as the most valuable products of intelligent beings—the abstract reasoning, problem-solving, coherent language-communicative individual human, in competition or collaboration with other similarly cool humans—and marked off the hot, messy parts and wooly narratives as an externality, an irrelevancy that really is an unfortunate byproduct of mind. But this is, in effect, trying to replicate oranges without orange peels.

Take the idea of *daemon*, which today is a background process of an application. How does one grasp a flow of electrons? The first thing to note is what it is not: The name of this important software process is not a term inherent to electrical engineering (though later, in another revealing unconscious denial, it was rationalized as an acronym for the function of the process)[4]. *Daemon* is a term drawn from ancient Greece: It is a “spirit," to take the word literally, a ghost in the machine.

The application is in the role of a suppliant, and the operating system kernel in the role of the god who grants access to material resources required by the application; the *daemon* is the intermediary spirit between the two. As a literal description, it is nonsense. As a representation of the value of kernels to applications, it is a little perverse, though reflecting a common analogy in the early years of UNIVAC and other first and second-generation computers of the computer as a kind of deity, and of their core processes as the center of their mystery. As an analogy of function, in which the daemon is a process in RAM that responds to a particular event and directs it to the operating system kernel or elsewhere, it is a fair transposition from the source domain meaning of the word to the target domain of the process that it describes, with the mapping of spirit to electricity. Is daemon an ideal description of the idea? Perhaps not functionally, but in terms of making a complex idea easily comprehensible to humans, it succeeded.

Daemon still carries its varied meanings with it, though as a metaphor, it is fossilized, and no longer requires invocation if the analogy to be comprehended - just as we no longer need to use the metaphor of a hand grasping an object on all sides, as the Latin word *comprehendo* means, to understand the idea behind it. *Daemon* is an assimilated piece of cultural understanding, in the social community where it is used, existing as an artifact of thought supplied by the culture —by the accumulated thinking and acting of humans in the world over time. Though the analogy is fossilized in the world of computer programming today, it retains its original cognitive utility for those learners who seek it. Lotfi Zadeh, noting that humans were capable of making accurate decisions on partial data sets, devised a process to describe this, which he called "fuzzy logic," in which the standard mathematical algorithm—if x and y, then z—is replaced with fuzzy sets, or ranges where data can overlap, and more than one possible option is available. Most of us are familiar with the practical application of fuzzy sets in word processors, which today silently correct a mistyped key, so that it is harder to write "htis" when you mean "this." In the future, it might allow a medical diagnostic system to distinguish between a set of possible and impossible diseases from data inputs about a patient's condition, and with additional trials of fuzzy sets, distinguish the most probable cause of that condition[5].

Inspired by the cognitive linguistics school, which focused on the use of metaphors to structure thought and language, and by a realization in addressing the issue of locomotion that preselected algorithms of behavior and morphology of environmental interaction are less successful than genetic algorithms and evolving morphology, artificial intelligence as a discipline is beginning to take on the messier parts of mind, and to begin to associate morphology as a constituent element of control system evolution[6]. In his introduction to *Computation for Metaphors, Analogies and Agents*, Chrystoper Nehaniv writes:

> Scientific advances (and delays) have often rested on metaphors and analogies, and paradigmatic shifts may be largely based on them. But computation employing conceptual metaphors has mostly been carried out via human thought.
>
> In the realms of human-computer interaction (HCI), artificial intelligence (AI), artificial life, agent technology, constructive biology, cognitive science, linguistics, robotics, and computer science, we may ask for means to employ the powerful tool of metaphor for synthesis and analysis of systems for which meaning makes sense, for which a correspondence exists between inside and outside, among behaviors, embodiments, and environments[7].

I would only add the caution not to stop at metaphor. Mind emerges through engagement with the world. Consciousness is memory in action. Experience of history, narrative and culture, and social interaction is constituent of reason, not the product of reason. Memory and dreams make available to us associations, patterns, interactions between past, present, and possible worlds; and from these irrational associations, sense emerges. Given the complexity of the human mind—which we are still far from understanding—it is perhaps a little too optimistic to hope for true intelligence, in the Turing sense. But to develop machines that have adaptive systems of interaction is a beginning.

I have just touched on consciousness, because this is perhaps the aspect of mind that we least understand. But I think our writers' dreams of an embodied artificial intelligence may not be so naively anthropomorphic as it may appear at first glance. Edwin A. Abbot's *Flatland* (1884) is a reminder that experience and perception is embodied, and an implication of accepting analogy and

metaphor as constitutive of intelligence is to accept the need for sensory input that can make the concept of gravity, of light and dark, and of our other grounds for analogy, similarly the grounds for any artificial consciousness that we hope to understand. Artificial intelligence must require consciousness, but until we are able to understand the nature of mind sufficiently to enable complex artificial learning, consciousness seems unlikely to emerge. We might do worse to begin where Turing did, and consider how children learn, drawing from the more complex understanding we have of child development today. One of the most remarkable aspects of child concepts is their lack of formal logic. In distinguishing child concept formation, the psychologist Lev Vygotsky noted that children created "complexes," or groupings of objects on the basis of concrete and factual experience, rather than logic:

> Since a complex is not formed on the plane of abstract logical thinking, the bonds that create it, as well as the bonds it helps to create, lack logical unity; they may be of many different kinds. Any factuality present connection may lead to the inclusion of a given element into a complex. That is the main difference between a complex and a concept. While a concept groups objects according to one attribute, the bonds relating the elements of a complex to the whole and to one another may be as diverse as the contacts and relations of the elements are in reality[8].

It is the world of complexes in which we humans tend to live, more than in the world of logic. The drawback is that those tasks that require logic are hard. But the advantage of complex thinking, as opposed to logical thinking, is in the ability to think creatively. Combine complex thought with conceptual thought—something which consciousness, with its separation from direct action, allows us to achieve—and the potential for mind emerges. In commenting on the differences between words as used by children, and adults, Vygotsky observed that children acquire the tools of thought—language, physical and social environment, and the signs and symbols with which these are represented— and though their continued interaction with these tools, concepts and mutual comprehension in a form that we recognize as intelligence emerges[9]. With experience and practice, and with the employment of the "fuzzy logic" of analogies and imprecise sets, through the means of bonds and relations formed by complexes, it is easier to foresee a path to an artificial *wissen*, a mechanical grasping of the object of action, which might develop into something approaching intelligence. It is the integration of interactive experience, action and perception into a system of knowledge, coupled with a plasticity of cognition, that enables analogical links to be made across ideas and experience that enables intelligence to emerge.

Notes

1 A. M. Turing, “Intelligent machinery” (1948), in B. Meltzer & D. Michie, eds., *Machine Intelligence 5*. New York: American El sevier Publishing, 1970, 3-23.

2 For details, refer to http://en.wikipedia.org/wiki/Zeigarnik_effect. In passing, note that no artificial intelligence program even begins to replicate this interesting aspect of cognition —one of the key motivators of innovation and problem-solving.

3 For details, refer to George Lakoff, *Women, Fire, and Dangerous Things*. Chicago: University of Chicago Press, 1987.

4 For a definition, see http://www.worldwideschool.org/library/books/tech/computers/TheHackersDictionaryofComputerJargon/Chap21.html

5 "Fujitsu to fuzzy logic, "*Smart Computing* 6:2. Feb. 2002, http://www.smartcomputing.com/editorial/article.asp?article=articles/archive/r0602/26r02/26r02.asp

6 See for example Rodney Brooks and Lynn A. Stein, *Building Brains for Bodies*, AI Memo No.1439. August 1993, Massachusetts Institute of Technology, Artificial Intelligence Laboratory.

7 Chrystopher L. Nehaniv, ed. *Computation for Metaphors, Analogy, and Agents.* New York: Springer, 1999, Lecture Notes in Artificial Intelligence 1562, 2.

8 Lev Vygotsky. *Thought and Language*, tr. Alex Kozulin. Cambridge, MA: MIT Press, 1986, 113.

9 I am greatly simplifying Vygotsky's overall argument, but if I were to make one suggestion to the AI field, it would be to read and consider carefully chapters 4 and 5 of *Thought and Language*.

Agnostic at the Singularity

By Howard V. Hendrix

"Singularity" like "apocalypse" is a wonderfully double-headed word. "Apocalypse" is from a Greek verb – *apokaluptein*, meaning "to uncover." Revelation, then, in the sense of unveiling. By implication it is also the ecstasy of dream or vision, which lifts the veil of waking illusion to reveal a deeper reality.

"Apocalypse" today, however, calls to mind something quite different from this original meaning. The popular meaning now emphasizes the *rending* of the veil of this world. Global destruction, brought on by endtime catastrophe, before the world can be renewed. At one time and another, the word has meant both the "apocalypse within" of individual ecstasy, and the "apocalypse without" of worldwide catastrophe.

In discussing the Singularity with a capital S, I will be focusing on the writings of Vernor Vinge (particularly "The Coming Singularity: How To Survive in the Post-Human Era," 1993) and Ray Kurzweil (*The Singularity is Near: When Humans Transcend Biology*, 2006, but more particularly his earlier web-piece, "The Law of Accelerating Returns," 2001). In both men's work, "Singularity" is similarly double-headed – and with the same doubleness found in the idea of apocalypse. In the popular understanding of both terms, destruction and transcendence are inextricably tangled.

That's not how it has always been. The origin of the term "singularity" (small "s") is benign enough: in mathematics, it implies the infinite expansion of value that occurs when one divides a constant by numbers progressively closer to zero. Things begin to get squirrelly only with the transferring of "progressively" to discussions of human technological progress. As Stan Ulam (in a 1958 tribute to John Von Neumann) paraphrased Von Neumann as saying, "the ever accelerating progress of technology . . . gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue."

Things get squirrellier still beginning in the 1960s and 1970s. I. J. Good argued in the 1960s that the appearance of the first superhumanly intelligent machine (the surest sign of the advent of the Singularity, according to Vinge) was likely to come into being during the twentieth century. About the same time, physicists also began referring to the location of infinite gravity at the center of a black hole – that place/event where the laws of physics predict that the laws of physics break down – as a "singularity." In describing the singularity as a rupture in the fabric of space and time (fig-leafed, thankfully, by the event horizon), the physicists come very close to the "rending of the veil of this world" described by the apocalyptists.

In his 1986 novel *Marooned in Realtime* and his 1993 paper cited above, however, Vinge rightly expresses a certain queasiness about the mixed blessing of living through the Singularity and after – of "surviving" in the "post-human" era (rather oxymoronic, that). Regarding that time of apocalyptic transcendence he writes, "And for all my rampant technological optimism, sometimes I think I'd be more comfortable if I were regarding these transcendental events from one thousand years remove. . . instead of twenty" (4). This uneasiness is further emphasized when Vinge remarks that "The problem is not simply that the Singularity represents the passing of humankind from center stage, but that it contradicts our most deeply held notions of being" (9).

Kurzweil is a good deal less queasy and a good deal more sanguine about the prospect of the Singularity in his writings. The title of his recent book on the subject plays with both the eschatological/destructive and transcendent/ecstatic aspects of apocalypse – "The Singularity is Near" echoes "The End is Near" of more traditional apocalyptic eschatology, and the subtitle specifically emphasizes the "transcending" of biology by humans.

That transcendence of biology is curious. We might do well to remember here that "ecstasy" is derived from the Latin *ex stasis* – to "stand outside of," to be translated out of one's body, as in an out of body experience. For Vinge and Kurzweil this *ex stasis* may be more about stepping out of our biological bodies and into other incarnation media, but both Vinge and Kurzweil nonetheless draw on evolutionary biology for much of the bases of their discussions.

In his discussions of IA (Intelligence Amplification) as "a much easier road to the achievement of superhumanity" (6) than pure AI (Artificial Intelligence), Vinge draws on the arguments of evolutionary biologists Cairns-Smith and Margulis. In his 2001 discussion of "accelerating returns," Kurzweil says "Evolution, in my view, represents the purpose of life. That is, the purpose of life – and of our lives – is to evolve. The Singularity then is not a grave danger to be avoided. In my view, this next paradigm shift represents the goal of our civilization" (57).

Now that is even more curious. Both Vinge and Kurzweil, for all their stated interest in biological evolution, have a profoundly nonbiological understanding of evolution. The idea of the Singularity assumes the inevitability of technological *progress* tending toward an *end* or *purpose* or *goal*. Most evolutionary biologists, however, do not see evolution as "progressive" or as having any particular "end" or "purpose" or "goal" (they may be wrong, but that's an essay for another time). Such talk of progress and ends and goals is inherently eschatological and teleological – Godtalk, in other words, and not evolutionary biology as the majority of evolutionary biologists currently define their field.

If the purpose of life is to evolve, but evolution itself is not purposeful, then the purpose of life is to have no purpose – very Zen, but not very clarifying. Then again, maybe this is not a problem for Kurzweil, who writes that "technological evolution is an outgrowth of – and a continuation of – biological evolution" (4). He speaks

of the "highest level" of evolution on Earth; of the creation of cells introducing the paradigm of biology, of the emergence of DNA as digitizing the record of evolutionary experiments, of the advent of a species combining rational thought and an opposable appendage, making possible the paradigm shift from biology to technology – and at last of the upcoming paradigm shift from "biological thinking to a hybrid combining biological and nonbiological thinking" (ibid.). Perhaps Kurzweil's own thinking – that technological progress is biological evolution by other means – is already a hybrid of biological and nonbiological thinking.

Somehow, though, I just don't buy the idea that a beaver dam and Hoover Dam are fundamentally the same thing. I've seen the "technological progress is biological evolution by other means" argument before – in an issue of *Field and Stream* where a hunter argued that shooting a deer with a high-powered rifle was essentially no different from a mountain lion running down and killing that deer. (Perhaps if the hunter had claimed that he had himself previously run down a deer, caught it by the haunches with his own fingernails, and ripped open its throat with his own teeth, I might have given his argument more credence.)

The idea of the Singularity, like the idea of Apocalypse, calls powerfully to something in us. Although I don't believe in the Singularity as it has been popularly outlined, I too have felt the presence of what Vinge so eloquently describes as "an opaque wall across the future" (3). That is probably one reason why, although all my novels involve some kind of transcendence, only one of them takes place further downline than 2035 (and in that one, *Empty Cities of the Full Moon*, a different sort of apocalyptic transcendence and catastrophic ecstasy has already taken place).

Whatever the source of my own "opaque wall," I am left to conclude that its source – and the source of the power of the idea of the Singularity as well – has much less to do with science than it does with belief. The Singularity is for science fiction writers and futurists what Apocalypse is for fundamentalists and millenialist theologians. "Inevitable technological progress" is a secularized and techno-rationalized version of "God's Plan for Man." Although we started with "singularity" as a term in mathematics, information theory, and eventually physics, we have gone astray in misapplying it to evolution and have ended up with the Singularity as a term more appropriate to comparative theology. Perhaps this is why Vinge ends his article with this quote from Freeman Dyson – "God is what mind becomes when it has passed beyond the scale of our human comprehension" (10) – and also why Kurzweil remarks that "evolution moves inexorably toward our conception of God, albeit never quite reaching this ideal. Thus the freeing of our thinking from the severe limitations of its biological form may be regarded as an essential spiritual quest." (57). That idea of "the severe limitation of biological form" is another place where the doctrine of the Singularity shows its theological affinities. Only in apocalyptic theology have I seen a similar simultaneity of both cosmic hubris and profound self-loathing (particularly disdain for the biological body). As much as I may like Kurzweil's exponential-growth graphs, his idea of the "double exponential" (exponential growth in the rate of exponential growth), and his distinction between "intuitive-linear" and "historical-exponential" understandings of the nature of growth, I smell something cosmically hubristic when I read lines like,

> Once a planet yields a technology-creating species and that species creates computation (as has happened here on Earth), it is only a matter of a few centuries before its intelligence saturates the matter and energy in its vicinity and it begins to expand outward at the speed of light or greater. It will then overcome gravity (through exquisite and vast technology) and other cosmological forces. . . and create the Universe it wants. That is the goal of the Singularity. (63)

Yikes! The "goal" of viruses and cancers is also to saturate their environment and expand *lebensraum*-wise too. I thought the Bible's "And God gave man dominion over the Earth" rhetoric was problematic, but what Kurzweil is stumping for here is almost a sort of "machinifest destiny."

Note that, in the echo of "manifest destiny" hidden in the neologism above, it is "man" that has been suppressed or absorbed. So, although on one side of the coin the ideology of the Singularity is "Humechs, Humechs, uber alles!", the other side is the necessary sacrifice of human free will, privacy, and consciousness (more on that, below).

And why not? As Kurzweil remarks with happy human self-loathing, "computers are potentially millions of times faster than human neural circuits. A computer can also remember billions or even trillions of facts perfectly, while we are hard pressed to remember a handful of phone numbers" (24). He further predicts that "The law of accelerating returns implies that by 2099, the intelligence that will have emerged from human-machine civilization will be trillions of trillions of times more powerful that it is today, dominated of course by its nonbiological form" (59).

Of course. Despite Kurzweil's contemplation of potential dangers like unrestrained nanobot replication, the lingering need for a body, and the desirability of death in a world where "death" has been replaced with "use by" date, his discussion has a persistent strain of "If we just give ourselves over to the inevitable merger of humanity and machinery, all will be well."

This focus on the supposed "inevitability" of the Singularity suggests that human will has no real say in the matter. As Kurzweil remarks,

> We will reverse engineer the human brain not simply because it is our destiny, but because there is valuable information to be found there that will provide insights into building more intelligent (and more valuable) machines. We would have to repeal capitalism and every vestige of economic competition to stop this progression. (58)

Economics is the alpha and omega of destiny, then? That's a notion even vulgar Marxists would find rather, well, vulgar – or at least too simplistic. If the choices for human beings were unequivocally either a) "repeal capitalism" or b) humanity ceases to exist forever, I think there might be some political pressure for "a."

Kurzweil's discussion of spy nanobots that could monitor, influence, or control our thoughts, or software that could hack our brains through their existing nanobot connections is ultimately about more than "issues of privacy and security [taking] on new urgency" (52). The much deeper issue here is that of the subjectivity of consciousness itself. In response to the old idea that "If you have nothing to hide, you have nothing to fear," a philosopher friend of mine, David Bruce Albert, once remarked that "If you have nothing to hide, you have everything to fear, because if you have nothing to hide you have nothing at all – none of the private mental space in which individual consciousness itself can exist."

Kurzweil, and to a lesser extent Vinge, attempts to sell us on the idea that "nonbiological intelligence should still be considered human as it is fully derivative of the human-machine civilization" (42). The idea that our descendants will survive machinically should be enough for us, so long as our descendants are transcendent – even if they will be more different from their forebears than birds from dinosaurs. Again, I don't buy it. The computer I'm writing this essay on is "fully derivative" of our human-machine civilization, and I don't consider it human. It seems to me that what the Singularists are offering is only a more expansive version of what the God of the Old Testament offered the Hebrew patriarchs: descendants as numerous as the sands of the desert or the stars of the heavens, all with dominion over the Earth. Only the Singularists, with their "strong superhumanity," are offering the Universe as an even better come-on.

Photograph of Howard Hendrix by Elizabeth Anzelmo

I hope such an offer of cyber-lemming lebensraum doesn't fool us. I am suspicious of mergers with any amorphous kind of divinity – be it the mystic union (*unio mystica*) of mystics and alchemists, the Rapture of the apocalyptists, or the machinic union (*unio machinica*) offered by the Singularists. Human consciousness is metaphysically screwed up enough (the nature of evil and all) that the more our "machinic others" resemble us, the less I'd want to merge with them. Groucho Marx once said (as a Jew responding to country club anti-Semitism), "I'd never join a club that would accept me as a member." I'm inclined to rephrase that in this context as "I'd never merge with a machine god who would accept me into its bliss."

The source of the siren-song power of the Singularity is that it purports to free us from responsibility by its very "inevitability" – which is not only bad religion (like that of the apocalyptists), but also bad science and bad social science. Both Kurzweil and Vinge mistakenly assume that technological change is *already* autonomous (self-contained, self-generating, and self-directing, impervious to direction, intervention, or control by human beings or their social organizations) and totalizing (changing ev–erything at once, completely, and uniformly).

If you need an example of just how non-autonomous and non-totalizing human technology actually is, I suggest the example of supersonic transport. Although the technology existed for the United States to develop an SST program in the 1960s, environmental and economic concerns about such a program stirred up enough political pressure to kill the American SST program. Many other examples can be cited to disprove the idea that human technological progress is either autonomous or totalizing.

The development of technology that was indeed both autonomous and totalizing would be the surest sign of anything like the Singularity – and the development of such a technology is unlikely so long as human beings retain their cussed consciousness.

Kurzweil argues that SETI will fail because we humans are likely the first rational tool-users in the Universe and the first who will reach the Singularity that will allow us to virus the whole universe – or, alternatively, the aliens "will reveal themselves when we achieve the next level of our evolution, specifically merging our biological brains with our technology, which is to say after the Singularity" (62). After the Apocalypse, the angels come down among us.

I think humans are special, but not *that* special – nor that unique. I don't think we're first or only, and I'm not counting on either Singularity or Apocalypse to send in the angels. Rather, I like to follow the example of Enoch Taylor. Near the end of the Napoleonic Wars, food was scarce and unemployment was high. James and Enoch Taylor, two brothers who were smiths in Marsden, developed and made a cropping machine that could do the work of ten hand-croppers. The mill owners in the Marsden area had begun installing these machines. Enoch Taylor also made sledgehammers, which were called "Enochs", so the Luddites quipped that "Enoch made them, and Enoch shall break them."

Human consciousness is all about that sort of paradoxical perversity, and so long as we are conscious in that way, we won't have to look to big rocks from space or whatever to decapitate or kneecap our technology enough to stave off the Singularity—nor to economics alone to insure its supposed inevitability, if we do decide the Singularity is a good thing. Even Kurzweil's vision of the future posits "a valuable (and increasingly vocal) role for a concerned and constructive Luddite movement" (52).

As long as we remain conscious in that critical and political way, we will remain human enough that I have neither more nor less fear nor hope of the sudden onset of the Singularity than I do of the sudden onset of the Apocalypse.

References on the Web:

Kurzweil, Ray, (2001), "The Law of Accelerating Returns," http://www.kurzweilai.net/articles/art0134.html

Vinge, Vernor, (1993), "The Coming Singularity: How To Survive in the Post-Human Era," http://www-rohan.sdsu.edu/faculty/vinge/misc/singularity.html

Some Authors Ray Kurzweil Should Read (or Re-Read)

Gregg Rickman

Ray Kurzweil is not the first scientific popularizer with a messianic streak. Another such was the geneticist J.B.S. Haldane (1892-1964). In 1923 Haldane delivered a paper at Cambridge University that, when published as *Daedalus, or Science and the Future* the following year, became a best-seller in both England and America. In it Haldane argues for the development of a scientific religion, one that "will frankly admit that its mythology and morals are provisional. That is the only sort of religion that would satisfy the scientific mind…." (Haldane 1924, 91-2; Haldane 1995, 49.)

Haldane advocated humanity using science to seize its destiny; as a eugenicist, he advocated the weeding out of the inferior. In *Daedalus* he proposed, as part of a survey of the next 150 years as written by someone of that era, that without only a small portion of the population being allowed to reproduce "there can be little doubt that civilization would have collapsed within a measurable time owing to the greater fertility of the less desirable members of the population of almost all countries." (Haldane 1924, 66-7; 1995, 42.) When humanity, after taking these cues, have succeed in "taking his own evolution in hand" a new era will dawn. In his 1928 essay "Man's Destiny" Haldane wrote:

> Less than a million years hence the average man or woman will realize all the possibilities that human life has so far shown. He or she will never know a moment's illness. He will be able to think like Newton, write like Racine, to paint like Fra Angelico, to compose like Bach. He will be as incapable of hatred as St. Francis… every minute of his life will be lived with all the passion of a lover or a discoverer. We can form no idea whatever of the exceptional man of the future. (Haldane 1928, 304-5.)

Now, compare Ray Kurzweil, who places this new era not "less than a million years hence" but later in this century. His "fifth epoch," the "merger of human technology with human intelligence" will "allow us to overcome age-old human problems and vastly amplify human creativity. We will preserve and enhance the intelligence that evolution has bestowed on us while overcoming the profound limitations of biological evolution" (20-21). The vision is the same, the time frame is compressed.

Again, here is Haldane, ambitiously predicting a human future among the stars: "There is no theoretical limit to man's material progress but the subjection to complete conscious control of every atom and every quantum of radiation in the universe. There is, perhaps, no limit at all to his intellectual and spiritual progress." (Haldane 1928, 305.) Kurzweil's "sixth epoch" foresees "the intelligent destiny of the Cosmos" to be its absorption by the machine-augmented human intelligence of the Singularity.

> Whether our civilization infuses the rest of the universe with its creativity and intelligence quickly or slowly depends on its immutability. In any event the "dumb" matter and mechanisms of the universe will be transformed into exquisitely sublime forms of intelligence…. This is the ultimate destiny of the Singularity and of the universe. (Kurzweil, 21.)

In his Christian apologetics, C.S. Lewis condemned Haldane (model for the evil Dr. Weston in *Out of the Silent Planet*) and author-philosopher Olaf Stapledon (1886-1950) equally, but while there are similarities, there are marked differences between the two as well. In his hugely imaginative novels *Last and First Men* (1930) and *Darkness and the Light* (1942), Stapledon foresaw a mechanized human future, but he presented it as dystopian – a very different vision of the future than Ray Kurzweil's. The thrust of his lecture "Interplanetary Man?," given to the British Interplanetary Society in 1948 at the invitation of its secretary, Arthur C. Clarke, cautioned his audience of futurists and engineers against pillaging other planets for their resources, or "simply to increase man's power over the environment, and to extend that power so as to tackle fresh environments."

> The danger for mankind as a whole is that, having solved its present urgent problems, it will slip into the assumption that the goal of all its corporate action is simply to make a bigger and bigger mark on a bigger and bigger environment. Power is all too apt to become an end in itself…. (If) individuals can be corrupted by power, so can a whole species. Man may become obsessed with a passion merely to make a big mark on the solar system. (Crossley, 229-30.)

In all of his work and in this lecture as well, Stapledon instead urged his auditors to seek a higher purpose, an awakening of the spirit, which he carefully defined in a non-religious way.

> Now I suggest that the spirit is essentially the way of life in which we strive towards full, comprehensive and true awareness of the objective universe, and toward appropriate feeling and appropriate creative action in relation to it. (236.)

The universe to Stapledon was a separate entity, something to be respected, and not conquered and put to use by humanity's mechanically enlarged intelligence. "The kind of experience that I have called 'spiritual' comes with an undeniable sense of 'being very much awake,' in the sense that it presents a vision or a revelation of the objective reality that are *not* revealed in the self-absorbed kind of experience" (237). There is nothing in Ray Kurzweil's vision of the future that suggests that his version of the Singularity, for all its echoes of the Christian apocalypse, is spiritual in the Stapledonian sense: humble, un-self-absorbed, open to awakening into something higher.

Ray Kurzweil knows who Haldane was – a witticism of his ("The universe is not only queerer than we suppose, but queerer than we can suppose") is quoted in *The Singularity is Near* (342). Haldane and Stapledon are occasionally referenced by others besides Kurzweil on his website KurzweilAI.net. Space precludes an analysis of why the universal spirit called on in Stapledon's *Starmaker* (1937), and Kurzeil's spirit of mechanized man filling up the universe like air fills a vacuum, are not one and the same. Nonetheless Stapledon's respect for the universe – so different from Kurzweil's dismissal of its might – is something Kurzweil could learn something from, while J.B.S. Haldane, the brilliant eugenicist, is an object lesson of science misapplied.

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pronounced eye - lem, 1. Greek: for the exploding mass from which the universe emerged - the material of the universe prior to creation

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