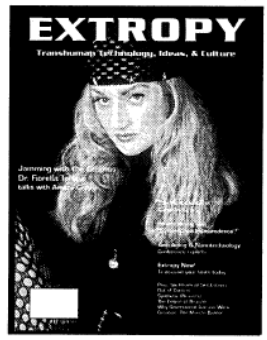
2nd half 1996
vol.8, no.2

EXTROPY

#17

Who is Fiorella? Exoterran artist and astronomer. Dr. Terenzi composes music from the galaxies and explores the feminine side of physics.



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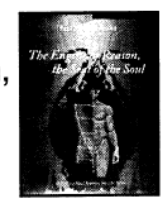

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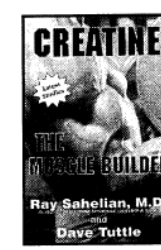

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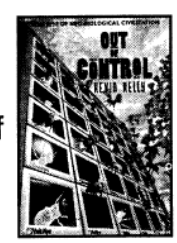

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EDITORIAL

DATE: August 1 1996

The Cultural Propagation of Transhumanism

Leigh Christian

"Extropy, now eight years old, continues to serve as the only strongly filtered source of extropian thinking."

Yes, *Extropy* is back after a delay. Even as *Extropy* slumbered for a few months, gathering energy for another intellectual leap over human limits, extropian ideas continued rapidly propagating.

Not long ago, the term "extropian" was strange and unfamiliar to almost everyone. Now, not only do we see it hurtling around the Web and appearing in Hip spots like *Wired* and HotWired, it's even being considered for the next edition of the Oxford English Dictionary.

The number of forums for extropian and related transhumanist ideas has burgeoned, especially on the Net. Numerous Web sites have sprung up and new e-mail lists formed. The sheer volume and flow of raw ideas can be hard to handle. *Extropy*, now eight years old, continues to serve as the only strongly filtered source of extropian thinking.

This issue contains the usual diverse range of topics and writers, united by their concerns of overcoming human limits through reason and technology. As I write, the Olympic athletes continue to push back limits to human speed, strength, and agility. USC law professor Michael Shapiro considers the moral and philosophical issues raised by the growing use of performance enhancing substances and treatments, and their possible future developments. A book on a present-day physical performance enhancer, Creatine, is reviewed in the renamed review section, Discriminator.

Readers who also spend much time on the Net might expect a sympathetic commentary on John Perry Barlow's Declaration of the Independence of Cyberspace. Instead, Reilly Jones takes Barlow to task in a way differing from other critiques. By an odd coincidence, Barlow also pops up in our report on the sad death of Timothy Leary—a man who gave up on the Life Extension aspect of his SMI²LE formula (Space Migration, Intelligence Increase, Life Extension).

Astrophysicist Amara Graps contributes our cover feature: a discussion with astronomer-musician Dr. Fiorella Terenzi, augmented by Amara's expansion of the conversation.

To continue covering all the ideas, persons, and events furthering extropic goals, we report on two recent conferences, on molecular nanotechnology and life extension. Adding to the balance of future-thinking and application to life today, Peter Voss tells us how to achieve Extropy Now! If this isn't enough, see the next page for our on-line forums.

Upward and Outward!
Max More, Ph.D.

Extropy #18 is scheduled for early 1997.

EXTROPY — the extent of a person's or a culture's intelligence, information, vitality, diversity, opportunity and personal growth. Extropians are those who consciously seek to increase extropy. The Extropian Principles are: (1) Boundless Expansion; (2) Self-Transformation; (3) Dynamic Optimism; (4) Intelligent Technology; (5) Spontaneous Order. [See *Extropy* #11 for Extropian Principles v.2.5, or http://www.primenet.com/~maxmore/extprn26]

TRANSHUMANISM — philosophies of life (such as Extropianism) that seek the continuation and acceleration of our evolution beyond our current human forms and human limitations by means of science and technology, guided by life-promoting principles and values, while avoiding dogma and mysticism.

EXCITATIONS

Send comments to extropy@extropy.org or to:
The Editor, *Extropy*, 13428 Maxella Avenue, #273, Marina Del Rey, CA 90292

Prometheus Project

From: johnkc@well.com
Date: Sun, 28 Jul 1996 07:49:17 -0700
To: extropians@extropy.org
Subject: The Prometheus Project

On Thursday (July 25) I made a pledge that I will give $1000 a year for 10 years to the Prometheus Project. The idea behind the project is to start a profit making company and obtain one million dollars a year for 10 years "for the purpose of doing the scientific research necessary to convincingly demonstrate and publish in peer reviewed journals, fully reversible brain cryopreservation". We're already up to $209,000 a year for 10 years and have been looking for money for less than a month.

I have always thought that Nanotechnology would be needed for reversible brain cryopreservation, but too many people I respect think otherwise for me to ignore the possibility that something much simpler might work. Although small by some standards this would be the largest research project ever undertaken in this area, the largest by far. The low hanging fruit has not been picked yet, so interesting things will certainly be found, and if the goal is actually reached the world will never be the same.

I can't imagine ever regretting this decision. If it works I'll be rather proud of myself for helping, and I might even make some money. Gaining immortality wouldn't be too bad either. If the goal is not reached at least I won't be tormented with the thought that it failed because people like me had no interest in it.

If you want to find out more about this read sci.cryonics, especially Paul Wakfer's (70023.3041@compuserve.com) posting of July 20, 1996: The Prometheus Project (repost)

On the web look at:

http://www.access.digex.net/~kfl/les/cryonet/kPrometheusProject.html This is the list of all Cryonet messages mentioning the project.

http://www.access.digex.net/~kfl/les/cryonet/prometheus.html This is a description of the project, and testimonials.

http://www.access.digex.net/~kfl/les/cryonet/ppledges.html This is the list of pledges.

You might also want to subscribe to CryoNet, send email to: majordomo@cryonet.org with the message *body* (not subject line): subscribe cryonet

John K Clark
johnkc@well.com

EXTROPIANS ONLINE

This summer we made numerous changes, changing servers, setting up a Web site, and welcoming on board a new List Administrator, David McFadzean. Here's the updated information:

Extropians e-mail list:

To find out how to issue command to Majordomo, to change your address, join or leave a list, etc., send a message to extropians-request@extropy.org with "help' in the body of the message (and nothing else). For example:

subscribe <list> [<address>]
Subscribe yourself (or <address> if specified) to the named <list>.

unsubscribe <list> [<address>]
Unsubscribe yourself (or <address> if specified) from the named <list>.

You can find a **web-based interface** to the lists at:
http://www.extropy.org Choose Extropians Online

Local e-mail lists:

You can join these through the web-based interface, as above, or by sending mail to extropians-request at extropy.org. The local lists cover Southern California, Northern California, and the East Coast of the USA:
exi-la-request@extropy.org
exi-bay-request@extropy.org
exi-east@extropy.org

Archives:

A Hypermail archive of posting the various Extropians lists can be found at:

http://www.lucifer.com/extropians/

You can search messages by subject, date, or author. Only posting made after we moved the list in June 1996 can be accessed this way.

If you have any questions or problems, please contact "postmaster@extropy.org".

Extropy Institute Web Site

The Extropy Institute Web site is up (September 1996) and continuously being developed. Come back to it frequently and you will see many additions.

http://www.extropy.org

ADVANCES

Dollar-Denominated Digital Cash

To follow on from the success of the valueless "Cyberbucks" ecash trial, DigiCash B.V. have now expanded their beta-test to include dollar-denominated ecash. Now, instead of using 'play money', it is possible to open an account at Mark Twain Bank in Missouri and conduct real transactions over the Net, paying with anonymous digital cash.

Mark Twain already provide traditional customers with accounts in multiple currencies, so ecash is merely treated as another currency. Users maintain both a dollar account and an ecash account at the bank, and for a small fee can transfer money between the two. Digital cash can then be withdrawn and deposited over the Net from the ecash account, and spent or accepted with software similar to that used in the Cyberbucks trial[1].

Ecash users have a choice of fees for their accounts, depending on the intended level of use. At the low end, the cheapest user account charges an $11 setup fee and $5 per month, and may convert $ 11 per month to and from ecash for free, after which a 5% conversion fee is charged. At the high end, a high-use merchant account charges a $ 300 setup fee and $5 per month but only a 2% fee on all conversions. In general, paying a higher setup fee reduces the monthly and conversion fees, and increases the amount that users may convert for free each month before the conversion fee is charged.

The advantage of this system over other Net payment schemes is that it provides cryptographic security and true payer anonymity[2]. However, at this point in time it is still regarded as a beta test, and hence Mark Twain Bank take no responsibility for losses incurred in ecash transactions. From my experience of the Cyberbucks trial, the software is very robust, however cautious users will only withdraw as much ecash as they need, and convert ecash payments back into FDIC-insured dollars as soon as possible.

Any ecash user can set up a shop, and at the time of writing there are nineteen publicised ecash-accepting shops on the Web. The products and services for sale range from software to auto ads, but perhaps of particular interest to Extropians is the pending acceptance of ecash by Laissez Faire Books. The process of creating an ecash-accepting shop is non-trivial, though simply charging for accesses to Web pages requires only limited knowledge of Perl.

Extropian and cypherpunk Sameer Parekh, President of the Community ConneXion ISP in Berkeley, has simplified this by integrating ecash into the www.c2.org Web server. Users can either run a script to set up shops automatically, or simply add a special tag to their HTML access-control files, telling the server to request payment before sending the page to the browser. As c2.org now allows users to pay usage fees with ecash, users without ecash accounts can still set up chargable Web pages in this fashion and have the charges deducted from their usage fees.

This new trial is another step forward for those interested in privacy and anonymity on the Net. I wish it well.

[1] See *Wired*, December 1994
[2] See "Protecting Privacy With Electronic Cash", *Extropy* #10,
"Introduction To Digital Cash", *Extropy* #15

Mark Grant Mark.Grant@isltd.insignia.com

Advances features short summaries of advances in science and technology. Our focus is on developments that further our extropic goals of extended life, intensified intelligence, increased freedom, and other ways of overcoming human limits.

Advances also presents economic information, especially as it relates to standards of living and investment opportunities in technological companies. —MM

Direct information for this section to Sean Morgan, Advances Editor: sean@lucifer.com or extropy@extropy.org or send to *Extropy*, Advances, 13428 Maxella Avenue, #273, Marina Del Rey, CA 90292. This issue's Advances edited by Eric Watt Forste with Max More.

ADVANCES

BIOTECH/HEALTH

A large step has been taken towards preventing breast cancer. A British-American team has identified a second gene that causes the disorder. The two genes now isolated account for 90% of the inherited cases of breast cancer (18,000 per year in the USA). Women inheriting the BRCA2 gene have an 85% chance of developing the disease. Carriers of the gene also have increased rates of prostate cancer, male breast cancer, and ocular melanoma.

This discovery will allow better screening of susceptible families. The number of lives that could eventually be saved is huge: Breast cancer strikes 182,000 women and 1,000 men each year, killing 46,000 women and 300 men. The first gene identified, BRCA1, was found on chromosome 17. BRCA2 is on chromosome 13. [MM]

Leptin for fat loss: Biotech company Amgen's stock last July gained $900 million in value after announcing the discovery of a protein called leptin. Leptin, when injected into obese mice, reduced their bodyfat. Leptin is produced by the recently uncovered OB gene.

Amgen's thunder appears to have been stolen on December 28 by an announcement from Millennium Pharmaceuticals that it had found the receptor for leptin. This may allow Millennium to create a pill capable of altering the gene's function to induce fat loss, while Amgen is still testing an injectable. Millennium CEO, Mark Levin, suggests that most human obesity may stem not from an inadequate amount of leptin but from the brain's resistance to it. Millennium thinks that the receptor it has found will lead to the discovery of another obesity gene—the one that determines how well the brain recognizes leptin's anti-eating signal.

Aging: Laura Chang and a team of four others at Memorial Sloan-Kettering Cancer Center in New York have cloned a human protective telomeric protein (called hTRF or human telomeric repeat binding factor) and demonstrated that the cloned protein localized in vivo to the chromosome ends. The positive identification and cloning of this protein may lead to a better understanding of telomeric mechanisms, which have been implicated in some aspects of the aging process, including cancer. (Science, 1995 December 8)

COMMUNICATIONS

You may have seen the ads for software allowing you to make long distance calls at local prices via the Internet. Products include Internet Phone from VocalTech, Webtalk from Quarterdeck, Intercom from Telescape Communications, and Webphone from Internet Telephone. How well do they work? Long distance carriers needn't sweat too much just yet, though the future prospects are intriguing. To make these programs work you'll need a sound card and microphone and a SLIP/PPP connection to the Internet. The person you're talking to will need the same software (from the same company). It really works, but sound quality falls below what we're used to on the phone. The two speakers will have to take turns talking, some parts of your words will drop out, it may take a few seconds for your voice to travel over the Net. To keep up with developments in this area, join the Voice on the Net E-mail list: Send: "subscribe von-digest" to:
majordomo@pulver.com

Call 1-800-WILD-FIRE (in the U.S.) for a demo of their **speech recognition product**. An intriguing foreshowing of coming semi-smart digital assistants.

NEURO-COMPUTER INTERFACE

(See also the report on neuroscience research at USC in *Extropy* #16.)

Nerve cell meets microelectronics: Realizing a tantalizing science fiction fantasy, Richard S. Potember, a chemist at John Hopkins University in Baltimore, and his collegues are building a chemical bridge between live nerve cells and microelectronics.

Using methods adapted from semiconductor manufacture, the researchers painted textured glass or silicon plates with a synthetic peptide that spurs the growth of fetal neurons. They find that the patterned peptide beds are cozy enough to coax baby rat neurons into sprouting dendrites and axons.

"They're growing," Potember says. "With this peptide on the glass, the fetal cells attach to the plate and mature into viable neurons, forming dendritic and axonal connections the way they normally do inside the body."

The biologically active surface constrains and directs neuronal growth into predetermined, circuitlike patterns. Guiding that growth, the researchers can get the nerve cells to mimic the logical circuits typically carved into semiconductors.

Following chip design rules for storing and processing data, the team aims to forge "live circuits" that could eventually respond to direct, computer-modulated stimulation.

"The interface between biology and electronics is important for biomedicine," Potember says. In the short run, this method shows promise for testing pharmaceuticals and possibly for studying neurological diseases, he says.

In the long run, the team wants to use the new technology in prosthetic devices. "This could be very helpful to someone who's lost an arm or leg," Potember says.

COMPUTERS

The Web spreads: Revenue from World Wide Web software was barely anything in 1994. Last year it was around $250 million. Hambrecht & Quist Inc. forecast revennue of $600 million this year. Even so, Web software will account for less than 1% of the $100 billion worldwide software market. 75% of this software is made in the USA. Thanks partly to the Web, sales of object-oriented software has started growing fast. According to IDC, $600 million dollars of object-oriented software will be sold in 1996, double the '95 figure. [MM]

Computer sales still booming: 35% more servers will be shipped this year—up to 1.05 million. PC sales will grow 16% from last year to 25.6 million in the USA (from 10 million 5 years ago), and up by 19% to 68.7 million worldwide, according to Dataquest. The Semiconductor Industry Association reckons on a 26% growth in chip production this year. The microchip industry is set to ex-

pand over the next decade or two even faster than the average annual 15% gains since the first microchip was put out by Texas Instruments 36 years ago. Don't begrudge Intel and other manufacturers their healthy profits: New wafer fabrication plants now cost around $1.3 billion each. New plants will have to be constructed every week to reach the third of a trillion dollar level by 2000 as forecast by Dataquest, Inc. [MM]

A *Business Week* (4/29/96) story describes the quest for **ever more powerful supercomputers**, the current record holder being a 281 gigaflops machine built by an Intel-Sandia team. By November Sandia labs will install a new Intel machine, a $46 million computer "capable of cracking the long-time fantasy speed of 1 teraflops. That's computer speak for a trillion calculations per second." That machine may actually manage 1.8 teraflops.

The Energy department is speeding up existing commercial pressures with almost a billion (US) dollar program The Accelerated Strategic Computing Initiative, or ASCI. Of course they have to call it "strategic" to justify spending a billion bucks extracted by coercion, rather than letting industry do the same job over a couple of extra years.

By early 2001, a 10-teraflops machine is expected, and by 2002 or 2003 a 100-teraflops machine. A 500-teraflops computer by 2005 may be possible, if funding continues. These speeds will not suffice for a number of scientific (and even industrial and entertainment) purposes. According to *Business Week*, no one has an idea how to manage even a one petaflop (10^{15}) machines yet, though need is seen for computers running in the exaflops (10^{18}). For instance, it's reckoned that to reliably test nuclear weapons purely through simulations, at least 100 teraflops will be needed.

See the box on the next page for the National Science Foundation's wishlist.

INTERNET

Backlinks

An overview of this topic is available at: http://www.hss.caltech.edu/~hanson/backlinks.html

The following is taken from John Walker's formal design document at http://

SEXUAL FUNCTION

A **new treatment for male impotence** (erectile dysfunction) offers exciting hope for millions of men suffering from the inability to achieve and/or sustain an erection. Previous treatments for this common disorder have involved injecting vasodilators directly into the shaft of the penis. Although effective, such treatments have not enjoyed enthusiastic acceptance by those suffering from the disorder. Among those who have tried "direct injection", the attrition rate is very high (>75% within one year). Now there is a compound which can be injected subcutaneously into the arm or thigh. The resulting erection appears about one hour after injection and lasts until orgasm or until the drug is cleared from the blood by the kidney.

The new technology, a peptide called "Rectide", was discovered accidentally at the University of Arizona, in Tucson. Some 15 years ago, researchers there (including Extropian Dr. Christopher B. Heward) had invented an analog of a peptide hormone known as Melanocyte Stimulating Hormone (MSH). This new analog was found to be a potent stimulator of melanogenesis and, because of its potential use as an artificial skin tanning agent, it was dubbed "Melano-tan". Initially, excitement about the profit potential of a line of new tanning products containing "melano-tan" was high. Unfortunately, it turned out that "Melano-tan" was only effective when injected and there was far less enthusiasm about the marketability of a tanning agent requiring injection.

The ideal product would be a molecule which could be delivered transdermally (i.e. through the skin). The current market for suntan lotions and creams support a multi-billion dollar industry and it was estimated that, a transdermally deliverable version of "Melano-tan" would be worth in excess of $250 million in annual sales. Thus, the molecule was patented and work began to perfect the technology for delivery through the skin.

In the years to follow, many creative approaches were tried, but one of the most promising was that of designing new, more lipophilic (fat soluble) molecules which, while retaining full biological activity at the MSH receptor, could be delivered by rubbing them on the skin. In the mean time, in order to promote the existing tanning technology, Mac E. Hadley, chief investigator on the project, began regularly self-injecting the original molecule to develop and maintain his own beautiful tan.

After years of effort and many failed attempts, the scientists finally came up with a very lipophilic analog which retained full biological activity. After thorough testing on all of the relevant bioassays, Dr. Hadley decided to see if it would maintain his tan. When he injected this new molecule into his arm, he got an erection which lasted for almost 8 hours. Although shocked, at first, by this unexpected effect, Dr. Hadley, a true scientist, was undaunted. He continued to experiment until he found a dose which would give him an erection of more normal duration. This new molecule was the first and only peptide known to cause penile erection, so Dr. Hadley called it "Rectide."

It has been estimated that as many as 20 million American men suffer from some form of impotence. Fully 50% of these problems are thought to be of psychogenic origin, but, until now, differential diagnosis has been both inconvenient and expensive. "Rectide" shows great promise as a diagnostic tool for distinguishing between the two major types of impotence psychogenic (idiopathic) and physiological (organic). In addition to is role as diagnostic tool, "Rectide" may also be useful as a drug for treatment of ideopathic impotence. Preliminary results from early clinical trials are very exciting.

[Dr. Christopher Heward]

ADVANCES

www.fourmilab.ch/documents/hacklinks.html

One essential part of Ted Nelson's original concept of Xanadu was that links between documents be bi-directional—when a link was made to a document, the linked-to text would become a link back to the document that referenced it. This was believed to be an essential component of an open hypertext system intended for discussion of complex issues, and a great improvement over current forms of scholarly publication.

With the advent of the World-Wide Web, links have come into the mainstream of writing and publishing, but these links are unidirectional—there's no way to know if a link has been made to your document, and no way to attach comments of your own to documents you read on the Web. In the Web, as it exists today, we have forward links but no back links.

Hack Links is a crude mechanism that provides a limited back link capability for Web documents. Despite its many shortcomings, it may prove useful to demonstrate the utility of back links and obtain practical experience in their use which can guide the evolution of a more practical and comprehensive facility for eventual inclusion in the HTML standard with Web client and server support.

Hack Links is implemented as a set of C programs which are installed on a server which wishes to provide back links to its users and executed via the Common Gateway Interface (CGI) mechanism. These programs maintain a database of extant back links in a file external to a document and permit retrieval of a documents containing back links, addition of new back links, and following links when a given piece of text contains multiple overlapping links. The individual programs are described below.

Stretch text

The following is taken from: http://fire.clarkson.edu/deuelpm/Stretch/intro.html

Stretch Text is a concept that Ted Nelson conceived and wrote about in Computer Lib/Dream Machines (Nelson, 1975). Nelson's vision of stretch text, inspired by Vannevar Bush, envisioned a mainframe computer programmed to enrich the information of the electronic text.

Stretch text can be defined as a kind of hypertext that gives a reader an "idiot knob" for their reading material. In other words, a knowledgeable reader can set his or her browser to Terse to get just the essential information or "turn it up" toward Verbose to get more detail.

I believe (given the current technology) that the addition or removal of information for a select target audience is ultimately the decision of the writer. The concept, however, should not be discarded...

In that vein, I'm working on an HTML Stretch Text implementation. The "verbosity control" is really just a link to another copy of the same document where I have added the detail. (No fancy computer science going on here!)

Problems	Speeds used for recent calcs	Needed by 2000	Long-range needs
Computational cosmology	30 gigaflops	200 gigaflops	10 exaflops
Interactions between atoms	300 gigaflops	30 teraflops	Under study
Molecular dynamics in biology	30 gigaflops	3 teraflops	20 petaflops
Quantum chromodynamics	30 gigaflops	7 teraflops	100 exaflops

Number of people over 16 in US and Canada with access to the Internet: 37 million

Estimated percentage of adults in the U.S. using the World-Wide Web: 7.7

Number of Internet Service Providers, worldwide (July, 1996): 3,054

As of April, 1996, number of domains in .COM: 316,271

Number of Internet hosts, as of January, 1996: 9.5 million

Number of web servers counted in the June Netcraft Web Server Survey: 252,685

The Internet Index Inspired by "Harper's Index"* Compiled by Win Treese (treese@OpenMarket.com)

NANOTECH

Advances toward molecular nanotechnology: scanned probe microscopy. SPM can be used not only for observing atomic scale structure but also for manipulating material with atomic precision. Snow and Campbell have integrated fabrication and measurement into a single process step; this sort of integration is essential for scaling up performance. Using a direct oxidation technique, they have obtained typical linewidths (of oxidized substrate) of 10 to 20 nanometers; lines at this width can be written at up to 10,000 nanometers per second. The method operates at low voltage. Simultaneous measurement and fabrication by the SPM tip allows control in the sub-10-nanometer regime. (Science, 1995 December 8) http://s1.GANet.NET/~wm0/mtest0.htm

SPACE & ROCKETS

William Mook has assembled a compendium of preliminary engineering studies for low-cost space missions together with historical and current engineering documents on abandoned (primarily for political reasons) atomic-thrust rockets.

Lockheed-Martin "Venture Star" Wins X-33 Downselect On July 2nd, 1996, at Caltech's Jet Propulsion Lab in Pasadena California, Vice President Al Gore and NASA Administrator Dan Goldin together lifted the concealing cover from a scale model of the winner of the X-33 experimental reusable rocket demonstrator competition, revealing Lockheed-Martin's "Venture Star" triangular lifting body as NASA's choice for the billion-dollar three-year cooperative project.

What Are The Specs?
Lockheed-Martin's X-33 design will lift off vertically, at a fully-fuelled weight of 273,000 lbs, powered by two sets of Rocketdyne J-2S turbomachinery (the J-2S was an upgraded version of the Saturn 5's J-2 upper-stage engine) feeding liquid oxygen and liquid hydrogen to two banks of small thrust chambers in a "linear aero-spike" arrangement on either side of the ship's

ADVANCES

blunt wedge-shaped trailing edge, producing a total of just over 400,000 lbs of thrust at takeoff.

Steering while under rocket power will be totally by differential throttling of the four banks of thrust chambers, side-to-side, and top-row-to-bottom-row. Steering during gliding flight before runway landing will be by a variety of aerodynamic control surfaces.

The triangular experimental flight vehicle will be 67 feet from nose to tail, 68 feet wide including the upward-slanted fins on the aft corners, and will weigh 63,000 lbs with empty propellant tanks. Thermal protection will be by new advanced metallic TPS plates backed by insulation over the composite plastic vehicle outer shell. The vehicle's broad curved underside (it reenters pretty much belly-first) spreads reentry heat loads out over a wide area, reducing maximum temperatures and allowing the use of metallic rather than tile TPS.

The tradeoff for this is low hypersonic Lift-to-Drag ratio (L:D) which means low reentry maneuverability, low "cross-range". A reasonable tradeoff for a precursor to a routine cargo-hauler... Maximum X-33 speed is described as mach 15+, roughly 60% of orbital velocity. The vehicle will be returned to base after flights on the back of a NASA Shuttle Carrier 747.

X-33 is scheduled for first flight less than three years from now, in March 1999.

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hvanderbilt@BIX.com
Space Access Society: 4855 E Warner Rd #24-150, Phoenix AZ 85044

ECONOMICS

How fast can we grow? Faster economic growth means faster growth in personal wealth, increased funding of research, and a quicker approach to the affordability of large scale projects such as space colonization. It's frustrating then that policy-makers and some economists insist that the economy cannot grow faster than 2.5% annually, in the long run, without boosting inflation.

When Keynesian economists (the followers of influential British economist John Maynard Keynes) used to have practically the sole voice in the postwar period, growth was in. According to Keynesian theory, economic growth could be raised either by tax cuts or by increased government spending. They preferred the latter both because their theory said it had a larger "multiplier" effect than the former, and because of their personal and political incentives to favor bigger government.

While the Ford Administration sought growth of almost 6% between 1976 and 1980, the Carter Administration sought 4.7% annual growth for 1979-83, and the Reagan Administration looked for 3.8%, we are now told not to seek more than 2.5%. Why the change of tune?

This reversal, argues supply-side economist Paul Craig Roberts (see *Business Week*, 1/8/96), is due to the dethronement of Keynesian economics. The supply-siders see the recipe for economic growth not in government spending (demand-side), but in improving incentives for work and investment. Higher taxes actually act as a drag on growth. As Roberts says, "Liberal economists have responded not by resurrecting Keynesian demand management—an impossible task—but by de-emphasizing growth."

The "liberal" economists claim that the economy cannot sustain growth greater than 2.5% annually (growth averaged 3.7% between 1982 and 1989), so economics instead must deal with the "fairness" of distribution.

If the supply-siders are right, the Keynesians and advocates of government growth are unnecessarily stifling healthy growth. If policy-makers focused on freeing up the economy through deregulation, lower taxes, and simplification of bureaucracy, growth could accelerate to 5%, 6%, or higher. Parts of China have been growing near to 10%. Isn't it about time we joined them? [MM]

Resources keep expanding: More signs that the cornucopians are closer to the truth than the doomsayers: The average cost of replacing reserves of oil and gas keeps falling. Between 1991 and the present, costs of replacing reserves has fallen from $5.90 per barrel to $4.50. (Arthur Anderson & Co.) Better technology driven by competition is to thank. Using technologies like three-dimensional seismic imaging, companies are improving the rates by which they strike oil or gas by a third. A 7% rise in crude oil production is expected next year. Texaco forecasts a 40% rise in production over the next five years. (*Business Week*) [MM]

From next issue Advances will be edited by Sean Morgan. Sean produces *Breakthrough!*, an online technological advances newsletter. You can subscribe to Breakthrough! by sending "subscribe breakthrough" in the body of a message to majordomo@lucifer.com Back issues are available at: http://www.lucifer.com/~sean/BT/

3rd International Conference on Anti-Aging Medicine and Biomedical Technology

by Michael R. Perry

Date: Sun, 14 Jan 96 19:35:13
ANTI-AGING CONFERENCE PRESS RELEASE

Scientists agree lifespans of 120 and beyond are now probable! Historic Anti-Aging Medical Conference attended by 1400+ of the world's leading researchers and physicians.

The **3rd International Conference on Anti-Aging Medicine and Biomedical Technology** held December 9-11 at the Alexis Park Resort in Las Vegas was, by any measure, a monumental success! This meeting dramatically confirmed the search is on for methods to prevent and reverse the adverse effects of the aging process.

The American Academy of Anti-Aging Medicine (A4M), University of Minnesota, and Oklahoma State University co-sponsored the 3rd International Conference on Anti-Aging Medicine and Biomedical Technology. During the meeting over 100 of the world's leading physicians and scientists discussed advances in medicine, research, and a variety of age-related topics. Groundbreaking work by respected clinicians and researchers was showcased. The meeting was a forum for a diversity of disciplines that have an immediate impact on daily life such as genetic engineering, hormone replacement therapy, health and wellness advances, advances in immunology and lifespan extension.

Presiding over the meeting was Dr. Ronald Klatz, president of the A4M and author of the newly released ***Advances in Anti-aging Medicine***; this book is the first textbook on Anti-Aging Medicine. He set the tone of the conference by proclaiming that... "Aging is not inevitable; aging is in fact a series of degenerative processes that ultimately lead to disease and death. Aging is a disease and we are at last tackling this, the greatest killer of all mankind." Among the keynote speakers were Drs. William Regelson and Walter Pierpaoli (co-authors of *The Melatonin Miracle*), Vincent Giampapa, M.D. (pioneering anti-aging plastic surgeon and co-developer of the Biomarker Biomatrix Technology) and Ben Weider, Ph.D. (President, International Federation of BodyBuilders).

Gregory Fahy, Ph.D.

Three individuals were recognized for excellence, achievement, devotion, and genius for their contributions to the advancement of longevity science which benefit all the world. Denham Harman, M.D., Ph.D. (founder of the Free Radical Theory of aging), Nathan Pritikin (discoverer of the role of cholesterol, diet and exercise related to heart disease) and Raymond V. Damadian, M.D. (inventor of the Magnetic Resonance Imaging device). These individuals' achievements merited the Infinity Award, the highest recognition by A4M, for their pioneer findings that led to the development of diagnostic protocol(s) and/or therapies that both prolong and enhance the quality of life.

During the conference, A4M was presented with a $100,000 check by Ben Weider, president of Weider Industries. This donation initiated a campaign to support significant anti-aging research studies. The Academy plans to raise the millions of dollars necessary to fund substantive, innovative, systematic research projects that could dramatically enhance human lifespan. When aging is viewed as a disease, researchers can develop non-invasive medical treatments to enable the cells of the body to successfully replicate themselves. New research that demonstrated these very real possibilities for extending maximum human lifespan was presented by some of the chief scientists of Geron Corporation, an innovator in biotechnology (Menlo Park, CA).

Among the presentations on significant diagnostic and therapeutic advances, one morning symposium dealt with the role of melatonin. William Regelson, M.D.

(Medical College of Virginia) led the discussion of the clinical applications of melatonin from data presented by international clinicians and researchers; their work demonstrated that melatonin is a significant component in the prevention of aging and its symptoms. Also featured were new treatment options available to

William Regelson, M.D.

reverse neurologic dysfunction. **Clinical Successes in Anti-Aging Medicine Symposium** presented clinical case studies using early diagnosis and treatment protocols to reverse and/or retard specific patient age-related diseases including neurologic disorders, cancer, skin aging, and cardiovascular diseases. Dr. Ronald Klatz moderated; among the leading clinicians or researchers speaking were: Julian Whitaker, M.D., Stephen Sinatra, M.D., F.A.C.C., Gregory Keller, M.D., F.A.C.S., and Hans Kugler, Ph.D.

Applications of **genetic engineering** were given by Michael Fossel, M.D., Ph.D., **hormonal replacement** as a longevity therapeutic protocol was discussed by Stephen Langer, M.D. Robert Goldman, D.O., Ph.D. (President, National Academy of Sports Medicine) and Ben Weider (President, International Federation of BodyBuilders) discussed **preventive lifestyles** that optimize fitness and well-being. Other topics include: **age regression** by surgical and medical techniques by Vincent Giampapa, M.D., role(s) of the **immune system, nutrition, nanotechnology**, and **live cell extracts**.

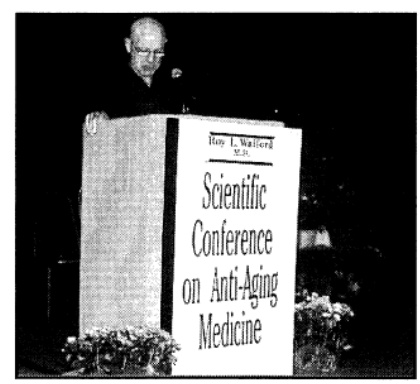
Given the significant research presented during this conference, a consensus exists that disease and the deleterious effects of aging will ultimately be eliminated. Examples leading to this conclusion include: Japanese women have an average life expectancy of 85 years. Currently, 60,000 centenarians are living in the United States. It is projected that there will be over 120,000 alive and well by the year 2004.

The creation of the American Board of Anti-Aging Medicine was announced during this conference. A4M will offer an accredited program in the new clinical specialty of Anti-Aging Medicine. This program will provide physicians with the opportunity to acquire current applicable information on diagnoses and treatment protocols as well as training sessions in this new preventive medical specialty. This clinical specialty is targeted for those who will provide medical care that will significantly extend and provide a healthful lifespan to patients.

Dr. Ron Klatz stated "Over 50% of those attending this conference should expect to see their hundredth birthday and beyond." The idea that "Youth is wasted on the young" may change to "**Youth is a long-term possibility... provided you take the steps necessary to preserve it.**"

MY IMPRESSIONS(MP): I was privileged to attend the A4M conference. There was an optimism and excitement about the future that was very invigorating. Brave words were spoken. "We are entering a new era of evolution—human potential without limits," said Dr. Klatz in his opening address the first morning, adding, "...Aging is not inevitable... but like all diseases is treatable and curable.... May you all live free, forever." One refreshing change from the attitudes I'd seen some years ago was that there was no longer that infamous insistence on "squaring the mortality curve." (The latter means, essentially, that people stay alive and healthy until some "reasonable, ripe old" age, then swiftly sicken and die, as in Huxley's *Brave New World*. This was said to be necessary and desirable to prevent "social hemorrhaging"!) Instead it was clear that serious thought was being given to *straightening the mortality curve*—simply making people immortal and free of all debilities including aging—forever. And—there was one talk, by Dr. Ralph Merkle, devoted specifically to cryonics (though not mentioned in the press release).

Overall, the feeling seemed to be that "the future is worth seeing" if one is in reasonable health, and the latter may be possible through one or another of the approaches that was discussed. As stated, there were more than 1400 attendees, which is far more than the number of people signed up for cryonic suspension. As expected, then, not all attendees were wildly enthusiastic about cryonics, and older, death-accepting attitudes were also lurking about, as was well illustrated at one point. Someone wasn't there, the speaker announced; his wife had been diagnosed with cancer. We were urged to



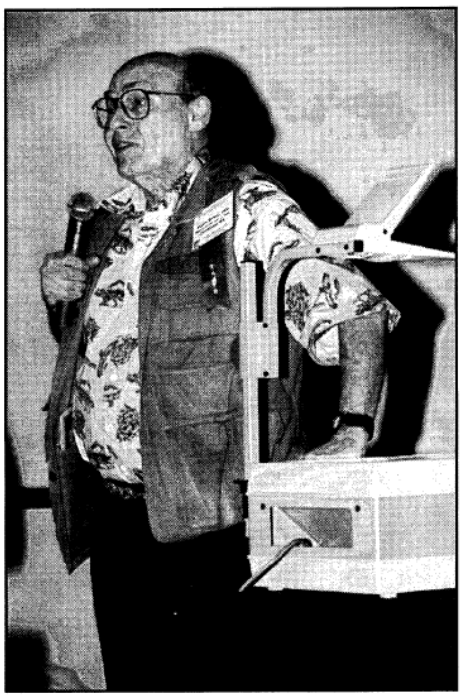
Dr. Roy Walford

"remember them in your prayers"—the freezing option wasn't mentioned. But, among the many presentations, at least some struck me as possibly very significant and cause for very cautious optimism about the prospect of *not* having to be frozen. Though there is, as usual, no guarantee, aging *could* be curable in a few decades, or at least, treatable in such a way that many living today will live long enough to experience a complete cure and hence, biological immortality.

Among the major highlights of the conference were the following:

The most significant research presented, in my estimation, was that by Geron Corporaton in Menlo Park, CA, relating to the role of telomeres and telomerase in both the aging process and

cancer. As is now becoming well-known, telomeres are structures that bind the ends of chromosomes together like the plastic ends of shoestrings. When most cells of the body divide, the resulting daughter cells have shorter telomeres—when the telomeres become too short, the chromosomes begin to unravel and the cell line dies. The shortening of telomeres limits somatic (body) cells in the human to about sixty divisions, the "Hayflick limit" named after discoverer Leonard Hayflick. That telomere shortening is important in aging was gruesomely and forcefully suggested by photos of progeria victims who start life with abnormally short telomeres, show aging-like symptoms in early childhood, and typically die around age 12. On the other hand, germ cells in the body produce telomerase, which *lengthens* the telomeres, and keeps pace with the shortening that is otherwise occurring. This is why the offspring of an organism do not start life at an advanced bioligical age—their biological clock has been reset! Resetting the clock is not always an advantage, however. Cancer cells also produce telomerase—and don't die out—until their unrestricted proliferation kills the whole organism!



Marvin Minsky

Of the three speakers from Geron, Dr. Michael Fossel was the most optimistic, predicting that the maximum human lifespan will be increased to 200 years and beyond within 20 years, through understanding and counteracting the mechanism of telomere shortening in somatic human cells. While, as he noted, the telomere problem was not the only process involved in aging, solving this one problem ought to improve things and lengthen maximum lifespan. (Then it should also buy us valuable time to work on the other problems!) Dr. Calvin Harley, another Geron speaker, thought aging would prove too complicated to be significantly impacted by the mere reversal of telomere shortening. He did, however, predict substantial improvements in cancer treatment through suppression of telomerase production in malignant cell lines. That this is not mere speculation was dramatically underscored by Geron's recent work with malignant HeLa cell cultures. (These cells trace their ancestry to Henrietta Lacks, a cancer victim of 1950s. It was found that her malignancy proliferated very well in culture and the cells have since seen wide application in research.) In this work the normally immortal cell lines were induced to die out after about 25 divisions by suppression of their ability to produce telomerase.

In a short space I can't do justice to all that was presented—but here are a few more highlights.

Ralph Merkle offered his usual, well thought-out, positive assessment of cryonics, based on anticipated developments in nanotechnology. As he sees it, one should sign up because there is little to lose if cryonics is unsuccessful, i.e. does not result in eventual resuscitation, and something definite to gain if it does succeed. Moreover, there is a *reasonable* chance it will succeed, which he estimates, for a typical case with the usual problems, at around two thirds. Dr. Gregory Fahy elaborated on the possibilities of nanotechnology, which should make feasible such essentials for cryonics as cell repair.

Dr. Marvin Minsky gave a delightful, disorganized talk on "rebuilding ourselves from the ground up." It is clear that we are not going to remain simply "just a vehicle for reproducing our genes" as now. We want to conquer aging and become more than human. But we will have to get motivated. "Because of lawyers and ethics and cowardice" research is hampered—it is going forward, but not as fast as one would like.

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Finally, I'll mention Dharma Singh Khalsa, M.D., an American convert to the Indian movement of Sikhism, who had some thoughts on "the role of the spirit." Although this may suggest mysticism, the issues he addressed are real ones, for example, what sort of *persons* are we going to be, *should* we be, if our lives are greatly lengthened? These are hard questions and Dr. Khalsa was not offering definitive answers but—what is also important—trying to get us to think about the issues.

JAMMING WITH THE COSMOS

A Conversation with Dr. Fiorella Terenzi

by Amara Graps

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Dr. Fiorella Terenzi is an intelligent and lovely woman who has an impressive (and varied!) resume for someone so young. After a rigorous training at Universita Milano in physics and astrophysics, and a thorough musical training in opera and other forms of music, she combined the two educations in her doctoral thesis. The thesis describes "galactic" methods to set galactic radio waves to sound. Terenzi then taught mathematics and physics for 3 years at Milan's Liceo Scientifico while she explored this new musical form. She moved to the United States when Island Records signed her as a recording artist.

Now she is breaking new ground in teaching astronomy. Her method is a popular, multimedia method, using her own music, her own visions and her own sex-appeal to grab you at the emotional level. One might consider her an entrepreneur/pioneer of sorts, using the entertainment industry to promote and support her idea of astronomy. The entertainer Dennis Miller called her "a cross between Carl Sagan and Madonna"!

Her career is certainly taking off now. Last year *Time* magazine wrote a paragraph with a full-page picture of her in their special issue: "Welcome to Cyberspace." Her first release on Island Records: *Music from the Galaxies* was enthusiastically received, she collaborated with Thomas Dolby on two tracks for the computer graphics music and video: *The Gate to the Mind's Eye*, and her CD-ROM multimedia astronomy project: *Invisible Universe* is now being released by the Voyager Company. She has also recently signed with the William Morris agency for public appearances.

On 26 December 1995, I had the pleasure of spending a long evening talking with Fiorella about her philosophy, her goals, her history. It was our second meeting. This article is the result of a synthesis of a number of ideas that she and I discussed that evening, and it's a tribute to her that I was inspired enough by that meeting to write this long article, that you are reading now. This essay is one of the most enjoyable essays I've written in a long while.

Notation: A = Amara F = Fiorella [ ] = extra comments by Amara

PAST, CURRENT, AND FUTURE PROJECTS

A: Tell me about your current projects.
F: The current project [available now] is *Invisible Universe* CD-ROM for Mac and PC.

[I found a copy in January 1996 at a bookstore in the San Francisco Bay area. See my thoughts about it in the Sidebar: THE INVISIBLE UNIVERSE CD-ROM]

A lecture tour is planned, which starts in March 1996. Also, this year I'm writing a book called: *The Sensual Universe*.

A: And your future projects?

F: As soon as I go back to New York, I will be in the studio with my producer and other musicians to complete my "mainstream" pop album, for which we already have a couple of songs. One of the songs is "Supernovae Amore," which is also going to be a chapter in the book. These musical pieces are a type of pop, mainstream combination of Enigma-Pink Floyd-Funk-Madonna-like music. Then this winter, a concert tour will start to promote the music. That music and the tour will be my main focus for the end of 1996 and into 1997. I am also having some discussions about a TV entertainment-scientific-musical show. Something fun and up-tempo.

A: How would you like to see science promoted, say, in a popular way?

F: I haven't seen anything yet that appeals to me. For that reason, I wanted to invent something completely new. I wanted to be the *first* recording artist that is an astrophysicist. My personal dream is to be the first astrophysicist to receive a Grammy Award, maybe while I'm above as a mission specialist in the Space Shuttle! I wish I could say 'yes,' I like how *that* science promotion is done, but I really haven't seen it done in a way that I like.

I think I was lucky in that I was at the right time when I was doing my research in acoustic astronomy. [I was lucky] because I was one of the first people to use computer music and relate it to astronomy. In the past, there could have been the right ideas and people, but they didn't have the *tools* that I have today. Five years ago, I couldn't have even imagined putting all of this information: the images, the video, the music, on a CD. So I was able to fuse the latest technology with the latest software. Now I'm doing that with music, animation, video, poetry on a medium that is a CD-ROM. That's pretty new.

A: What was the title of your thesis?

F: My goodness, it's so long and in Italian! Let's see: "Disengno e realizzazione di un sistema integrato MAP/CMUSIC per la composizione di partiture musicale e la sintesi numerica dei suoni." [Roughly translated: "Design and realization of an integrated MAP/CMUSIC system for the composition of musical scores and the numerical synthesis of sound."]

A: What galaxy did you use for your thesis?

F: UGC 6697 in Coma Berenices, between Virgo and Leo, 180 million light years away. It's a very powerful and luminous radio galaxy. That was my first jam-musical-partner, my co-performer!

[UGC 6697 is a pretty interesting astronomical object! I did a little background reading on it, see the Sidebar: RADIO GALAXIES AND UGC 6697]

My personal dream is to be the first astrophysicist to receive a Grammy Award, maybe while I'm above as a mission specialist in the Space Shuttle!

BRINGING A FEMININE ASPECT TO ASTRONOMY

A: Tell me more about your idea of bringing the feminine aspect into your music and astronomy presentation.

F: These aspects that I'm bringing to my work now, and want to bring into my future work, are probably a sum of events that started when I was a child and continued when I was a student at the physics department at Milan. In order to be accepted, you had to repress your female point of view, your femininity, you had to look like a lot like the other professors. So for me, the discovery of my femininity, and how I can combine it with astronomy is a recent discovery.

I didn't know until recently that cosmology in the very beginning of human history was a more feminine cosmology. The view of the sky long ago was more feminine, with a "mother goddess." Then with Christianity, the female perspective was pushed aside, the male deities dominated. So we moved from a feminine cosmology to a male cosmology. So this feminine view is a point of view that I really want to share with people. I'll have a chapter of that in my book.

Plus, it took a lot of time to get in touch with that feminine side because I needed to make a name for myself first as a scientist. I actually got in touch with that feminine side through music. Science tended to make me a little "stiffer," make me more analytical, more rigid. And music is so erotic, so passionate... So through music, I was able to say, "OK, I'm bringing Fiorella to science" and *Invisible Universe* is a good example of that. In fact, my clothes in my CD-ROM are, in some sense, inspired by the astronomical objects. For example, with the beautiful Andromeda Galaxy, I felt an impulse to wear a red/purple, tight, dress with an open slit because Andromeda is such a beautiful object, I wanted to look beautiful while I was talking about this object! But I really believe in the beauty of the cosmos, and I hope to bring it to a lot of people.

[What does it *mean* to bring the feminine aspect to science? How did the ancient *goddesses* become dominated by the ancient *gods* and what other influences did religion have on astronomy? How did religion influence women's involvement in astronomy? Even though this is a very complicated (volatile!) subject, I write a few thoughts about it in the Sidebar: FEMININE COSMOLOGY]

A: Were women commonplace in your academic environment?

F: Well, in Italy, it's even worse than other places because it is such a "macho" society. In this society, the men want to dominate, and the only role for women there is to be either a wife or maybe a mistress. My classes started large, but there were almost no women. And by my last year at the University, I was always the only woman attending my cosmology, astrophysics etc. courses. But unfortunately, it was not a situation happening only in Italy.

When I was growing up, and a young girl, perhaps 11 or 12 years old, I looked for (female) role models. I couldn't find

any role models in the city where I was living. So I turned on the TV and saw movies. For example, [I saw] movies made by George Lucas, like *Star Wars*. The main character was a man. Then I saw *Close Encounters of the Third Kind*, hoping to find a female leading character—an intelligent, sensual, beautiful woman, that was also a scientist. AGAIN, the main character was a man. All of the movies from America had male leading characters. What was even worse, was that the movies that I liked—sci-fi movies—were dominated by male leading characters. I really love very much the work of George Lucas and Steven Spielberg, but they had an old idea of what women could do for their characters. Maybe they are afraid to do something completely unconventional like having a female as a main character?

So by observing all of these media pictures, I realized that I wanted to get out of the laboratory, I wanted to change my course from being a professor, to that of being an entertainer. I wanted to entertain with science, astronomy, to sing about quantum physics, I wanted to make people dance! I want to reach them in a big way because, for me, one of the most gratifying moments I receive are when I lecture at such places like Santa Monica College, Morrison Planetarium, Griffith Observatory, Orange County, New York, Boston, Philadelphia, etc. and a young girl approaches me and says: "I want to be like you." That is the most important achievement for me—the main goal, that is to show people what else they can do with their lives. Especially what other women can do with their lives. They see that it's "cool" to be a biologist, and how glamorous it can be, plus they can see how much power that knowledge can provide. For me, it's not meaningful to see actresses like Melanie Griffith or Sharon Stone on TV or movies because it doesn't take anything or effort to be like that. You just need to show off your body while you're young and that's it! But knowledge in your head is like power in your hands. You can make judgments, you are faster in your thinking, you can perceive reality in a completely different way. And once you taste that power of knowledge, you can't go back.

When I lecture, there is a transformation in my character. I start out looking very scientific with a lab coat, hair up, with glasses and slowly I turn into a

THE INVISIBLE UNIVERSE CD-ROM

by Amara Graps

I had some opportunities to look at (and hear) Fiorella's astronomy CD-ROM, *Invisible Universe* , first during the evening of my conversation with her, and then later, after I purchased the CD-ROM at my local bookstore. (Note: you will be able to purchase just the music from *Invisible Universe* as a separate music CD, if you wish.)

My first impression was 'Wow!' She has assembled a stunning collection of images that rivals Timothy Ferris' images in his classic large-format book: *Galaxies*. In fact there are a lot of similarities between the two as far as information content goes (Fiorella's CD-ROM has perhaps twice as much text) and beautiful images goes (roughly the same number).

The difference between the above *Galaxies* book and Fiorella's CD-ROM is that Fiorella's CD-ROM is a much richer learning experience with her music, the hyper-links, her movies and guided tours, maps of the sky, and the astronomy poetry readings by other people. In addition, her CD-ROM covers stars, planets and other celestial objects, not only galaxies.

While I didn't get a chance to go through all of the information presented, what I *did* read seemed accurate. Terenzi had the assistance of six UCLA astronomy grad students writing the explanatory text for each of the objects, so it should be up-to-date and accurate.

There was one aspect about her CD-ROM that I found most amusing! It was her Quick-Time movies. She makes her personal appearance in the Quick-Time movies as stunning as the images she discusses. Each of her appearances was a different look: a scholarly look in a business suit, an "evening-night-out" look in a red evening dress, for example. Even though I already knew something about her personal philosophy, (that is, of wanting to express her more feminine side, and that these beautiful celestial objects made her feel *even more* like expressing that side), I *still* couldn't figure out if her QuickTime glamorous personal appearances were an unconscious sensual expression of how these astronomical objects made her feel, or whether she was purposely trying to invoke an emotional response from the viewer!

I finally decided NEITHER and BOTH! She was PLAYING! I came to this conclusion after seeing one of her QuickTime movies where she appears as a disembodied head, floating from side-to-side on the computer screen, all the while explaining what was happening in the presented astronomical image. I was giggling the whole time her head was floating around!

So, in response to Fiorella's disembodied head in the CD-ROM, I created the picture (p.20). I started with a Polaroid snapshot, taken December 26 of Fiorella and myself, and made us disembodied heads floating in a lovely background picture of the galaxy M51. This is for you, Fiorella!)

completely different glamorous, sensual image. The girls in Hollywood who come to my lectures get really excited when they see that. They see what they might be able to do. They see that I can invent music with atoms—hydrogen atoms, and make it fashionable. That's a great achievement to show them the different choices that they can make in their lives. And I can say from personal experience that these things can be accomplished without using drugs, or violence. You can escape a situation in which you are unhappy. I like to use an analogy that the rap music folks use. That is, by not using crack or doing violence, and by using your mind, you can come out from the ghetto. If you are able to push yourself, you can come out and do something extremely important for people. All by studying, and using the college and university. Achieve that status. From that status, you have a thousand possibilities to be what you want to be. Then you can help other people and show them the possibilities. Invent a new way to get out and use education!

NON-ELITE ASTRONOMY LECTURES

A: You taught for 3 years in Italy and, meanwhile, had established yourself as a recording artist, and so you came to the US that way. Did you find that, when you were still in that academic environment, that it was too restrictive for you? For example, if you were teaching in America instead of teaching in Italy, would you still have found the academic environment too restrictive for you to promote science in the way that you wanted?

F: I think that certainly it would have been better for me to teach in America than in Italy. America has great advantages: better technology with which to teach, easy access to libraries, Internet, multimedia. In Italy, they are still having some trouble getting on the Internet, for example. E-mail doesn't work. BUT what I don't like about [all] these academic environments is that they are too elite for my tastes. Not many people can come and see what it's like in a University. I want people to come into the laboratory and see what's going on. I want them to hear these radio astronomical sounds. I want them to own my research! One of my goals is to turn the music from "Music from the Galaxies" into public domain. Because I want people to sample, play, use whatever they want from these sounds. Most of the time the academic environment is very elite. You need someone to get you in and see what's going on inside the walls. I don't like that elitism. I love people. I want to reach millions of people. I want them to enjoy the science that's going on. It would be a pleasure to see the Nobel Prize given like a Grammy or an Emmy Award. Because if you think about it, the scientists are the ones that are building our society, they are the driving force. Without the scientists, we wouldn't have the computer, the tape recorder, the shoes we are wearing, all of these things we see here in this room. But why does science have to be so 'nerdy'? In the past, science wasn't done this way. Think about Leonardo de Vinci, Galileo, the poetry, the emotions that work from those two evoked. Science was an everyday part of life, part of everyone's experience. It was more philosophical. We are losing the philosophy. There was humor and irony. Most of the time science is very fun and very sexy too.

A: It seems like with science and philosophy, if one has these areas as part of one's everyday experience, one becomes a much more rounded and educated person. One sees things in a different perspective and understands more. I think that your method of bringing science to 'millions' in this popular way is really great because a lot of this information wouldn't very easily make it out of the universities and research labs currently.

F: If you use the normal way, like say using Carl Sagan, I think that that teaching method loses the poetry. My *Invisible Universe* CD-ROM was very much driven by the idea of having people just *look* at the beautiful universe. See a galaxy, full of stars, with the dust and gas. And have them notice some strange things on the screen, hear the music, sense the ethereal wonder of it. And see some cosmic event on the screen, and THEN, when they are caught up in the emotion of it all, ask "What's that object?" Then you've grabbed them. They have the interest and the excitement, and I can give them the information. That's where the learning starts. The CD-ROM gives unlimited information, explanatory text, history, numerical data, a guided information tour. But you have to first ask the question: "What's that object?" You have to do that by watching the beauty of the universe, listening to the melody, or maybe by reading Shakespeare and Blake. Hear Herbie Hancock, the musician, talk about space. And then, if he is saying something about 'dust,' you think: "what's dust?" Then I can give them all of the information that they want. That really is the way I started to be a scientist, that is, by asking myself, "what's out there?" It was not by reading a book or by listening to a professor tell me what a star is and pointing to pages in a text. For me it was a spontaneous process arising simply by asking what that object is. Why is it shining?

[I take a closer look her CD-ROM in the sidebar: THE INVISIBLE UNIVERSE CD-ROM]

USING THE IMAGINATION AND COMMUNICATION ON THE EMOTIONAL LEVEL

A: You told me of the influences that your grandmother had in your curiosity about the sky as a child. How old were you, and how did that happen?

F: Actually now we are going in a direction that I've only discovered about myself recently (the last few years). That is, not being afraid of being a scientist in the way I want, that is, to use my fantasies and imagination. Scientists are often afraid, they *must* be rigorous, they must be very analytical, they must be very correct. But they don't have to be afraid to use their imagination and fantasies because the way that you communicate with people is very much on an emotional level.

The way I got started asking questions of my grandmother was through an emotional process. My grandmother didn't know *anything* about the sky. But I was about 5 or 6 years old, and we were spending summers out in the country outside Milano, close to Crema, where there were big farms and I stayed there. At night, she would say: "Fiorella, let's go for a walk in the country." And so we would walk and walk and it was *so dark*. No light was anywhere. And she would begin to tell me these *amazing* stories about the universe. Such as, if we continue to walk and walk to far distances we would then reach that star, and she would tell me why the moon was so big and white and the stars so small. These stories were completely based on imagination and fantasy and of course, weren't correct. Now with the education I have, of course these things are not true, but I appreciated very much all of that fantasy and imagination. The idea of capturing a star, the idea of *being* a star all led me to want to learn and study. The real true scientists are not afraid to use some of their imagination because it's very much complementary to the analytical part.

A: Feynman was a classic example of one who uses his imagination..

F: Yes! He was just sparkling and overflowing with ideas... If you take literally some of what he was saying, you would think that he was crazy! But actually there was a big truth to what he was saying. But his passion, [and] emotion just grabbed your imagination.. Feynman was one of the greatest scientists ever. So this other aspect of communication (i.e. imagination) is what I've learned recently. Even when I was teaching at Liceo Scientifico, after I got my degree, I was still so afraid of using this other way. In the beginning. Then in time I learned to not be afraid! You will find the same thing too, since you're interested in doing some teaching. You will see how you progress. In the beginning, you will be afraid to explain what inertia is, you will try to be very scientific and very precise. Then in the second week you will elaborate a little bit on that concept. Then in the third week you will want to tell your students how you discovered that if you cooked spaghetti with the water boiling there is a phenomena to be observed...

A: Convective processes in the boiling of spaghetti water!

F: But it takes time. Science is hard.

A: What kind of star do you imagine yourself being?

F: I don't want to be just a star—I want to be a galaxy! Because I want to be one hundred billion stars! Then that's enough.

THE SENSUAL UNIVERSE

A: Now what about galaxies falling in love?

F: I've been thinking about my book, *The Sensual Universe*. These days I'm very much in an inspirational mode, spending time almost every week in the studio, composing music. So my imagination is really active now. When I thought about how galaxies sometimes get together, I started to see an analogy with relationships between men and women, here, and galaxies, out there. If I find myself thinking about, say a relationship with some guy, it is as a kind of cosmological event. I think that we are two galaxies out there, and we attract each other. And of course we are up there in empty space and we look at each other and say, "let's get together." Then we make a first approach and start to attract each other and then to gravitate and rotate around each other. We can be either the whole galaxy or a star. Then there is a point when gravity isn't enough. Some other processes start happening. A big jet of superheated material goes flying Whoomf! off in one direction... shoots right through me. And I respond! And slowly, slowly we fall in love, we get together and we live in perfect harmony. So from two galaxies, we get together and form one galaxy with a double nuclei. Like what we observe out there in the Universe.

But sometimes people aren't so lucky. They are galaxies, they fall in love, attract each other, but they don't stay together. They pass through each other, they realize that they are not made for each other after all. So poof! They kiss goodbye, one goes in one direction, the other goes in the other direction, and that's it.

Another galaxy, perhaps in a burning passion of love, cannibalizes some other galaxy and eats the nucleus. Then those two galaxies destroy each other.

So that's love in the Cosmos and that's going to be in my book.

Likewise, now I'm beginning to see personalities as being like stars in the cosmos because we are from stars. Some people are like comets, like some artists. They have one great success, and pass

through the Solar System and are gone! Then they come back in, say, 15 years, have another success, and are gone again.

Some other people may be so lonely that they just die like a white dwarf. They die alone in silence and coldness because they have no more energy or passion to burn.

A: Or brown dwarfs who never have enough mass to ignite in the first place.

F: Or others who have *so much* passion that they explode, and turn into a supernova.

Others are cyclical and pulse like a pulsar.

Maybe there are people like the North Star who stand, always perfect, always up there shining.

Likewise I like to think of myself...

A: Oh! What kind of star do you imagine yourself being?

F: I don't want to be just a star—I want to be a galaxy! Because I want to be one hundred billion stars! Then that's enough.

A: Is every astronomical object in your *Sensual Universe* book going to be tied to a person? You said previously that you want the book to draw parallels to real life.

F: Definitely my love story is going to be in the book. My grandmother is going to be in the book. Likewise, some of my experiences that I went through in the University, and also here in America, will be in the book. I will try to give them good interpretations and try to relate them to some cosmological event. Sometimes human nature is so particular and so unique that we astronomers haven't found yet an object that describes it!

A: But we will!

F: Yes we will! As technology progresses (laughter).

A: You may have some trouble, though, in getting this theory accepted in a paper submitted to the *Astrophysical Journal*!

F: But you never know... That's the beauty of the cosmos!

[I have some suggestions for Fiorella about this approach in: SIDEBAR: Aristotle's Cosmology]

EPILOGUE

In my life, I have experienced astronomy from many different places and from many different perspectives.

I have experienced astronomy from JPL as Voyager 2's new Uranus ring occultation data arrived at my computer and as images of Miranda's pancake-pasted surfaces appeared on the TV monitors for the world to see for the first time. I have experienced astronomy from the chilly dome of Palomar's 18" Schmidt telescope guiding on a star to catch asteroids on a piece of film, and from the noisy interior of NASA's Kuiper Airborne Observatory collecting data on protostars. I have experienced astronomy from a warm room at Mauna Kea's Infrared Telescope Facility and through a 10 inch reflecting telescope at California's Joshua Tree desert. I have experienced astronomy while working through blackbody calculations at my job, while working through homework sets with my classmates, and from listening and giving planetary science presentations at conferences.

In all of these situations, my method of experiencing astronomy was by using my rational, analytical tools. Any emotions that I experienced about the beauty and wonder of the universe appeared as a secondary effect.

Fiorella Terenzi's method of guiding your experience of astronomy, in contrast, is to appeal directly to your emotions. To show you astronomy, she wishes to evoke your emotions*first*, then use your curiosity and thinking processes to carry you through the experience.

Now that I've had this opportunity to get to know Fiorella better and see astronomy through her eyes, I have a strong desire to sometime experience astronomy in a different way than how I currently am experiencing it. That is, to go out to a *very* dark field somewhere with someone close to me, bring a bottle of wine, spread out a blanket, watch the sky, and tell stories.

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RADIO GALAXIES AND UGC 6697

by Amara Graps

Radio galaxies are among the most intriguing objects in the universe. They are often distinguished by a pair of huge diffuse lobes that pour radio waves forth. The lobes are often associated with a central, compact solar-system-sized radio source. Some think that black holes power the energy at the source of radio galaxies. The source is linked to the lobes via jets which spew material that travels at near light speeds.

UGC (Uppsala General Catalogue of Galaxies) 6697 is a radio source associated with an irregular galaxy Zwicky 97087 in the Abell 1367 Coma Berenices supercluster. The Coma supercluster is a huge cluster of densely-packed (~10,000 in number) galaxies mostly of the lenticular, dust-free, 'SO' type and elliptical type, crowded at the supercluster core. UGC 6697 is an usual object in a number of respects and has been extensively studied in all wavelengths in the last 15 years, especially by G. Gavazzi at the Istituto di Fisica Cosmica, Milan, Italy and his colleagues.

From what I gathered from my cursory readings of this object, UGC 6697 is an unusual radio source, whose associated galaxy Zwicky 97087 (and several companion galaxies) seems to be plowing through the Coma supercluster to the supercluster's center, with gas and dust being stripped in the process and streaming out behind it. This very energetic object emits radiation at almost all wavelengths including X-ray wavelengths. It is also the site of very active star formation and its material isn't rotating around it's central core in a typical fashion.

Here are some details of the unusual features of this UGC 6697 radio source:

1.) Radio asymmetries. In the radio wavelengths, the object has a marked asymmetry, which resembles a head-tail source, that, in turn, reflects an intrinsic asymmetry of the parent galaxy Zwicky 97087 (Gavazzi et al., 1984). The Very Large Array Radio telescope H I emission maps confirm that the atomic gas in the cluster (Zwicky 97073, 97079, and 97087) is displaced from its optical centers (Dickey, J.M. and Gavazzi, G., 1991). The researchers take this as evidence that Zwicky 97087 and its neighbors are entering the dense medium of the cluster core for the first time.

2.) Optical asymmetries. The optical morphology of the associated galaxy cluster (Zwicky 97073, 97079, and 97087) is also disturbed. The galaxies are systematically brighter at the side with the sharp radio gradient, and fainter on the opposite side. The parent galaxy Zwicky 97087 also shows a sequence of faint diffuse knots trailing to the northwest behind the bright disk (total extension ~= 60 kpc) with associated radio emission (G. Gavazzi and W. Jaffe, 1985).

3.) Peculiar Rotation Curve of associated galaxy Zwicky 97087 (Gavazzi et al., 1984). The 'rotation curve' is a scientific expression for the circular velocity of a test mass as a function of its position in the galactic disk. This information is important for constructing models of the galaxy's mass distribution, and as a means of interpreting observation data. (Bowers and Demming, 1984.)

4.) High star formation rate. Optical and radio data from this galaxy, as well as some statistical surveys show that it has a much higher than average star formation rate than the other galaxies in the Coma Berenices supercluster (G. Gavazzi and W. Jaffe, 1985). Some have concluded that its enhanced current star formation might occur due to molecular gas collapse stimulated by the ram-pressure mechanism. The 'ram-pressure' mechanism is a mechanism for stripping gas from galaxies in rich clusters. The galaxies' relative motion through the cluster medium is analogous to the wind knocking the hat off of a rapidly pedaling cyclist. (which may explain the "swept-back" look of head-tail radio sources (Shu, F. 1982)).

5.) CO molecular gas distribution is normal for Zwicky 97087. No asymmetries were found (Boselli et al., 1994). If an asymmetry were found, that would be the signature of a tidal interaction, either between the local galaxies or with the Coma Berenices cluster as a whole. An explanation for this distribution and the asymmetries found elsewhere is that ram-pressure is exerted by the hot intergalactic gas. This would explain not only the peculiar atomic gas and star formation distributions, but also the orientation of the radio tails.

6.) UGC 6697 has an associated X-ray source (Fruscione and Gavazzi, 1990).

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FEMININE COSMOLOGY

by Amara Graps

Fiorella Terenzi wants to remind us that our ancient cosmological mythology was of the mythological Goddess being the giver of life and representing all time and space. Our ancient and current cosmological mythology affects our world view significantly.

Since this section links cosmology, mythology, and religion, I will start by defining these terms.

Some Definitions

Cosmology can be roughly defined as the study of the origin and evolution of the Universe. However, humans couldn't distinguish between the galactic and large-scale universe and our Solar System until the invention of the telescope (when scientists began to determine the structure of our galaxy and nearby galaxies). Therefore, until the invention of the telescope, cosmology was the study of the motion of solar system objects such as the Sun, Moon, comets, planets etc.

Mythology can be roughly defined as stories that serve to unfold part of the world view of a people and/or explain a practice, belief, or natural phenomena. Myths can coordinate the living person with the cycle of his/her own life, with the environment in which he/she's living and with his/her society. Mythological thinking in our species' history first appeared at the time of Neanderthal man. Because our ancestors spent so much time outdoors, and the human eye tends to organize hundreds to thousands of points of light, such as that from a night sky, into ordered patterns, *cosmological* mythologies probably appeared very shortly thereafter.

Religion can be roughly defined as the service and worship of the supernatural or deity(ies). The deity(ies) worshipped are usually those described in a myth. Unfortunately, many people interpret *literally* the myths, instead of seeing them as merely symbols. "Facts of the mind made manifest in a fiction of matter," Maya Deren, Joseph Campbell's colleague, once said.

The first avenue that I wish to explore here is: The *God* Mythology versus the *God-Goddess* Mythology and how that affected our ancestral view of the Universe. Since I've been thinking about these ideas off-and-on for close to a decade, I will use this opportunity to synthesize some of my thoughts. Therefore, what follows may or may not be what Fiorella had in mind. (Reader beware!)

Mythological Gods and Goddesses

The myths of a culture create and become part of the character of a culture. You "do as your gods do" because the symbols in mythology ultimately refer to YOU (i.e. your interpretation). Your deities' concerns are your concerns, and vice versa. So if a culture viewed the heavens as extensions of themselves, their lives will follow that concept. Likewise, if people in a culture live their lives with philosophies that contain far-reaching views, their mythological deities will contain those views too. So I think that the cosmological myths and deities of particular times and cultures are very revealing and important in understanding man's cosmological views throughout our history.

I wanted to change my course from being a professor, to that of being an entertainer. I wanted to entertain with science, astronomy, to sing about quantum physics, I wanted to make people dance!

About 5000 years ago, the mythology of the ancient agricultural world was dominated by the "Goddess of Many Names." This deity's concern was mostly of the earth's fertility and life, i.e. giving life, nurturing life, taking life. This female, as "giver of forms," had progeny who were also other gods and goddesses. The Goddess and her offspring were viewed as inseparable from the natural world. For example in the ancient Lower Egyptian culture, one of the goddess' progeny was "Nut," the heavenly sphere. There was a timeless quality to this mythology, in that life was an ever-returning cycle, and time had no beginning and no end.

Beginning around the second millennium B.C., various nomadic herding tribes from southeastern Europe traveled across Asia Minor and the Near East to the Indus Valley and began invading and assuming control of the lands and temple-cities. The chief gods of these Indo-European invaders were hunting gods and sky gods. A complex fusion of their cultures took place during which the matriarchal patterns of the goddess myths were incorporated into, but not entirely suppressed, by the more patriarchal ways of the Indo-Europeans ("Aryans"). The resulting myths were revealing in that numerous "encounters" between the gods and goddesses took place, for example, Zeus seduces various nymphs. At this time also, the main Mother Goddess deity was divided and dispersed into at least six less-powerful goddesses, for example: Athena, Aphrodite, Artemis, Hera, Demeter, Persephone.

Coming out of this mixture was a powerful warrior culture centered on the city of Mycenae, which flourished between 1600 and 1150 B.C. Also, at around 1200 B.C. came the Dorians, new invaders from the northwest, who were militarily superior, and who insisted on a firmly patriarchal mythology. The myths from this time reflect this conquering mentality such as Apollo slaying the snake Python, and Perseus slaying the serpent-haired Medusa. A consequence of the patriarchal mythology was that the power of the Mother Goddess was permanently diffused.

I've now told you about the *general* mythologies of this time period. How did the *cosmological* mythologies change through these same periods?

Before 4000 B.C., the goddess mythologies flourished in small communities with the image of the Goddess as the axis of the Universe.

Beginning around 4000 B.C. the earliest cities were constructed, larger communities emerged, a differentiation of professions began, and gods and god-

desses started to play a bigger role in these peoples' lives. As the tall ziggurats were being built, the people looked *up* more than ever before. The priests watched the skies and noticed a mathematical regularity in the passages of the seven "spheres" (the sun, the moon, Mercury, Venus, Mars, Jupiter and Saturn). The priests translated this cosmic order into civilized human life, where royal ceremonies paid homage to these spheres. In nearby Egypt at this time, similar civilizations were also constructed.

The mythological cosmology of the cultures at this time were very rich. Once the mystery of the night sky in these cultures revealed a cosmic order, the human response in these cultures was just as vast. Their response showed a deep recognition of the human body as being a duplicate *in miniature* of the macrocosmic universe. A general belief was that, by conforming perfectly to ones own virtue, as the animals do to theirs, as the plants do to theirs, the sun, the moon, the planets and the stars do to theirs, a person at once supports the universe, and at the same time is supported by it. This sort of cosmology is what results when goddesses have a large part to play in a culture's myths.

When the invaders arrived, and along with them, their gods, the harmony was broken. The gods that they brought were black and white, good and evil, light and dark. Where formerly the myths contained planetary cycles, marking days, nights, months, years and eons of unending time, now the myths contained a straight timeline with a beginning, a middle and a prophesied end. So when you cut the female goddess out of the myths of a culture you get a totally different culture. I don't think that the cosmological myths since that time have been nearly as rich, intricate, and supportive. This may reveal something of our culture today, as well.

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Bringing a Feminine Aspect to Science

Fiorella Terenzi also wishes to bring a feminine aspect to science. But I don't know that that means! Does it mean that science is performed differently or with untraditional methods and approaches? Does it mean that it is practiced within a more human-centered ethos? Does it mean that she would like to see more women scientists? (Actually, I think we all would!) So the second avenue that I wish to explore here is the role that religion played in the science education for an elite group of people who were mostly male. Again, I may or may not have interpreted what Fiorella had in mind. (Reader Beware Squared!)

Women have not had a large role in the sciences for most, or all, of the existence of science. Even in historical instances, when women were influential in other areas, they have not been able to gain a significant entry in the hard sciences. You may say that it was simply because of the prevailing sexism of the times. However, the reasons are more likely due to the church dominating much of our ancestors' scholarly endeavors. That made a large difference in the science gender percentages, as I will show you.

For about 1500 years, up until about the seventeenth century, the Western cosmological perspective was dominated by Christianity. The earth was at rest at the center, and a series of heavenly crystalline spheres orbited carrying the sun, moon, planets, and stars. Each of these spheres had an associated religious entity such as angels, archangels etc. Beyond this sealed cosmos was the heaven of God, where spirits of all sorts were vibrantly buzzing with activity. In the seventeenth century, the Newtonian cosmos emerged and is mostly what we use today.

The mathematically-based sciences, such as physics, have had roots throughout scientific history that were deeply entwined with religion. This connection has been strong even after the seventeenth century. I know, you are probably saying to yourself: "But WAIT, how could the physical sciences and religion have such a close association?! Wasn't Galileo trying to *break away* from the Church?"

Unfortunately, from the thirteenth century through the eighteenth century, the prominent scientists of those times were consciously aligning themselves *with* the Christian churches. Galileo's ardent hope, in fact, was to gain the Pope's endorsement. Other prominent scientists such as Copernicus, Kepler, and Newton were deeply religious men who created their cosmological systems by reconceiving the Judeo-Christian god as a "divine mathematician." The scientist Cusa believed that to study mathematics was to study the mind of God. Roger Bacon promoted science as a means to terrorize unbelievers and to interpret the Scripture.

Unfortunately, from the thirteenth century through the eighteenth century, the prominent scientists of those times were consciously aligning themselves *with* the Christian churches.

These religious links made it close to impossible for women to enter the scientific arena. The higher education that was a part of the resurgence of learning in the late Middle Ages was available only to men training for the Church. These universities provided education for the clergy, and since women were not eligible for clergy positions, there was no place where the women could learn mathematics and science.

In the eighteenth century, science and religion finally began to separate. There now remains a somewhat secular environment with some scientists viewing themselves as a kind of scientific

priest. Recent well-known physicists have even presented their work as a quest to illuminate the mathematical plan of Creation that is of divine origin (Einstein, Hawking). And the Theory-of-Everything proponents may have quasi-religious rather than scientific goals.

A culture of physical sciences that encourages both men and women to pursue different kinds of goals would be a good thing. More variety. Since science is a culturally-directed pursuit, it would be beneficial for all to have women involved in determining what science is, how it is practiced, how to put it to use in our lives, and what are its ideals and goals. I hope this dream isn't too far off.

References

The main premise and all of the material in the "Bringing a Feminine Aspect to Science" section came from:

Wertheim, Margaret, *Pythagoras' Trousers*, Times Books, 1995.

Aristotle's Cosmology?

Fiorella Terenzi's new book: *The Sensual Universe* will paint cosmological objects with a human face. Galaxies will gravitate towards each other because they are in love. Comets will pass through our inner Solar System like artists with infrequent creative expressions. This sort of human interpretation may have appeal for young people, and indeed, it could be a fun and amusing concept for many adults. But I worry that this sort of science presentation could be misleading to those who don't know the science facts any better.

Her approach is very similar to Aristotle's cosmos. In Aristotle's cosmology, everything strives towards an ideal appropriate to its nature. A stone drops to the ground because it wants to return home. The Earth and other celestial bodies orbit in circular paths because the circle is the perfect shape and these celestial bodes want their paths most suited to their heavenly nature.

It would be a step backwards, scientifically, to present such material as fact. Since I'm certain that Fiorella wouldn't want it to be accepted this way either, I only have one piece of advice about her future literary presentation. BE CLEAR! Separate the fact from the fiction and make sure that these amusing ideas are presented as simply amusing ideas and NOT FACT. And I hope her book succeeds!

Acknowledgments

Many thanks to S. Coyote and T. Stanley for our discussions regarding these ideas in this Feminine Cosmology section!

ABOUT THE AUTHOR

Amara Graps is a computational physicist and consultant working on numerical analysis, scientific research, and technical writing projects for companies as well as government laboratories (NASA-Ames), and universities (Stanford). Her work experience, primarily in astronomy, astrophysics, and planetary science research, was gained from her current cooperative agreement at NASA-Ames, where she has been associated for ten years, from Stanford University, and from previous jobs at the University of Colorado and the Jet Propulsion Laboratory. She earned her B.S. in Physics in 1984 from the University of California, Irvine and her M.S. in Physics (w/computational physics option) in 1991 from San Jose State University. She is currently writing software for the Solar Oscillations Investigations (SOI) Project at Stanford University, modeling processes in the primitive solar nebula for a project at NASA-Ames, and is preparing to move in 1997 to Heidelberg, Germany to work on a Ph.D. project about comet dust.

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Extropy means creating order from chaos, striving for ever higher levels of human life—optimizing both the quality and quantity of our lives. An extropian world-view seeks to dynamically maximize our intellect and knowledge to control and shape our lives and future. Technology, the practical implementation of human ingenuity, is part-and-parcel of this vision. In fact, to many of us future technology symbolizes a 'Great New World' and initially attracted us to extropian ideas. Is this focus justified?

Do you identify extropianism primarily with having a keen interest in future technology? Are you looking forward to the day when science will give you a longer life, help you overcome your limitations, give you a fulfilled life? Do you wish that progress would 'hurry up'—you can't wait to start living an extropian life? Well, don't wait. Extropianism is not only a philosophy for the future, it's about getting the most out of life today as well as tomorrow. To simply wait for the future to rescue us from today's limitations is to abdicate responsibility—a very **en**tropic thing to do! The future is here, we can be transhuman - if we so choose.

Technology is only a means to the end of Optimal Living. Are we actually fully utilizing technology, including that derived from philosophy and psychology, to optimize our lives now, both in quality and quantity? Nanotechnology will not feed, clothe or re-build us for many years to come. Cryonics, however important, is only a safely net of unknown fabric. Fortunately, we 'Extropians' have the knowledge and attitude to benefit now - we don't have to be enslaved by mysticism, society's conventions, ignorance or pessimism. We don't have to imprison ourselves by our destructive emotions, childhood trauma or genetic limitations. We have the potential for dramatically improving our lives, right now. We can effectively double the time that we spend truly Living, starting today. We can do this by improving our skills, remaking our personalities, our selves. It is not only exotic technology, but also ancient wisdom properly implemented which can help us transcend current limitation. Our optimism is dynamic, and pro-active. We need to transform ourselves to achieve personal extropy.

OPTIMAL LIVING

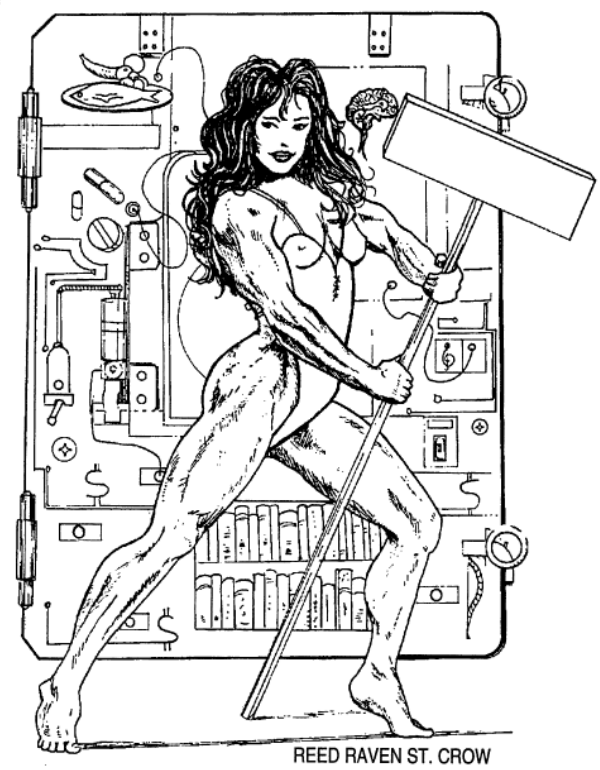
What is Optimal Living? It comprises long term physical and emotional health, fulfillment and happiness; not wasting our lives on irrelevant or unpleasant tasks. How much time do we spend on sub-optimal activities? If our work is not a pleasure, we are off to a bad start; we probably spend at least 50% (55 hrs / week) of our total waking lives preparing, commuting and working, and that's not even counting time wasted vegetating away because of stress, frustration and exhaustion. Most of us spend at least another 20% (22 hrs / week) of our waking lives on other tasks which we regard as necessary evils rather than pleasures. These may include shopping, cleaning, cooking, laundry, gym, fixing things, doing taxes and other red-tape, and filling 'social obligations'.

Have you ever done an analysis of your actual life? How much of our lives do we waste being with people we don't really like or in relationships which are far from optimal? What percentage of your time do you spend doing things you want to do, rather than have to? What is our LQ (Living Quotient)? How can we get from 30% to 60% or 40% to 80% (effectively adding maybe 30 years to our lives), or even from 10% to 90% (does 10% even qualify as living)? Fortunately, many of us enjoy our work most of the time, but is it optimal? What would we do if we could wave a magic wand?

There are no magic wands. But we have something almost as good - intellect, knowledge and free-will. We just need to learn how to weave them in just the right way. Before we explore solutions, let's look at another requirement, money.

MONEY

Extropy is to a large extent a function of money. Most of the leading-edge technology that we want for a healthier, safer and longer life is expensive. Quality generally carries a premium: Heath foods and supplements, timely and effective preventative and corrective medical care, healthy living environment (low on pollution and noise), safe cars, homes and equipment, anti-aging drugs and cosmetics, cryonics. How much do you think artificial neurons or genetic engineering will cost initially? Hot (and healthy) bodies are an expensive hobby. Education and knowledge have their price. Freeing ourselves from unfulfilling work, unpleasant environments and



REED RAVEN ST. CROW

dreary chores costs money. Food for the soul, be it art, scientific discovery or (interplanetary) travel, has to be paid for. Even relationships cost spare time to be enjoyed. Boundless Expansion, limitless mental and physical growth, seems to require boundless resources.

How can we achieve the dual objectives of reducing wasted time and making money? By learning the skill of managing and making money, and discovering ways of making money that we enjoy, we can kill both vampires with one stake. I regard three issues as crucial:

Goal definition - Most of us were not taught to regularly search our souls for our deepest desires and to analyze them rationally. Many of our goals seem to be defined by others, our parents, friends, lovers, bosses, the media or society. Others emerge from vague feelings or are 'forced' on us by seemingly immutable circumstances. How often do we actually take the time to clearly identify and review what we want to do now, in a year, in ten, in thirty? To determine who we want to be? To carefully analyze conflicting emotions and wishes, and to subject them to a reality check? It is no trivial task to identify rational goals for which one is also passionate. Many people never manage it. What a waste! Our goals represent the meaning our lives have. Effective goal definition skill is one of the virtues we may need to acquire, others are covered under self-transformation.

Money-making skills - Making money includes effective management of expenditure and investment, as well as knowing how to create wealth. This is a skill that can be learned like any other. One of the common myths is that investment capital is the biggest barrier to starting a business. Not so, the shortage is in good ideas and motivated, skilled entrepreneurs; investors are plentiful. Are we utilizing our advanced extropian knowledge and technology to develop better investment and business plans? Are we using our smarts to realize how valuable investments are to our future life-style? A good investment can grow 10 fold in 10 to 15 years, every $100,000 invested can give us at least $1000 per month income, forever. Those are the tame options; starting a business can yield much better returns, apart from eliminating dependence on the whims of some boss. Integrating our personal goals with money-making skills makes work profitable as well as pleasurable.

Self-transformation - In addition to goal-definition and money skills there are other personality traits, virtues and skills which will help us optimize living. I would rate a rational, optimistic philosophy of life as fundamental to achievement. Such a philosophy affirms the possibility of objective knowledge, helps to eliminate contradictions and asserts the efficacy and value of the individual. It lays the foundations for a workable personal ethic which helps us tell right from wrong, both in theory and in practice. We can utilize the emerging science of psychology to help us overcome faulty past programming to manage emotional responses and improve our thinking. Ethics and psychology can assist us in turning chores into pleasures, and enhance relationships. NLP (neuro-linguistic programming), Branden's self-esteem techniques, critical thinking training and rational ethics are some of the tools available to us. Information technology can help us acquire the knowledge needed in whatever fields we choose to be active.

Sidebar: Some 'Extropy Now' Technology

Knowledge derived from philosophy, psychology and cognitive science may not be as sexy as nanotechnology or genetic engineering but it offers some of the most profound enhancements we can achieve today.

Objective Philosophy—Making reality comprehensible and thus controllable. Understanding the nature and limits of knowledge helps us define and optimize our lives. Effective means for identifying wrong philosophies and 'knowledge'.

Rational Ethics—Effective, practical principles to help us define and achieve goals. Re-defining ourselves, our character, our virtues. Practical guides on how to tell right from wrong - for ourselves and in relation to others.

Scientific Psychology—NLP to help reprogram limiting emotional responses. Self-esteem techniques. Goal setting techniques. Time management. Effective and fulfilling communication and relationships. EQ enhancement.

Cognitive Development—CPP (Cognitive Process Profile) Cognitive assessment and development system. Courses in rational, critical and constructive thinking. IQ enhancement.

Physical Health—Effective diet and exercise. Preventative and corrective medicine. Safe cosmetic and functional enhancements. Not limited to FDA approved drugs and procedures.

Information Technology—Internet & WWW, CD-ROM information, expert systems

Investments—Utilizing IT and our advance extropian knowledge of the future plus our open mind philosophy / perspective to gain investment advantages. Idea Futures? Predicting company success and failure. Using philosophy / psychology to set goals and investment motivation and discipline.

Extropianism is not only a philosophy for the future, it's about getting the most out of life today as well as tomorrow. The future is here, we can be transhuman — if we so choose.

Onwards, Now!

Optimal Living requires that we dynamically define and review our goals, acquire the skills and knowledge needed to achieve them, and most importantly, to actually implement our plans. Setting the highest goals for ourselves and total rational commitment to achieving them, maximizing personal extropy, is what really makes us Extropians. We should individually and collectively investigate all possible av-

enues to overcome limits now. Let's not be too dazzled by sexy future technology, some of our most effective means of self-actualization are of the mundane variety. In addition to using the latest longevity drugs or computer systems, we should consider the effectiveness of time and money management, and even such quaint wisdoms as building good character, knowing who we are and where we are going.

Let me through down the gauntlet: I want it all, and I want it now! I challenge every reader to do the same. How can we co-operate to help each other extrope? What knowledge of philosophy, ethics, psychology, business, finance, information systems, etc. can we share, pool or trade now to help us achieve common objectives? I am convinced that our collective wisdom and energies are horribly under-utilized. Let's see if we can find sufficient common motivation for spontaneously ordered co-operation to emerge from our precious individuality. Not many people share our thrill of riding the crest of the Future Shock Wave, in fact, few understand our special surfing language at all. Doesn't it make sense to benefit each other? How about initiating some extropic program?

Whatever advantages a co-operative approach may have, it must never detract from the inescapable individual responsibility for personal growth. Responsibility for our lives must neither be abdicated to the future nor to others. The priority is to do an audit of our lives: how we spend our time and money, our long and short-term goals, our strategies for achieving them, plus a review of technology (including philosophical and psychological) used to help achieve our goals. Are we satisfied with our time utilization? Are we happy with our financial plans? How do we break out of the mental prisons which hold us back? Let's carefully review our options and overcome the limits within ourselves. Let's make sure that we squeeze the last drops out of any technology that may promote our goals. Let's not waste the next 20 or 50 years just fantasizing about the future. Let's take charge—today. Order from chaos, now.

Peter Voss, December 95
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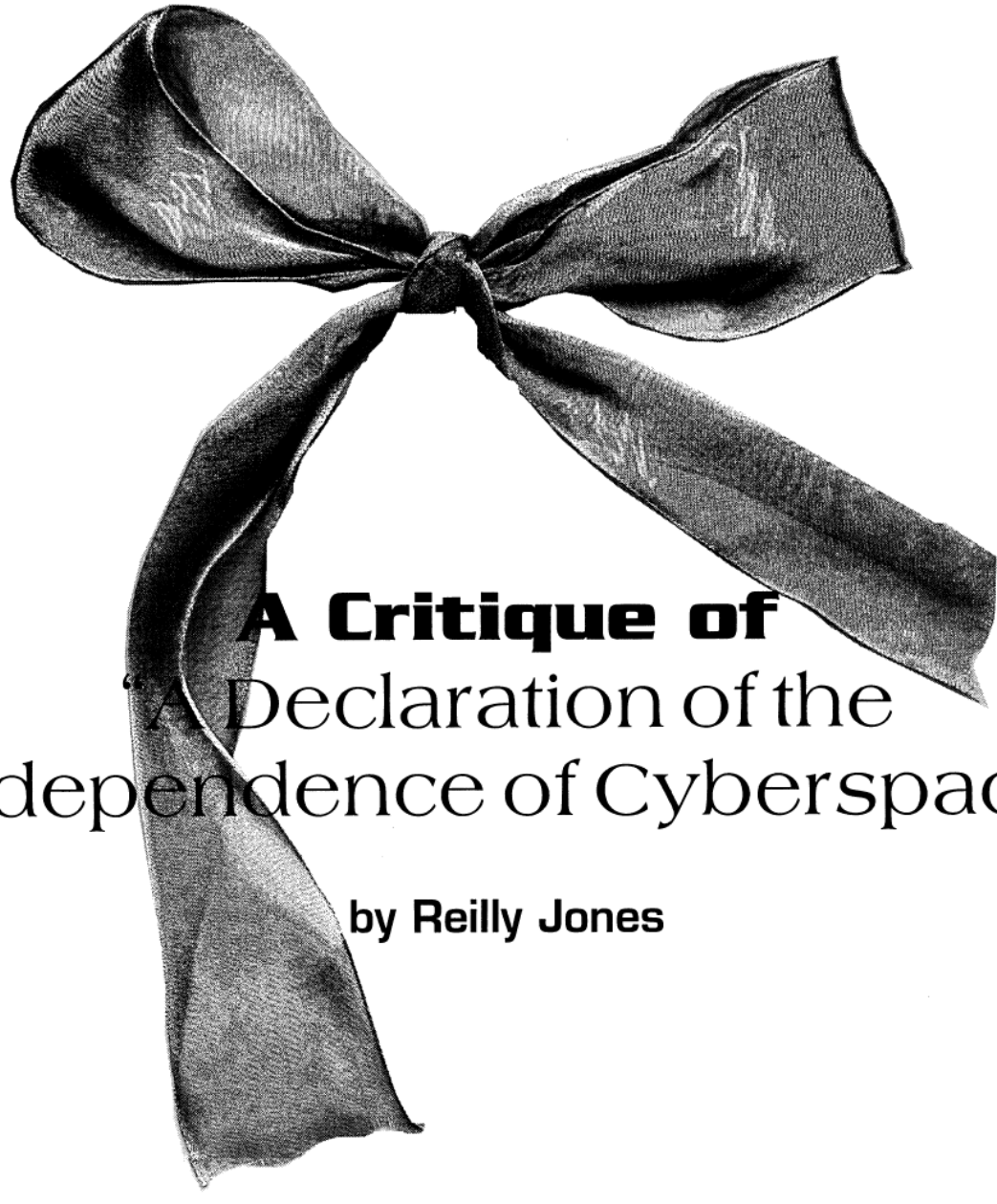

A Critique of "A Declaration of the Independence of Cyberspace"

by Reilly Jones

Last February, responding to U.S. passage of the Telecommunications Reform Act, John Perry Barlow, writer, lyricist for the Grateful Dead, and co-founder of the Electronic Frontier Foundation, disseminated on-line "A Declaration of the Independence of Cyberspace."[1] In this polemic, he declared cyberspace independent of external sovereignty. His assertion generated much discussion, pro and con, leading Barlow to respond publicly in *Wired* magazine.[2] Although a federal court ruled that the Communications Decency Act's content-based regulation of the Internet medium violates the U.S. Constitution's First Amendment, Barlow's broad rejection of State jurisdiction over cyberspace remains in force and, as I will show, subject to criticism.

Malignant Political Universalism

Barlow's "Declaration" contains a *dormant intellectual malignancy* that could grease the path to universal tyranny. That malignancy lies in expressions of political universalism, a recurring utopian urge that has only produced misery. His use of phrases such as "global social space," and "Social Contract," highlight an all too familiar affinity with the sorts of 'universal rights' that have left a bloody trail from the French Revolution down through the Cold War. Barlow proposes to form a global cyberspace polity, "where anyone, anywhere may express his or her beliefs," with impunity. He advocates the imposition of the American polity's unique right to free speech on all the world's polities. The creation of any global polity for the purpose of securing such a universal right, could act as a catalyst to the formation of a World State. "We will spread ourselves across the Planet," Barlow envisions, "so that no one can arrest our thoughts." In addition, Barlow's "Declaration" undermines an already-weakened U.S. Constitution. As I will demonstrate, the

Constitution's polycentric principles, i.e., limited sovereignties of enumerated powers, offers our last line of defense to universal tyranny.

To begin with, set Barlow's "Declaration" side-by-side with the American Declaration of Independence, a comparison that he expressly encourages. This comparison demonstrates the cultural and intellectual free-fall we have entered. A theme recurs throughout his "Declaration," a temperamental adolescent complaint of, 'You don't understand me! I want a lock on my bedroom door!' Barlow says: "I ask you of the past to leave us alone; You are not welcome among us; You do not know us, nor do you know our world; You do not know our culture; Our world is different; You are terrified of your own children." Barlow only forgot to add "Don't trust anyone over 30!" Will the hippie residue of the 60s never grow up? I guess the answer to that, is blowin' in the cyberwind.

Adolescent emotivism crops up again: "You have no moral right to rule us nor do you possess any methods of enforcement we have true reason to fear." No reasoning whatsoever backs up this outburst of feeling. Wait until the IRS, FBI, ATF, or another of the grown-ups' three-letter agencies come after you, then see if you have true reason to fear. Barlow's response in *Wired* doesn't improve matters by invoking the equivalent of a high school 'in' crowd: "[I]t does seem self-evident that there is a Net culture, manifestations of which can be found everywhere in this magazine." I suppose, by analogy, that manifestations of a TV culture could be found in *TV Guide*. Barlow's self-evidence thus reflects mere self-selection.

Such self-selection prompts me to wonder: For whom does Barlow speak? "On behalf of the future" he writes, and "I address you with no greater authority than that with which liberty itself always speaks." Whose future? Whose liberty? Who granted him the authority to speak for the world's future and the world's liberty? When he speaks for universal cyberspace, and of it breaking free of all external sovereignty, does he really mean to exclude those in cyberspace who don't mind some statist regulation? Would Barlow deny citizens of particular geographic communities the right to choose regulation of cyberspace-mediated behaviors that historically have proven harmful? Barlow promotes a rigid form of liberty: freedom for him and like-minded individuals alone.

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His proposal to form a global cyberspace polity tills bloody old ground. "We are forming our own Social Contract." Why would you and I want to follow this historically destructive Rousseauean model of polity formation and hew to their totalistic 'general will'? "We believe that from ethics, enlightened self-interest, and the commonweal, our governance will emerge," he says. Whose ethics? Whose self-interest? Barlow can forge the commonweal only by eliminating incompatible individuals, a task that calls on either persuasion, or coercion. The cyberbureaucracy of the hippie residue will no doubt feature their*own* censor's chair, mandating a mildewed day-glo atmosphere of political correctness. Suppose that we resist 're-education' and refuse to join their 'Social Contract.' Must we be coerced?

Sacred Cyberspace

Barlow does not make clear, in "declaring the independence of cyberspace," the nature of the boundary between the internal sovereignty of cyberspace and the external sovereignty of the rest of the world. "We must declare our virtual selves immune to your sovereignty, even as we continue to consent to your rule over our bodies." Where does his virtual self end, and his physical self begin? Barlow's confusion arises from his definition of cyberspace. In the *Wired* response, he tries to clarify the distinction between cyberspace and the rest of the world by declaring that only "thoughts" exist inside cyberspace, no physical "action." Would child pornography, libel, slander, consumer fraud, traffic in insider information, theft of state and trade secrets, copyright violations, obtaining access to or tampering with personal records be legal as long as they are "thoughts" in cyberspace rather than "actions" elsewhere? Must one global cyberspace polity decide these questions and override the diverse answers from all other polities? Barlow's proposal claims it must.

He attempts to transcendentalize cyberspace, even to sacralize it, to place it entirely outside of any jurisdiction. He imagines cyberspace as a timeless, spaceless realm, as "the new home of Mind," and "thought itself, arrayed like a standing wave." He reveals that "There is no matter here," and "Ours is a world that is both everywhere and nowhere." Barlow's cyberspace lives as well as cogitates: "It is an act of nature and it grows itself through our collective actions." No mere flight of fancy, this picture of cyberspace bolsters his central jurisdictional claim: "Cyberspace does not lie within your borders."

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In part, the fact that information has many uses explains Barlow's confusion. Information *about* reality allows us to comprehend the actual world with clarity; information *for* reality allows us to increase the extropy in the actual world; information *as* reality allows us to escape the actual world and carries our vitality away with it.[3] In this last form, *as* reality, information loses its materiality, offering the escapist a route to different realms. Jurisdiction could not possibly apply to this transcendent realm, to this heaven on earth! Perhaps if the States of the world don't define cyberspace as Barlow does, he would at least settle for religious tax-

exempt status.

Unfortunately, Barlow undercuts his notion of collective CyberMind in his *Wired* response. "Even if I wanted to, there wouldn't be much I could do to call [the Declaration] back at this point." This recognizes explicitly that matter ultimately controls cyberspace. Anything that goes onto the Net can land on someone's hard drive, and might remain in storage long after the writer has changed opinion three times, gotten a new boss who dislikes boat-rockers, etc. Dare we post our deepest, most interesting thoughts? Who can be sure that our old content won't be used against us in a New World Order 'show trial'? Such concerns demonstrate that cyberspace constitutes a very solid, material object—not a transcendent realm.

Toward a People's Republic of Cyberspace

Having diagnosed Barlow's confusion about the nature of cyberspace, I have to wonder what—other than the fact that Barlow hangs out there—makes it more special than, say, a suburban shopping mall? Should we declare shopping malls to form a worldwide independent jurisdiction, transcendental agoras totally disconnected from the real world?

When Barlow rebelliously declares that "You have no sovereignty where we gather," he stakes out just such an exclusive jurisdiction. Sovereignty, here, refers to the power of giving the law on any subject along with the power of punishment. Jurisdiction refers to which individuals exercise sovereignty in each particular case. Jurisdiction, a structural consideration, means more to liberty than the law itself, because stronger individuals make law for weaker ones. Strong individuals, with jurisdictional authority backing them, determine which entities qualify for inclusion in the human community, which are entitled to the benefits of citizenship, and which have the capacity to enter into consensual agreements. If cyberspace is institutionalized as its own *unlimited* sovereign, then its jurisdiction will grow at the expense first of other institutions, and if successful, at the expense of everyone outside of cyberspace. Hence Barlow initiates a new version of Marx's class struggle.

If external sovereignty can only be exercised at the gate to cyberspace, and cyberspace is global in nature, then won't declarations such as Barlow's midwife the World Surveillance State? We already sense such a regime in embryonic form. Overlapping nets above us obscure our vision of the stars. First, the crisscrossing jet streams of its diplomatic, military and corporate overlords whizzing around to important meetings; then above them, an orbiting grid of spy satellites watching everything below. We sense the AI supercomputer scanning microscope examining our lives in detail; and we are mindful, in our laogai-gulag-holocaust world, of the totalitarian apparatus of informing on each other.

Barlow repeats the traditional formula for legitimate sovereignty: "Governments derive their just powers from the consent of the governed." Despite this theoretical ideal, in practice States require only the *acquiescence of the governed*. Contrary to Barlow's claim that in cyberspace "[W]e cannot obtain order by physical coercion," most order, or acquiescence of the governed, comes from coerced consent. This coercion consists of massive, coordinated, intentional fraud, coupled with a silencing of the truth. The Soviet state pioneered "disinformation" programs, forms of worldview warfare specifically designed to elicit the consent of deceived individuals. These have scientifically evolved into highly sophisticated techniques available to all advanced groups of influential and powerful elites.

Citizens labor under a pervasive bombardment of false facts, false meanings and false values from the statist miseducation system, the shameless liars in the orthodox media and the virtueless reality of Hollywood's image makers. This sophisticated fraud gives rise not simply to false judgment, but utopianism. Absent accurate, reliable facts, clarified meanings and correct values, individuals find it hard to escape indoctrination. Instead, they remain caught in a closed ideological loop, a self-perpetuating strain of anti-realist thought. Barlow writes from within this loop, whether consciously or not.

The Utopian Conceit

Barlow writes classic utopian cant, an example of what Thomas Sowell calls the "vision of the anointed."[4] "We will create a civilization of the Mind in Cyberspace," exhorts Barlow. "May it be more humane and fair than the world your governments have made before." Governments make the world, and the world is inhumane and unfair? Then, by all means, through 'permanent revolution' in cyberspace, we will make them 'wither away.' Intentionally or not, Barlow evokes Marxism. "We are creating a world that all may enter without privilege or prejudice accorded by race, economic power, military force, or station of birth." Can "From each according to his ability, to each according to his need!" be far behind? Apparently not; Barlow adopts as his underlying premise the view that we can create a heaven on earth by freeing our natural goodness from all external discipline through a transcendental cyberspace. "The only law that all our constituent cultures would generally recognize is the Golden Rule."

Members of the utopian 'anointed' appoint themselves shepherds over the 'benighted.' They want to institute emotivism as the world's only ethical system because individuals who judge right from wrong via 'feelings' readily respond to being told how they *should* feel about things. I can see the future crowds yelling exultantly, "We are free!" then looking around and quietly asking, "Can we say that?" Cyberspace, in its aspect of information *as* reality, the appearance of freedom from the actual world, could offer the shepherds a perfect stockyard for managing the world flock. True to this form, Barlow indulges in escapist fantasy,

I can see the future crowds yelling exultantly, "We are free!" then looking around and quietly asking, "Can we say that?" Cyberspace, in its aspect of information *as* reality, the appearance of freedom from the actual world, could offer the shepherds a perfect stockyard for managing the world flock.

"I declare the global social space we are building to be naturally independent of the tyrannies you seek to impose on us."

Next: A Cyberspace Constitution?

Constitutions represent theoretical expressions of a polity's practical political life. To change a constitution, the practical political customs of a polity must change first. Before a world polity calls for a constitution applicable to the entire planet, the practical political life of *every* person of the world must reflect thinking in global terms. Declaring cyberspace free to develop its own political customs sans 'interference' from existing local polities thus represents a step toward developing a Cyberspace Constitution, applicable world-wide.

Our Western Culture has dissolved and its remnant civilization begun to fade. Yet where are the spaces protected from hostile criticism, from the urban rat race and prying eyes where new cultures can arise? A collectivized World State will leave little room for us to carve out our own havens of liberty. Each individual has little power to oppose the formation of the World State. Hence the need for mediating institutions between individuals and statist authorities. Mediating structures, as the threads of the web of public life surrounding the cells of our separate private lives, provide critical protection for individual liberties. Institutions providing private law arbitration, reputation markets, and technical communication standards must act as competing powers to thwart utopians' constant attempts to consolidate world power.

This polycentric model allows the fluid formation of diverse polities of limited sovereignty in cyberspace, what I have termed "cybernexus." These polities constitute wholes, with no split between "mind" and "body." They include the social relationships and technological superstructure required to maintain the virtual communities in cyberspace. This creates a complex adaptive political system, one resistant to both egalitarian mobocracy and oligarchic tyranny. There can be no universal cyberspace. A total war between limited sovereignties and global tyranny lies before us. Will there be *any* new human cultures at all, let alone opportunities for posthuman speciation? I, for one, do not want utopian cosmic consciousness; I want to foster the seeking of a plurality of individual destinies.

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This polycentric model allows the fluid formation of diverse polities of limited sovereignty in cyberspace, what I have termed "cybernexus."

Liberty and freedom represent different concepts. Barlow offers not just a declaration to be free of any existing governmental authority, but rather a statement of his desire for 'vacant freedom.' Such vacant freedom exists only after the overthrow of all authority—including truth and history. Without history, depletion of a large store of meaning and context in our lives occurs. Absent truth, lies and propaganda reign. Barlow thus encourages fraudulent revisionism and relativism, a violent form of worldview warfare.

Vacant freedom, in practice, unfolds as wars between gangs over turf. Liberty, on the other hand, arises when individuals in unresolvable conflict with each other, turn to law for resolution by judges to whom the parties have, by mutual existence in a consensual moral polity, accepted the method of choosing the judges and given them limited judging powers that they accept as valid. "For true liberty is not a matter of ridding oneself of external law," Miguel de Unamuno wrote, "liberty is consciousness of the law. The free man is not the one who has rid himself of the law, but the one who has made himself master of it."

If we have bad laws, such as the Communications Decency Act, let us, by all means, change them. But let us not throw out all of our existing polities. The historical lesson to be derived from the fall of the Roman republic to tyranny can still be found on the dusty shelves of used book stores. A contemporary observer of this tragedy, Sallust, prescribed the course of action that foils this fall, "It is better for a good man to be overcome by his opponents than to conquer injustice by unconstitutional means."

Notes:

1. Web location, *www.wired.com/wired/if/declaration*

2. John Perry Barlow, "Declaring Independence," 4.06 *Wired* 121-22 (June 1996).

3. Albert Borgmann, "Information and Reality at the Turn of the Century," vol. 11, no. 2 *DesignIssues* 21-30 (Summer 1995).

4. Thomas Sowell, *The Vision of the Anointed: Self-Congratulation as a Basis for Social Policy*, (New York: BasicBooks, 1995).

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Ari Requicha's MOLECULAR ROBOTS

by Max More, Ph.D.

Prof. Ari Requicha taught the first course based on Eric Drexler's seminal work on molecular nanotechnology, Nanosystems. *He is Professor of Computer Science and Electrical Engineering at the University of Southern California and founder of the Laboratory for Molecular Robotics at USC.*

A: The lab is very new. We have 4 principal investigators. My background is in robotics and automation, in computer-aided design and geometric models. So I am interested in spatial reasoning. What I'm really known for is solid modeling, which has to do with representing solid objects in computers.

The other principal investigators: one is Peter Will, the division leader at the Information Sciences Institute. His main work has also been in the robotics and observation area. Then we have material scientists, computer science and physics people, and we have a chemist who also has an appointment in materials, and he is a surface science person.

M: What are the short term and long term goals?

A: The very long term goal is to build nanomachines and to do things such as determine the structure of materials by probing them with atomic force microscopes and instruments like that which for us is an exercise in tactile sensing. We are saying that instruments like scanning tunnelling microscopes (STMs) and atomic force microscopes (AFMs) seem to be the most promising way we have now to manipulate very small things, nanometer-scale things, and they turn out to look a lot like robots in what they are doing.

We are hoping to work with room temperatures and compensate for a variety of problems by being clever with software and using the right sort of robotic strategies. In the short term what we want to do is take silicon substrates, basically semiconductive substrates, probably silicon and build mezzas. What we want to do is grab some interesting molecules with an STM and put them on top of these mezzas and create an array. That will show that with a little more work one could probably build interesting atomic devices with this approach. It has to be something that can not be done by standard semiconductor processing. So that's our first objective.

M: What is the difference between the SPM and STM?

A: An SPM is sort of a generic name. Scanning Probe Microscope is a generic name for all these machines. It include atomic force microscopes. An STM is a tunnelling microscope, AFM is the force microscope, sometimes it's called an SFS, a scanning force microscope, then there are others. Things that work with temperature and magnetic fields. These all fall under this thing: scanning probe microscopes.

So far SPMs have been mostly designed as imaging instruments. Now what we want to do is use them as robots. If one were to design an SPM with the thought that this is going to be primarily a manipulator you might design it differently. There may be some breakthroughs. One of the big problems we have is that it is hard to know where the probe is in XY with enough accuracy. It's not like a standard robot where you have encoders in the arms and you know exactly where your hand is fairly accurately. So if you can redesign things to be manipulators they might come up differently and better. Technology is evolving pretty rapidly. A lot of people are trying new designs right and left, so something might happen. There are some basic problems one being that probes are very big still, they are 29 nanometers diameter which is a very big thing to move an atom that's a tenth of a nanometer.

M: Having taught the course on Drexler's *Nanosystems* you are familiar with the wide coverage of the book. How does molecular robotics fit into what Drexler describes as molecular nanotechnology?

A: Molecular robotics would cover a lot of it because in essence what Drexler and everybody else is trying to do is build things from the bottom up. It's a very computational notion. Computation in computer science is mostly about how to use a small number of primitives to do complex things. And here you have these hardware primitives which are atomic things and you want to combine them in interesting ways.

It's like having a language where you can make interesting sentences using a bunch of characters and sounds. If you try to do that then you are doing assembly, and assembly is something that the robot people have been studying for many years. So when you talk about molecular robotics you are talking about assembling things out of molecules and atoms and that's really very much like what Drexler and others want to do.

It's very exciting you know. If any of this works, it's going to be great. What it's going to do is let you do with the structure of matter the kinds of things we do with the structure of information. We've got this bit and we've figured out how to put bits together and to build from there. We can build these programs with millions of lines of code that are probably the most complicated things that humans have ever built. We've got that fairly well under control. Now, if we start playing with hardware primitives that are in the materials and we manage to have anything that resembles that ability to combine them in new ways, you could do… well, I'm sure there are going to be applications that we cannot even think about now.

What it's going to do is let you do with the structure of matter the kinds of things we do with the structure of information.

M: Do you want to be around to see the consequences of this in 50 or a 100 years?

A: Sure! I plan to be around hundred years from now.

M: Do you have a program of action to make that happen?

A: Drink as much as possible, that sort of thing. [Laughs.] Unfortunately I don't think I'll be around to see it, but I might be around to see the beginning of it.

PERFORMANCE ENHANCEMENT and Legal Theory

An interview with Prof. Michael Shapiro

by Max More, Ph.D.

Michael Shapiro is a professor of law at the University of Southern California.

MM: Which performance enhancement technologies do you think will raise the most interesting or problematic legal and ethical issues?

MS: Some technologies emerging from the research being done now will follow a disorder model. Let me make a comment about disorder models. The terms "enhancement" and "augmentation" are problematic—not meaningless, but hard to interpret. You can set up the problem in the following way: There are lots of things that we do to improve ourselves that don't seem troublesome to most people because we can place these processes within a justificatory model based on remedying disorder, trauma, or the like. Models are, roughly, abstract guides to action or analysis. The model has axioms of the form: If X has disease Y, then X can use therapy Z to rectify the situation. This leaves out various qualifications we can ignore. We don't have to deal with whether the person can be forced to be treated. But when readers of *Extropy* think about enhancement, they're certainly not confining themselves to matters of controlling disorder—they may not even think of the latter as true enhancement.

In an article I wrote on performance enhancement in the *USC Law Review*, I started off with some examples to illustrate the distinction between enhancement and therapy. Kirk Gibson used cortisone for a bad knee and hit a home run that helped win the opening game of the 1988 World Series for the Dodgers. On the other hand, in the same year, Ben Johnson ran in the Olympics but was found to have taken steroids and the Olympic officials nullified his victory.

Then there are situations that are somewhat more ambiguous. The steroid problem inspired some statutes. They were meant to deal with these two different justificatory models [disorder and augmentation]. For example, in Florida, there's a statute that says, "prescribing, ordering, dispensing, administering, supplying, selling, or giving growth hormones, testosterone, or its analogs, human chorionic gonadotropin, or other hormones for the purpose of muscle building or to enhance athletic performance" [are grounds for discipline]. For purposes of this subsection, the term 'muscle building' does not include the treatment of injured muscle."

Well, of course, one puzzle is that if you treat injured muscle, or fix broken bones, or give cortisone for a bad knee, you're improving performance.

But, you might say, it's bringing a person up to a previous baseline, so it's natural. Nature has some kind of moral force linked to it, or so some argue. But what you're doing when you give them steroids is to try to raise them above their natural baseline.

But suppose someone with a lot of athletic talent is born with a predisposition for chronic arthritis, and finally is given cortisone as an adult. This person never had a prior "normal" baseline. The most you can say is that there is a rough ideal normal baseline—that is, normal to the human species—that the person has always fallen short of. It's still a disorder model that's invoked to treat the arthritis.

I was going down the hall and one of our visiting professors was walking in my direction. He had a cup of coffee in each hand. I said "TWO cups of coffee?" And he said "Gotta be sharp!"

What about people who take caffeine for headaches? If I take commercial aspirin, containing caffeine, it may improve my performance both by relieving the headache and by the stimulant effect. Sometimes musical performers will use beta blockers to keep their hands from trembling or to steady their voices. Substances which are generally thought to be performance dampers may be performance enhancers, depending upon the function. For example, people who are in rifle competitions may drink an alcoholic beverage. It can reduce their tremors and calm

them down. So, you have to sort out exactly what is being done for what purpose and consider what system of justification we're talking about—and whether that justifying model should make any difference.

The last point should be stressed. The very basis for distinguishing disorder from augmentation models is seriously in question, quite apart from the expectable difficulty of drawing boundaries between them.

To focus more on your question about legal and ethical issues: Think about human growth hormone. There are people with diseases of the pituitary who are extremely short. I think many would agree that it's okay to give them human growth hormone—maybe even obligatory—provided we satisfy ourselves about the risks. We can leave aside for the time being the question of the child's current preferences.

Should I protest: Why am I being judged against somebody else who's got better body control, better anti-clumsy genes? Does that make any more sense than saying you're simply being tested to see how your system reacts to steroids?

But suppose you're just at the short end of what seems like normal variation in the bell curve of height. You're just very short—say, an adult male who's less than 5 feet tall—and you have trouble reaching the gas pedal on a car, people are always bumping into you or falling over you, you can't get dates, and perhaps you don't advance in your career. What do we say here? You can try to replace this with a handicap model instead of a disorder model—that is, the person is operationally impaired compared to the species norm. But is this just replacing the disease model with an augmentation model invoked mainly to get to the baseline, not necessarily to rise above it?

One difficulty in condemning enhancement is that we all accept it in some form—even technological—as part of our shifting baseline of what's normal and acceptable. For example: I was going down the hall and one of our visiting professors was walking in my direction. He had a cup of coffee in each hand. I said "TWO cups of coffee?" And he said "Gotta be sharp!" But few people worry about this— side effects aside—except in specific situations like athletic competition. There's no disorder model at work, but the augmentation is fairly modest.

In the case of performance enhancement in sports, games, and contests—we might call admission to universities contests—I've divided up the analysis into several overlapping categories. It applies both to physical and mental enhancement. There are arguments based on certain moral categories that appear to be well-defined—but they aren't—and purport to tell you in an algorithmic way what you can and can't do—but they don't. The reason I've got these moral category arguments categorized like this is that they are often used in a ham-fisted, formalistic way.

The moral category arguments include overlapping sub-arguments like arguments from nature, arguments from identity, from merit, and from external influence. The natural/unnatural distinction lacks power here. Nature is often thought to be morally weighted. But this moral weight, if any, is pretty attenuated. You can often take what is natural—assuming you can define it at all—as a default guide to something that works. But it often isn't: it's not natural to take antibiotics. What people mean by natural or unnatural I think is whether or not it conforms to what has become part of normal baseline for human beings—such as wearing clothes. In this sense, it's natural for us to put clothes on, but obviously it's unnatural in some other sense. I'll say some more about moral category arguments later.

There are also arguments based upon harm and coercion. Of course these are also moral arguments and make for legal arguments too. They appear to be less fixed and are often made in a less formalistic way. They gain some additional force where the technology is very risky—but of course traditional training can be risky too. It's not always clear what the incremental risk is when the technology is used properly.

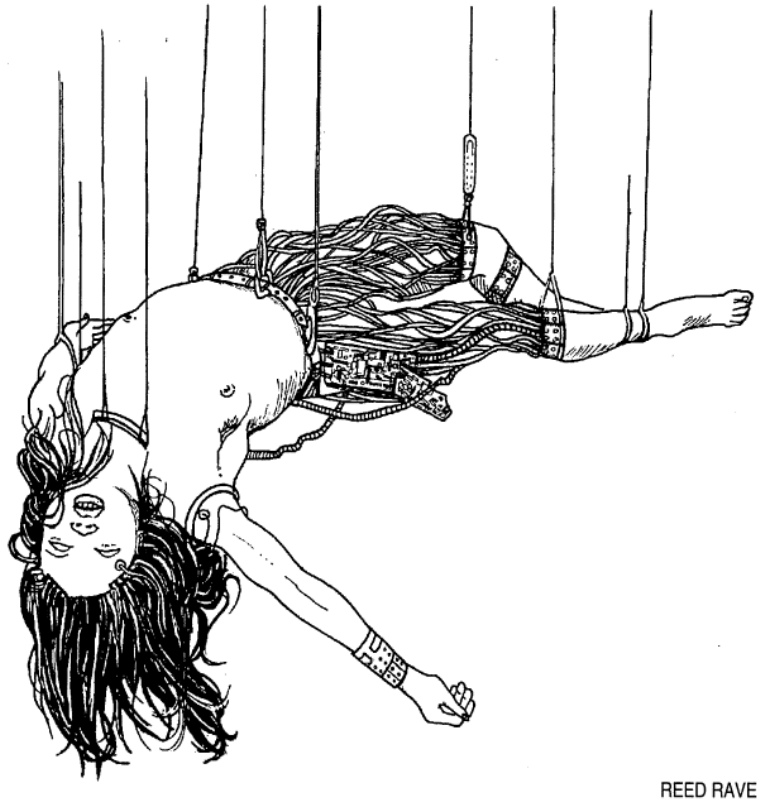
Then there are arguments I call sports coherence arguments. People will say things like: you cannot have performance enhancement in contests because it defeats the entire purpose of the game. In some forms these arguments make no sense because they assume to start with that enhancement is prohibited. The real question concerns the situation where there is no prohibition, but competitors might be required to disclose what they're using. With nondisclosure, you'd have a different kind of game that you might not want, but it wouldn't be incoherent.

Finally, a set of arguments called normative-systemic arguments—they might be called institutional arguments—which seem to me to be the only arguments that make any sense. But they aren't overwhelming.

Suppose, for example, you have a performance enhancement technology that is extremely risky. There was a poll taken—how credible I can't tell—reported in Reuters in 1988, in which Olympic athletes were asked something like: "If you knew you could take this drug and you knew it would guarantee you a gold medal but would kill you five years later, would you take it?" Supposedly half of them said yes, but who knows whether they'd actually do it when confronted with it?

Now, here's a thought experiment to illustrate the argument: I have an eight-year-old and a four-year-old. Do I want them to think it's okay to take such risks? Is it that important to get a gold medal, at the price of dying at an early age? That seems to me to be bizarre. Under some moral theories, it would be wrong. Still, if some people already have that preference, there are autonomy-based reasons letting

them go ahead with it, although there are counter-arguments. But the question here is: can and should we control the acquisition of these preferences in the first place? That sort of risk-taking will look to many like an assault on the value of life. But people—including children—learn from what they see. Athletic competitions may be particularly effective social learning mechanisms: "Everything I needed to know in life I learned from baseball"—that sort of thing. So this is a social learning argument. The spectacle of an open practice in which people take enormous risks with their health or their life in order to get a prize tends to reinforce value systems that may acceptable in a society if a few have them, but not if many do. It may be OK in a complete warrior state, but not here. If an external observer came down from another quadrant, how would they measure the value we assign to life under a win- and-die system? But these are empirical claims that are hard to confirm or disconfirm. And current enhancement techniques usually won't kill you if used right.



REED RAVEN ST. CROW

The other argument-from-social-learning is that if you perceive performance enhancement as getting a return disproportionate to your efforts, then it conveys the idea of getting something for nothing. It promotes a sort of welfare ethic. If this is the general view, which in the case of steroids is quite mistaken, you take a pill and swell up or get stronger and faster and you can lift the continental shelf or win the decathlon. If people see it this way, they see competitors getting something for nothing, which weakens values of diligence, fortitude, and so on.

MM: But they don't seem to actually work that way. It just means everybody just has to push harder. The other guy is going to be using it too!

MS: Yeah, that's right. If everybody used it, of course, and if it improved everyone by the same absolute increment, you would be shifting the bell-shaped curve to the right. You would be improving absolute performance levels but not relative ones. So for this sort of performance enhancement it might even make people more diligent. And it's hard to see, if the same people keep on winning and losing, how you're getting an inappropriate reinforcement of something for nothing. That would happen mainly, if at all, if people were cheating and you knew they were cheating but you didn't know who. [This sort of thing is important in contests such as getting admitted to universities—SATS, MCATs, LSATs—or applying for jobs or licenses.]

That leads to the sports coherence argument, which is the weakest. It trades on a misunderstanding. It's true that if performance enhancement techniques are banned, but some people cheat, then the contest is unfair, at least on the books. But that's an important qualification. If you want to define what a sport or a game is you have to consider not only the canonical definition in the rulebook, you also have to consider how the game is actually played. You could consider—and I'm using the term "cheating" in a metaphoric sense—constructing games based on seeing who can cheat the best. People at football practice try to make sure that no one's spying on them. There have been a few scandals where people acting for an opposing team snuck into practice. Well, you could construct a game like that. You

You can imagine a world in which performance enhancement alters identity in such a way that it's very hard either to get a grip on what the game or the sport is, or who or what won. It wouldn't track our notions of winning and losing, or our notions of merit or desert.

could have a total, complete contest in which you not only play football but you spy, do psychological warfare, kidnap the opposing quarterback, and so on. Some may think this is unfair. But you could construct a game where those are the rules applying to everyone. Why don't we have games defined like this—at least at present? Games like this are coherent, but people may think it promotes adverse learning. I mean, you don't want kids in high school to play football and think it's okay to kidnap and kill the opposing quarterback. I certainly don't want to live in a society like that. And we're not quite there yet.

But in a less fanciful situation, if you permit performance enhancement but require disclosure, the game is not incoherent.

Some of the authors [in the *Journal of the Philosophy of Sports*] protest that if you allow steroids and certain other enhancers then what you are doing is not really testing talent, effort, skill, or diligence. What you are testing is how the body reacts to a certain chemical, or some other technology. This is unpersuasive because, number one, you could also argue that what we are now testing is how one's body responds to lifting heavy objects, going on special diets, or training generally. We're testing arbitrary differences among persons, like variations in the genome. Even the capacity to try hard is affected, though not limited, by genetics. I'm pretty clumsy. Should I protest: Why am I being judged against somebody else who's got better body control, better anti-clumsy genes? Does that make any more sense than saying you're simply being tested to see how your system reacts to steroids?

[I'm skipping over the coherence of using what might be called supplements and implements—better track shoes and running tracks. But there are also devices that form part of a contest's definitional core—poles in vaulting, autos in auto racing. Better poles are a kind of performance booster. But if it were electromechanically contrived to allow people to jump forty feet, we'd have a different—but not incoherent—game. So you can see, again, that the concept of performance enhancement is entirely clear.]

Back to moral category arguments. Performance enhancement sometimes gets people to thinking about questions like: are we sure just who performing? There was a paragraph by H.L.A. Hart in an article that he wrote in the *Harvard Law Review* in 1958 in which he imagined a world in which we all changed traits constantly in a way that, on any theory, there has been a change of identity. You took a pill and it increased your mental and physical abilities enormously. What does it mean to say you won?

You can imagine a world in which performance enhancement alters identity in such a way that it's very hard either to get a grip on what the game or the sport is, or who or what won. It wouldn't track our notions of winning and losing, or our notions of merit or desert.

But as things are now, it's very difficult to see how any current performance enhancement agents compromise identity. We can anticipate technologies in the next generation such as drugs that remind one of steroids but don't have serious adverse effects and are established to be effective. Suppose performance enhancement with these drugs were accepted and regulated (if that happened, there would probably be fewer harmful "side effects"). There's no identity crisis here. [There isn't even that serious an identity crisis with the Mentats in Frank Herbert's *Dune* novels: they all enhance their mental abilities with the spice. But there are contexts in which we might not care that much about identity: enhanced scientists finding cancer cures (but what do we do when Nobel Prize time comes around)?; Mentats as tools to defend the feudal house.]

Of course, there are some merit problems even now. Who gets credit for winning a football game? The team, the quarterback, the coach, the trainer, Mom and Dad? It's an interesting question, but not one to agonize over. But there's nothing incoherent about dividing up credit, as long as you specify what the credit is for. The question is admittedly more vivid with technological enhancement. Who gets the credit for enhanced performance through germ line engineering? We have already genetically engineered larger mice by incorporating rat growth hormone genes into mice embryos. If germ line engineering produces a tall person who succeeds in the NBA, to whom do you give credit? The basketball player, the person who engineered the genes, the parents who decided to do this? The answer is yes—but credit for what? But again, we ask that now. Who gets credit for Hideo Nomo? His parents produced him, nurtured him, he was trained by his Japanese baseball team, he's been trained by the Dodgers.

[Finally, there are access-distribution problems. It's one thing to complain that not everyone can get a Rolls- Royce. But if you could generate major changes in mental and physical ability, you may sharply and irreversibly increase social stratification. Enhancement technologies don't come free. Whatever the conceptual difficulties, we think of them as affecting merit attributes, which themselves are the bases for distributions. If you're very smart, you might deserve some commodities and rewards more than others. But when these commodities are themselves mechanisms to enhance merit itself—well, Who merits merit?]

Publications in this area:

—The Technology of Perfection: Performance Enhancement and the Control of Attributes, 65 *S.Cal.L.Rev.* 11 (1991).

—Who Merits Merit? Some Problems in Distributive Justice Posed by the New Biology, 48 *S.Cal.L.Rev.* 318-370 (1974).

—The Technology of Success [remarks on physical and mental performance enhancement], *L.A. Daily Journal* [County Legal Newspaper], Jan. 17, 1989, p. 7, col. 1.

—The Genetics of Perfection, *L.A. Daily Journal* [County Legal Newspaper], Mar. 8, 1989, p. 7, col. 1.

The HEAT DEATH of TIMOTHY LEARY

For at least a part of his short life, Timothy Leary was a proto-Extropian. These were not the days of his fascination with psychedelics to the exclusion of other mind-changing technologies, nor were they his last days in which he came to accept and embrace death. Leary ended up accepting age-old traditions of giving in to the final and ultimate blow to human freedom. Why did Leary, such an iconoclast and one-time physical immortalist, end up being incinerated rather than frozen? Why, on May 31st 1996, did Leary leave existence forever rather than use cryonics to give himself a chance of returning to life?

In the 1970s and '80s, Leary showed his extropic side, wonderfully encapsulated in his SMI²LE formula: Space Migration, Intelligence Increase, and Life Extension. It seemed Leary had grasped three aspects of the extropic drive to overcome limits: escaping the confines of the Earth's gravity well, allowing indefinite expansion; augmenting human intelligence to allow wiser thinking and continued breakthroughs; and extension of lifespan to make all other goals possible. Combined with Leary's frequent individualist admonishment to "Question Authority, Think for Yourself", the SMI²LE formula covered some of the core extropian attitudes and values. Given these writings, no one could be too surprised when Leary made arrangement for cryonic suspension in the late 1980s.

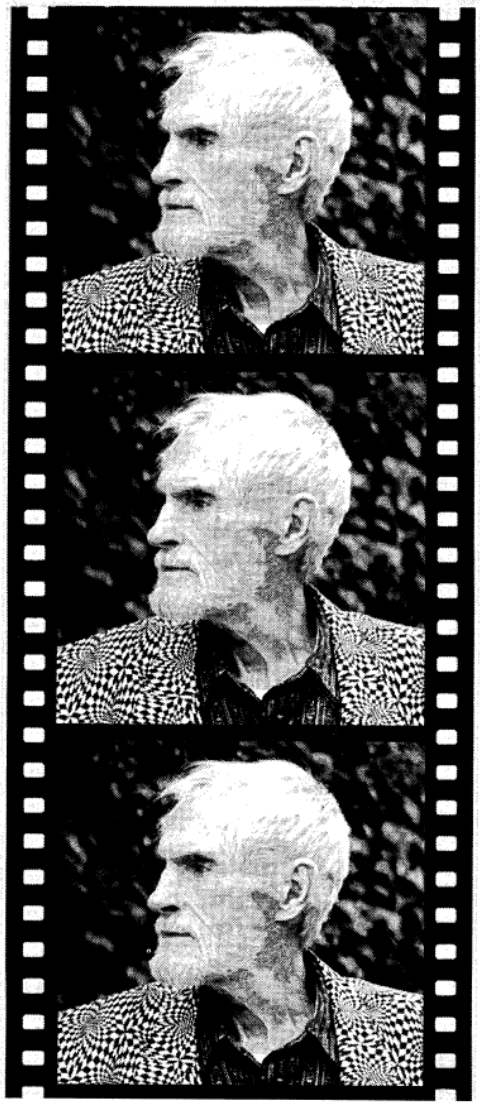
It is instructive to note what is missing from these formulas and from Leary's life. We see no mention of improving our emotional nature, taking control of the urges evolved into us. No mention is made of long-term thinking and planning. I know of nowhere in Leary's writings where he acknowledges the importance of clarifying one's values and goals. Although he urged independent thinking, he never stressed rationality and objective thinking, nor the desirability of modifying one's desires in accordance with the conclusions of reason.

The missing extropic elements in Leary's thinking and personality go a long way towards explaining his disappointing death. Six factors seem to have had some influence, contributing to Leary's fatal last-month abandonment of cryonics. However, most of these are merely contributing factors. They would not have made a difference if Leary had developed his thinking and his character to include more rationality and responsibility as well as his abundant independence and enjoyment-seeking.

In November 1994, Leary switched his membership from the Alcor Life Extension Foundation to CryoCare (without telling Alcor for some time). Nearer his death it seems that his relationship with CryoCare's agents, particularly Mike Darwin, may not have been the best, though we can't be sure whether Darwin, when removing the equipment, gave Leary a condescending lecture or a concerned talk. (The event was recorded on video.) Charles Platt says about this:

> Timothy Leary praised Mike Darwin highly, expressed affection for him, and enjoyed his company. There was never a 'blow up,' so far as I am aware, and Leary was so grateful for the free medical care he had received, he suggested that if we made money selling the story of his cryopreservation, the money should *not* go into Leary's own patient-care fund, but should be donated to BioPreservation. (Eventually I compromised with Leary on this, suggesting a 50-50 split between his patient-care fund and BioPreservation, although I never thought we would be able to sell the story anyway—at least, not unless we sensationalized it in a way that was clearly unacceptable.)

It appears that Mike Darwin's decision to remove Biopreservation's equipment from the Leary house may have precipitated Leary's decision to abandon cryonics. (For an account of the reasons for the withdrawal of equipment—but not of commitment to provide suspension—see Charles Platt's extensive report in *CryoCare Report* #8* or at http://www.cryocare.org/cryocare.)



* "The Strange Case of Timothy Leary." If anyone wants a copy of the print version (with three photographs illustrating it) they should email Carlotta Pengelley <103070.2314@compuserve.com>.

I see no reason to label this a major factor in Leary's abandonment of his ambulance ride to the future. If there was a conflict between Leary and CryoCare's agents, his reaction seems overboard. It also doesn't explain why he would refuse to go back to Alcor or transfer his arrangements to some other organization. John Perry Barlow, a close friend and confidant of Leary's in those last months, said this:

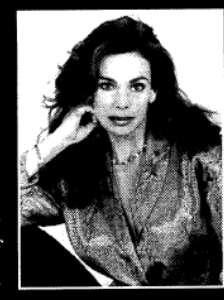
> Tim and I discussed this late on the evening that you folks took the gear out. I asked him what he was going to do now. He wasn't sure. I said, "You know, this means you're off the hook with Cryocare." Suddenly, he brightened, a nagging concern had been jettisoned. "You're right!" he said. "I'm not going to do it." I could tell he was immensely relieved. He'd been wanting to find a graceful way out of this for some time and you provided him with an exit.

A second contributing factor may have been his flirtation with a belief or hope for reincarnation. I know that, shortly before his death, he gave indications of such a belief. On one occasion, as a bird flew by, he commented that perhaps his soul would come back in that form. In the words of John Barlow again: "I also think that in the end, he began to accept the idea of there being a soul, independent of the body, and that his best shot at immortality lay in some combination of that and having his archives uploaded into cyberspace." It's distressing that a man of considerable intelligence should end up falling for such sheer foolishness. Some of his ideas and words live on through his Web site, but Leary himself will never again have a new thought, enjoy a joint, or make new friends. His lack of attention to the importance of critical thinking—not just the ability to question authority—fatally opened him to the unfounded reincarnationist beliefs of those around him.

A third factor leading to Leary's heat death seems to have been pressure coming from regulars at his house. Chris Graves, whose company wanted exclusive rights to film Leary's death, clearly disliked cryonics because it might interfere with his own plans. According to Charles Platt of CryoCare, Graves became extremely angry when Leary gave CryoCare equal rights to film Leary's death. His anger was fuelled when his offer to write a report on the death for *Wired* was turned down while, later, *Wired* accepted a proposal from Platt (a frequent contributor to the magazine). Graves did what he could to

Memories of the Memorial

Natasha Vita More



Timothy Leary's commemoration was not the event that I had anticipated. It was not performed in the manner nor provoked the transhuman sentiments that I had envisioned. I wasn't letting go of a friend who I might meet at a future rendezvous—the Far Edge Party—or any other extropic encounter sometime in the next century, nor was I bonding at this memorial service with a community of associates building their lives on a similar value. To the contrary, I was participating in a ritual, one that has been performed for eons—a liturgy honoring death.

The memorial service took place in a hanger at Santa Monica Airport. It was staged more like an altar with rows of pews. A soft hush filled the enormity of the space. Several enlarged photographic images of Tim were on display at the front with some flowers spread about. A kind-faced man wandered the hanger burning incense and waving the thick haze into the air, as others lurked in the background getting high.

I sat on the easterly aisle mid-way from the front seats. I looked around the room to spot a familiar face or two. There were many, but not the faces I knew from Extropian, Alcor, or life extension festivities or conferences. These were familiar faces, indeed, but ones who I knew from the film industry or Spago's, or LA's cyberculture.

People filtered in and out during Ram Dass' introductory eulogy. One by one, the speakers stated their relationship to Tim, and one by one the stories began sounding more like a pitch to death or a proclamation to having been closer to Tim than the one before. It wasn't until Robert Anton Wilson spoke that I felt a deep and overwhelming pang of reality. His revered and pivotal eulogy was so lucid that it was almost as if Tim was being brought before us as the transhuman that he was—not an icon for the dying. It was through Wilson's vivid memories prefaced with anecdotal vignettes that caused laughter—the kind of witticism that Tim loved so much. Wilson's comments were so appropriate, terse and on the mark, that for a quick moment I forgot my anxiety and took another look around the room. I saw blank stares of praise towards the dying. I had to constrain my emotions. Where is everyone? Where are Steve, and Tanya and the cryonicists! I wanted to stand up and shake the room into some sense. What about Tim's ideas about intelligent agents and migratory evolution? I took a breath and wondered if there was any DNA in a piece of his hair that might be preserved. I bit my lip, remaining silent.

"Timothy was more intelligent than Buckminister Fuller, funnier than George Carlin ..." Wilson continued. I laughed off-guard. Yes he was.

Later, after the speakers' aggrandizement and acceptance of Tim's death, after the video documentary which was, I suppose, a means of bringing him back if only for a few minutes, after the deathist statements by individuals who didn't have a clue, after the "What do you do?" while passing business cards and flaunting of pictures beside the altar and family and friends, I walked to my car looking over my shoulder. There was the hanger at Santa Monica Airport. Just a hanger. Not a dewar nor a suspension team nor another friend who we just might meet again sometime not too far in the future.

bar Platt from the Leary house. Grave's constant closeness to Leary, with his poisoning of the cryonics idea, may have added to Leary's shift away from his suspension plans.

Fourth, Leary may have ultimately rejected cryonics because of a chronic inability to take anything very seriously. He lived for the moment, according to his whims. At a talk Leary gave in the late '80s, I picked up a booklet by him explaining 24 ways to overcome death. Cryonics was one among many, with some merely being ways to ignore rather than conquer death. When cryonics no longer suited his plans for media attention, he started talking about suiciding on the Net (though apparently without any real plans for this), then eventually abandoned cryonics. According to Charles Platt, "I spoke to Leary specifically about cryonics ONCE, when I asked routine questions such as "What do you plan to do if you wake up in the future?" He hadn't really thought about it, confirming my sense that he wasn't taking cryonics very seriously." His public parting with cryonics, reported in numerous newspapers, included a nasty dig at all cryonicists (without qualification). Since cryonics was now interfering with his play, requiring a degree of responsibility, planning, and diligence, he ceased to be interested. Cryonics was great so long as it was a new toy, well fitted to inciting media attention.

I can only speculate on a fifth, possibly major, cause of Leary's decision to die. He gave several signs that he didn't really *want* to live any longer. Perhaps he was burned out. He had never been one to take care of his health, to maintain the body that housed his personality. Over his lifetime, he smoked cigarettes, used cocaine and numerous other drugs in addition to the relatively harmless LSD. He was not one to exercise or tailor his diet according to the needs of his body.

His cancer need not have killed him as fast as it did. He rejected a simple course of hormonal injections that could have given him at least another two years of life with less pain. He not only refused this treatment, he refused 24 hour nursing care. This he needed, since the party-minded people living with and off him failed to care for him adequately. Leary didn't seek proper nutrition, nor vitamin supplements, and according to Mike Darwin of BioPreservation, he missed every appointment for CT scans made for him. Others have reported that Leary always wanted to talk about his friends and the past. Perhaps he had no plans for the future and so little desire to live on, except in the form of some words on his Web site.

Finally, the influence of deathist ideas from several sources, particular from John Perry Barlow in the last weeks, led to Leary's ultimate demise. When he discontinued his cryonics arrangements less than a month before his death, Leary said that it was more important to make a statement about death than to be suspended. One of his closest associates expressed the view that Leary had not truly confronted his own death until a couple of weeks before it happened. It seems that his mind was shying away from seeing death for was it was. Grateful Dead lyricist and cyberactivist John Perry Barlow wrote: "I also think that in the end, he began to accept the idea of there being a soul, independent of the body, and that his best shot at immortality lay in some combination of that and having his archives uploaded into cyberspace." Leary preferred the fantasy of a spiritual afterlife to the practical but effort-demanding option of cryonics.

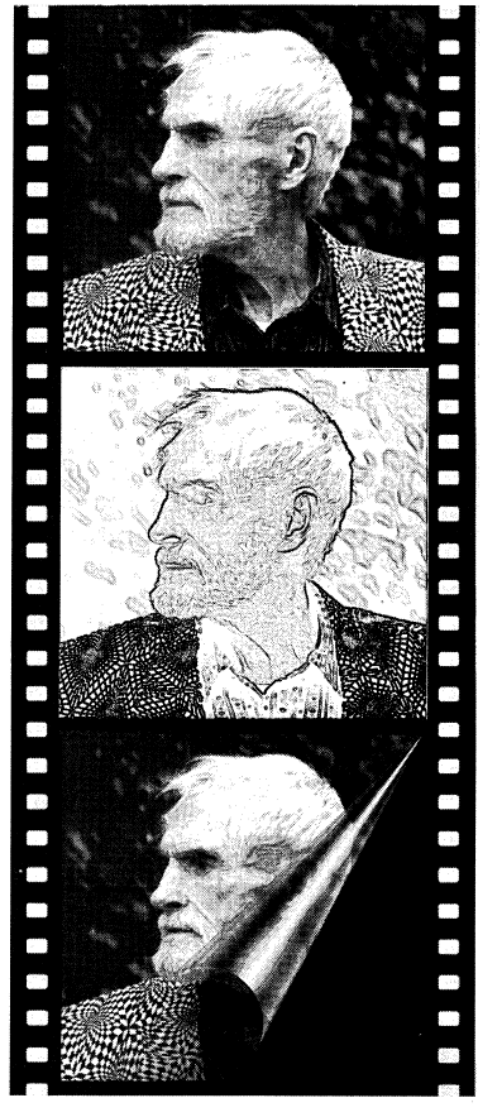
His late rejection of cryonics and the possible extension of physical life seems to have been influenced strongly by Barlow, a close friend and confidant of Leary's in the last weeks. At the memorial service, I heard Barlow tell the audience that death is as important as life, and that we should welcome death into our homes and families. Barlow, in an obituary circulated online, wrote how he was relieved that Leary "had given death a better name" instead of having himself frozen. Barlow has written:

> I will take some responsibility for Tim's decision to drop being preserved. I told him that one of the greatest things he could do with his life would be to die publicly, joyfully, and naturally. America has become a culture of such obsessive control mania that death is now regarded as a shameful failure of will, best kept in the closet. I think even the cryonic movement is a manifestation of this denial.
>
> So I was hoping that Tim would die as all of us should, with acceptance and dignity. I also knew that doing so these days has become an almost revolutionary act and that the media would seize on any element they could find to restore the horror of death. Having his head cut off and frozen seemed the very thing they'd grab.

Despite some extropic attitudes, Barlow is a strong and conscious apologist for death. He disagrees with the extropian view that death is to be stared in the face then overcome. Barlow welcomes death as necessarily integral to living. Humans will have to challenge this bowing down to death before they can become transhuman.

Barlow cannot be blamed, however, for Leary's death. Leary was a highly intelligent man of wide reading. He made the decision himself. It was his history that led to the decision. No influence late in life can be blamed for his extinction.

Leary's death reminds me of the deaths of Robert A. Heinlein and Ayn Rand. These two heroic thinkers should now be in suspension but went out the conventional way. How many more vital thinkers will we lose? Leary certainly had shortcomings, but he was an optimist, an advocate of core extropian ideas, as embodied in his SMI²LE formula, and he constantly admonished his listeners to Question Authority, Think for Yourself. He was ultimately killed by an inattention to reason, a preoccupation with the fun of the moment, and a lack of the long-term thinking necessary to transhuman living.



Bio-Enhancement Update

Ray Sahelian, M.D.

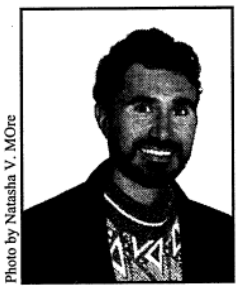


Photo by Natasha V. MOre

Beyond Prozac

It's refreshing to come across an approach that takes not only a comprehensive biological look, but also stresses the important influence of the health of our physical body on our brain health.

Beyond Prozac: Brain-Toxic Lifestyles, Natural Antidotes & New Generation Antidepressants (HarperCollins, published 1995), by Michael Norden, M.D., starts out, "Twenty thousand years ago, we evolved to meet the conditions of life on the African savanna. Our bodies, our brains, remain virtually unchanged from those of our Stone Age ancestors. Yet in the last few hundred years a bewildering rush of cultural evolution has thoroughly transformed our world." Dr Norden goes on to say that cumulative stresses of our modern life has set off an avalanche of depression, anxiety, and insomnia. His central premise is that modern stresses have caused a deficiency of an important brain chemical involved in mood—serotonin.

From the very start of the book, I had difficulty in completely accepting his assumptions. How does he know that our brains have not changed over the past thousands of years? From an evolutionary point of view, it would make perfect sense that the adaptation process continues, with our physical brain continually molding itself. Neurons are dynamic. Synapses have been known to change their shape within minutes. There are changes going on in your neurons right now as you are reading this sentence.

How can he also imply that there are more mental disorders now—such as depression and anxiety— than there were in the past. No statistics, that I know of, were kept on anxiety and depressive disorders in the Middle Ages In fact, if we study history, we often read about the harsh conditions the majority of the population endured. Food was often meager, winters harsh, justice infrequent, physical illness, toothaches, and chronic pain common, hot baths rare, and ice cream didn't even exist!

Most of the book is focused on serotonin, and how it is involved in a variety of mental and physical disorders. Although serotonin is an important mood neurotransmitter, there are at least 60 brain chemicals that also play important roles in the healthy functioning of our brain. This doesn't even include a variety of hormones made by our endocrine system, nor substances released by our immune system such as cytokines. Tons of molecules influence our brain. A strong weakness of this book is its overemphasis on serotonin at the expense of other brain chemicals.

Readers who are new to the whole field of mood and its many causes will benefit from reading *Beyond Prozac*. One of the strengths of this book is that it does touch on a variety of topics that do influence mood such as light therapy, sleep, vitamins, prostaglandins, and exercise. However, each chapter is sometimes so sketchy—only vitamin B6 is mentioned in the section on vitamins!—that often the book looks a pot pouri of different ideas brought together without a thoughtful and detailed synthesis.

The one chapter that I liked was titled "The Body Electric." I was not very familiar with the influence of negative and positive ions on mood, and Dr. Norden presented enough evidence to interest me in seeking scientific papers to further learn about this topic. Apparently air with a high concentration of negative ions, such as that found by the ocean or by waterfalls, can improve mood while air in cities has more positive ions which has the opposite effect. The last few chapters briefly discuss Prozac and other serotonin reuptake inhibitors, some anti-anxiety medicines such as Buspar, and a look at promising future anti-depressants.

The book market is flooded with books that promise to quick-fix our mood. Many are written by self-styled psychologists who advocate an, "All-you-have-to-do-is-change-your-attitude," approach to curing all our psychological problems. It's refreshing to come across an approach that takes not only a comprehensive biological look, but also stresses the important influence of the health of our physical body on our brain health.

Overall, *Beyond Prozac* is a worthwhile read for most everyone. You may not agree with everything in the book, and many of Dr. Norden's opinions and assumptions may turn out not to be completely accurate, but there are, nevertheless, enough interesting thoughts and suggestions to give up a night or two of watching *Roseanne*, *Home Improvement*, and *America's Funniest Home Videos*.

http://www.primenet.com/~sahelian

New Web site includes

- The first chapter of every book written by Dr. Sahelian
- Latest studies on pregnenolone, DHEA, melatonin, creatine
- Upcoming media events

The ABCs of Creatine

Excerpted from Chapter 1 of
Creatine: The Muscle Builder
by Ray Sahelian, M.D. & Dave Tuttle

Whether you're an accomplished athlete or you've just started an exercise program, you need to know about creatine. Many supplements touted over the years as performance enhancers have come and gone, but creatine is here to stay. We predict that it will be one of the most popular muscle-building nutrients ever made available to you. Why? Because it works. Yes, it *really* works.

What is Creatine?

When we told our friends that we were writing a book on creatine, some of them had quizzical responses. "You're writing on creating? Creating what?" "Is it an herb?" "A book on croutons. How interesting!"

Creatine is not an herb, mineral, vitamin, hormone, or steroid. It's not those bread cubes that you scatter over your salad, either. Creatine is a natural nutrient found in our bodies and the bodies of most animals. Approximately 95% of the body's creatine supply is found in the skeletal muscles. The remaining 5% is scattered throughout the rest of the body, with the highest concentrations in the heart, brain and testes. (Sperm is chock-full of creatine!)

The human body gets most of the creatine it needs from food or dietary supplements. Creatine is easily absorbed from the intestinal tract into the bloodstream. When dietary consumption is inadequate to meet the body's needs, a limited supply can be synthesized from the amino acids arginine, glycine and methionine. This creatine production occurs in the liver, pancreas and kidneys.

How Does Creatine Work?

Creatine is an essential player in the primary energy source used for muscle contraction. It exists in two different forms within the muscle fiber: as free (chemically-unbound) creatine and as creatine phosphate. This later form of creatine makes up two-thirds of the total creatine supply. When your muscles contract, the initial fuel for this movement is a compound called ATP. ATP provides its energy by releasing one of its phosphate molecules. It then becomes a different compound called ADP. Unfortunately, there is only enough ATP to provide energy for about 10 seconds, so for muscle contraction to continue, more ATP must be produced. Creatine phosphate comes to the rescue by giving up its phosphate molecule to ADP, recreating ATP. This ATP can then be "burned" again as fuel for more muscle contraction. (We'll discuss all this in greater detail in Chapter Six.)

The bottom line is that your ability to regenerate ATP depends on your supply of creatine. More creatine, more ATP remade, and more ability to train your muscles to their maximum potential. It's that simple. This greater ATP synthesis also keeps your body from relying on another energy system called glycolysis, which has lactic acid as a by-product. This lactic acid creates the burning sensation you feel during intense exercise. If the amount of acid becomes too great, muscle movement stops. But if you keep on using ATP because of all the creatine you have, you can minimize the amount of lactic acid produced and actually exercise longer and harder. This helps you gain strength, power and muscle size; and you won't get fatigued as easily.

Creatine has also been shown to enhance your body's ability to make proteins, especially the proteins within the muscle fibers. Two of these proteins, actin and myosin, are essential to all muscle contraction. So when you build up your supply of these contractile proteins, you actually increase your muscle's ability to perform physical work. And the more work you do (whether it's lifting weights or running 100-meter dashes), the stronger you become over time.

How Much Creatine Is In My Body?

The amount of creatine you have in your body depends mostly on the amount of muscle you have. (There is no creatine in body fat.) The average 70kg. (155 pound) person has a total of about 120 grams (4.2 ounces) of creatine in their body at any one time. Pound for pound, women may actually have somewhat more creatine than men. Vegetarians by and large have lower creatine levels than meat-eaters. The average sedentary person uses up about two grams of creatine per day (Walker, 1979). This creatine is broken down into a waste product called creatinine, which is collected by the kidneys and excreted in the urine. Athletes use up much more than two grams per day, with the exact amount depending on the type of sport, intensity level, and muscle mass.

Can I Get Enough Creatine From My Diet?

The average person consumes about one gram of creatine per day (Lykken, 1980).

Creatine is found in moderate amounts in most meats and fish, which are, after all, skeletal muscles. Good sources of dietary creatine include tuna, cod, salmon, herring, beef and pork. Tiny amounts are found in milk an even cranberries. While it would seem logical that chicken and turkey have creatine as well, we were unable to confirm this from the available research studies. Cooking destroys some or much of the creatine that exists in these foods.

An important thing to remember is that meats and fish contain a lot more than creatine. All animal flesh contains relatively high amounts of cholesterol. Most meats, especially beef and pork, also contain high quantities of fat. One kilogram (2.2 pounds) of raw round steak contains only four grams of creatine, but 119 grams of fat. Porterhouse steak has a bit less creatine, but 325 grams of fat per kilo! Needless to say, you won't live very long if you clog your arteries with the cholesterol from meat or even fish to get the amount of creatine you need to improve your strength and power. What you need is a non-fat, non-cholesterol supplement called creatine monohydrate.

Is Creatine Something New That Scientists Have Discovered?

While researching the scientific information published about this nutrient, we were surprised to learn that creatine was first discovered in 1832 by the French scientist Chevreul (Balsom, 1994). This was way before barbells were invented! Creatine was first found in meats, and later, in 1847, a sharp observer noticed that the meat from foxes killed in the wild had ten times as much creatine as the meat from inactive, domesticated foxes. He concluded that creatine accumulates in muscles as a consequence of physical activity.

In the early 20th century, it was discovered that not all of the creatine consumed by humans was excreted in the urine. This led to the recognition that creatine is, in fact, stored within the body. In 1912, researchers found that ingesting creatine can dramatically boost the creatine content of muscle. Then, in 1927, Fiske and Subbarow discovered creatine phosphate. That led to the realization that creatine is a key player in the metabolism of skeletal muscle.

Since then, there have been literally thousands of studies published on creatine. However, most of the studies focusing on creatine and sports performance have only been done since the early 1990's. It is these studies that we will focus on in this book.

Who Can Benefit From Creatine?

Although the research on creatine and exercise performance is relatively new, so far it appears that the greatest benefits occur in those sports which involve short, intense bursts of energy. That is because these sports rely most heavily on ATP as an energy source. Athletes in bodybuilding, powerlifting, sprinting, track and field events such as javelin and shot-put, wrestling, swimming, football, hockey, basketball, tennis and soccer would be most likely to improve their strength and sports performance with creatine. We doubt that creatine will be of any benefit for people who comfortably cruise on a cart around the golf course and occasionally get up to putt. Other sports where creatine is not likely to be of any significant benefit include baseball, archery, skeet shooting, and certainly billiards.

It is still unclear whether athletes involved in endurance activities such as long-distance running or bicycling will benefit from creatine supplementation. There have been anecdotal reports that people in these sports may benefit (Stroud, 1994), although other studies show that creatine either does not help or may actually hurt. The difficulty in these situations appears to center on the increased muscle mass which creatine provides. While that's great if you're a bodybuilder or wrestler, it can be a detriment if you have to carry all that weight around during a marathon or triathlon. It becomes a tradeoff between the increased strength you get from creatine and the increased muscle mass. Further research will provide us with more definitive answers as to what role creatine supplementation can play in endurance-type sports.

Is Creatine Safe?

Experiments with the administration of creatine to humans have been going on for over a century. Dr. Paul Balsom of the Karolinska Institute in Stockholm, Sweden, is one of the world's leading experts on creatine. He states in a review article published in 1994 in *Sports Medicine* that "to the best of our knowledge, the only documented adverse effect that has been associated with creatine supplementation is an increase in body mass."

We suspect that most athletes will gladly accept this "adverse effect."

One caution we'd like to make is that the studies which used high dosages of creatine, such as 20 grams per day, were only a month or less in duration. As a result, we do not have controlled, scientific studies which indicate exactly what happens to athletes taking large amounts of creatine for many months or even years. The only long-term study on creatine to date provided one gram per day to patients with gyrate atrophy, an eye disorder (Sipila, 1981). Creatine helped the condition. Therefore, we do not yet fully know the consequences of high dose, long-term supplementation.

As part of our research process for this book, we distributed a detailed survey to nine gyms and four track teams/clubs. Personal interviews with athletes who have used creatine for over a year did not show any long-term side effects which one would be concerned about. Nor is there a particular reason to think that there should be a problem, given the way in which creatine is synthesized and excreted from the body. The only short-term side effect mentioned was diarrhea, which some athletes said occurred when they took dosages greater than those recommended in this book. The diarrhea went away when the dosage was reduced.

Creatine has also been shown to enhance your body's ability to make proteins, especially the proteins within the muscle fibers.

Dave Tuttle, co-author of *Creatine: The Muscle Builder*, writes for Iron Man and Muscle and Fitness. His first book was *Forever Natural: How to Excel in Sports Drug Free*
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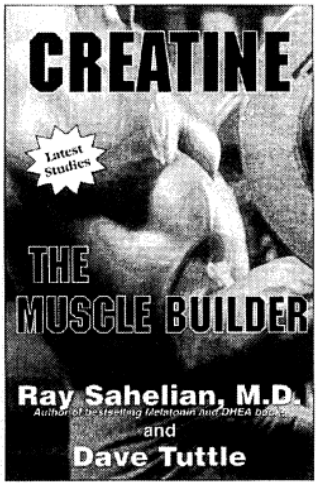
THE HOTTEST AND MOST CONTROVERSIAL HEALTH TOPICS OF THE '90S

BOOKS BY RAY SAHELIAN, M.D.



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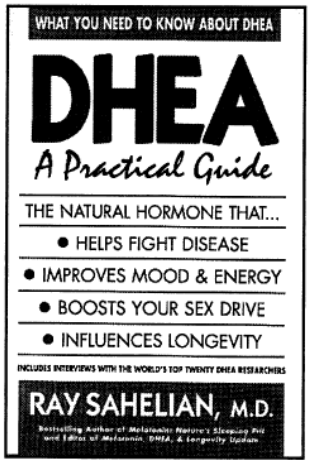

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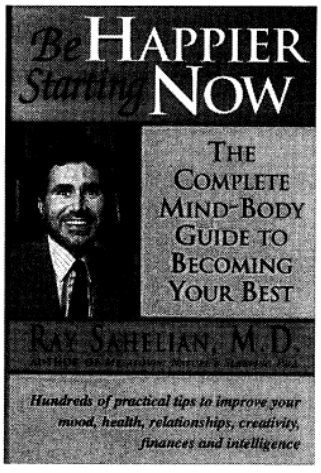

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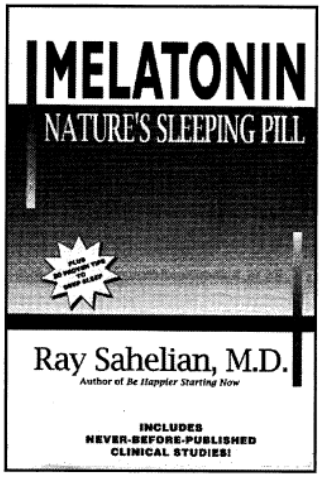

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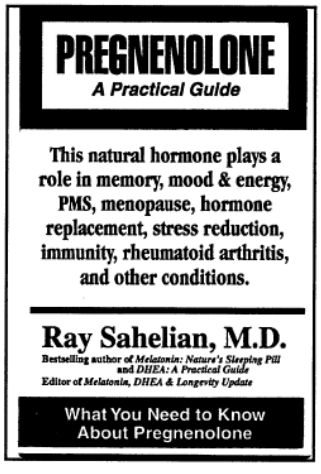

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FORESIGHT EXCHANGE

Comments: The (Idea Futures) market has moved to http://www.ideosphere.com/, where it is now known as the Foresight Exchange (FX), a name suggested by Sasha Chislenko. Bearish sentiment has set in on both the likelihood of near term e-cash and single stage to orbit (SSTO) technology. It seems that IF investors have determined that e-cash is another example of the information super-hypeway and that the evolution of SSTO from a skunkworks project to a mainstream government project does not ensure swift success. Duane Hewitt <duane@lucifer.com>

Symbol	Bid	Ask	Short Description	Change	Capitalization
$vIF	68	70	Real $ Ver. ofIF by 1.1.2000	+1	$4146
Cryo	9	11	Cryonics Catches On by 2000	0	$795
Canc	29	30	Cancer Cured by 2010	0	$6142
Cr56	80	84	56bitciphercracked<1998	-2	$2382
Cybo	39	41	Cyborgs by 2035/12/31	-1	$1653
Cash	25	50	E-Cash implemented before '97	-20	$12246
IDEA	20	22	IDEA cipher crackd by 2000	-3	$1148
Immo	20	23	Immortality by 2050	-7	$2734
Mars	41	45	Year of first foot on Mars	-1	$571
MLAW	4	8	Minimalist Legal System wins	-10	$402
Moon	47	50	Moonbase by 2025	-1	$3920
Spce	65	66	Private Space Exploitation	+1	$1757
SSTO	42	43	Single Stage to Orbit	-31	$3358
Stew	9	11	Nanotech Stewart platform	-4	$1368
surg	71	80	unnaural cosmetic surgery	+4	$1596
New MexIX	9	23	US restricts Melatonin by '97	N/A	$864

Prices are as of July 18th, 1996

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This is the four letter trading symbol that represents the claim. It is similar to the use of trading symbols in normal stock markets.

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This is the price (or percentage) that someone is willing to pay for YES coupons in the claim.

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Capitalization:
This represents the number of outstanding coupon pairs on a claim and is a measure of the interest and amount of disagreement there is on the claim.

SEE EXTROPY #16 FOR AN EXPLANATION OF THE IDEA FUTURES MARKET.

The Fourth Foresight Conference on Molecular Nanotechnology,

held in November of 1995, now exists
in the memories of those who attended and on the web at
http://nano.xerox.com/nanotech/nano4.html.

by Ralph Merkle

Nanotechnology is moving onto the WWW, and the Foresight conferences are no exception. Abstracts for the talks are available from the conference page, and many of the papers related to the talks themselves are already on the web. We're still collecting talks in digital form and putting them on the web as this is being written, and going through the refereeing process for publication in the special conference issue of Nanotechnology (which itself is moving onto the web).

One thing we've always been concerned about was the ability of attendees to network with each other. This time, we've put the attendees names, affiliations and e-mail addresses on the web; linked from the conference page. Conference talks are available both in audio tape and video tape and—yep, you guessed it—ordering information is available from the conference page. The concepts involved in molecular manufacturing often involve complex three dimensional shapes—and we've now got a few VRML models of structures from *Nanosystems* on the web, courtesy of Construct. Would you like to spin a Stewart platform around and look at it from different angles? Get a VRML-equipped browser, go to the conference page, and look for the VRML demo item. Not many people have used VRML yet, but its growth is expected to be meteoritic—a boon to nanotechnologists who want to describe complex three dimensional structures.

Stoddart

Perhaps the biggest surprise was the number of attendees. The trend of the earlier conferences was relatively modest growth: 100 or so for the first conference, then ~125, then ~150. We were projecting somewhere between 150 and 200. We got 300. While it's difficult to say exactly why this happened, a major cause is the sharply increased acceptance of the basic principles of molecular manufacturing. The idea that we can arrange and rearrange molecular structure in almost any way permitted by physical law, and do so inexpensively, is increasingly being viewed as a given. What was obvious to Feynman in 1959 is now being accepted by ever more people today—a mere 37 years later.

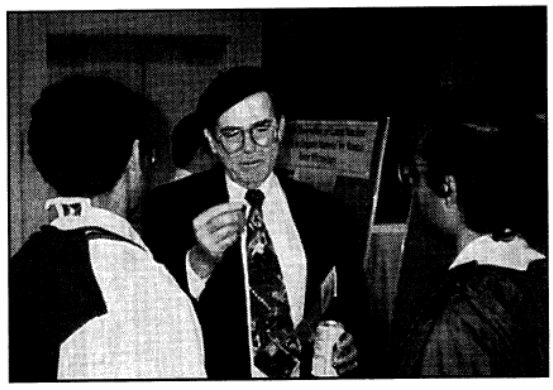
Seeman/Drexler

Handel

While a few skeptics on the fringe continue to say nanotechnology is impossible (though never any single skeptic for very long—someone usually explains to them exactly how far from reality they have strayed and we hear nothing further from *that* critic about how impossible the whole thing is...), the major questions have become the

Prize lunch

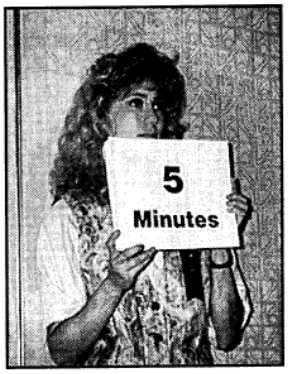
Smalley



Goddard

obvious: how do we do it? How long will it take? What approach should we pursue?

Self assembly? Scanning probe microscopy? AFM? STM? Theoretical work? Experimental work? Computational modeling? While there is a tendency for specialists to assume that their own field is, of course, the most important, it's really quite difficult to say which approaches will be fastest and which fields are the most critical. Right now, the answer is "All these fields are important."



Stephanie

That isn't to say that there isn't a great deal of confusion and misunderstanding floating around. There is. The most coherent and well thought out proposals for molecular manufacturing—indeed, the *only* coherent and well thought out proposals for molecular manufacturing—are based on the proposals by Drexler. And in all of those proposals, positional control and self replication play an important role.

Seeman

Researchers involved with chemistry, supra-molecular chemistry and self-assembly are still sometimes confused about positional control—the idea of actually *holding* a molecule is somehow taboo to some chemists—but this confusion is breaking down under the combined influence of both theoretical and experimental work that shows quite clearly that this is feasible. (Interestingly, the computational chemists seem to be least inhibited in their exploration of positional control. Perhaps this is because a computational chemist can model a positionally controlled reaction with the same or even greater ease than modeling molecules banging around at random).

The STM and AFM researchers have no problem with the idea of positional control — they view it as obvious and often can't see how any other approach could even be considered! But these artificial self-replicating systems... Maybe designing such systems is just too complex, too hard, and, well, maybe mere humans just weren't meant to do it. No matter that the entire planet is *covered* with self-replicating systems—they don't count! After all, the artificial self-replicating systems being proposed are *different*. Very non-biological. Very mechanical. Involving positional devices. Robotic arms grabbing molecules, synthesizing that ultimately non-biological stuff: diamond! How can we possibly argue that such artificial self-replicating systems are feasible just because the biological kind of systems exist?

Strictly speaking, we can't. The fact that a duck can fly is not, after all, proof that a 747 will be able to fly. Which is what makes the literature on artificial self-replicating systems (dating back to von Neumann in the 1940's) of such interest. Again, little by little, the obvious feasibility of self-replicating systems in general and the more recent work—mostly theoretical this time—showing that artificial self-replicating systems designed for manufacturing present no design challenges beyond our current design abilities, is slowly being accepted.

The picture that emerges is one of continued but gradually decreasing confusion. Which is, after all, what research is all about.

Postscript: for those who want a more detailed look at what was said and who said it—well, the conference web page is waiting!

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Extropy Institute (ExI) was incorporated in 1992 as an educational, tax-exempt organization. Like the Extropians e-mail list, ExI was an outgrowth of *Extropy* (founded in 1988 by Max More and Tom Morrow). We created ExI in order to provide a structure and network that would facilitate the spread and evolution of extropic ideas, values, and culture. Extropy Institute is the foremost organization developing and disseminating transhumanist ideas.

This organizational mission encompasses two aspects which together explain all our activities: (a) Within our existing Extropian culture refining and developing our ideas, working together to transform ourselves into "posthumans" and to evolve a radically new culture free of the irrationalities and limitations of the past. (b) To clearly and persuasively communicate our philosophy of life even to those who are not already attuned to the same ideas and attitudes, in order to influence the broader culture in more extropic directions.

ExI pursues these *transhumanist* goals in several ways. Complementing our primary publication, *Extropy,* is our members' newsletter, *Exponent. Exponent* carries shorter articles, membership information such as forthcoming meetings, reports on progress of projects, new media coverage, and discussion of organization questions.

We hold a variety of meetings, including Idea Forum discussion meetings and dinner gatherings, lunch meetings, and impromptu celebrations and outings with extropic themes. As membership grows, local events across the country and abroad are taking place. Spring '94 saw an important new development: EXTRO[1] heralded the start of a series of annual conferences where ideas can be explored in depth, and bounced off persons of many different specialities and perspectives.

The Extropy Institute Web site is now open (as of September '96) at:

http://www.extropy.org

Here you will find detailed information about Extropy Institute and transhumanist activities and ideas. Updates on 1997's EXTRO[3] conference will appear on the site. (See p.50 for more Web site info.)

As befits a transhumanist, high-tech subculture, supplementing printed publications and physical meetings is the on-line Extropian virtual community. The Extropian cyber-community continues to expand, encompassing the main Extropians e-mail list (now in its 4th year), the ExI Essay list, five local e-mail lists for arranging meetings, parties, and other joint activities, a newsgroup, and an Extropian presence on the World Wide Web. To join the main Extropians e-mail list, see page 6 for information. Our new web site adds greatly to ExI's online presence.

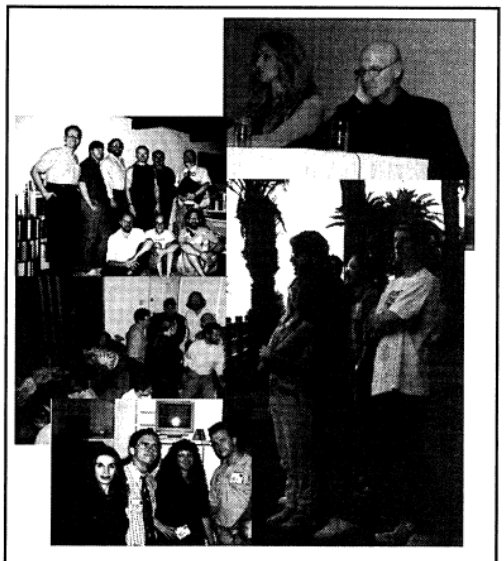
If this issue is your first real contact with extropian ideas, the short version of The Extropian Principles (p.48) will help clarify our shared values and goals. (The full text appeared in *Extropy* #11, and is on the web site.) The Principles is intended not as a detailed statement or final word on any topic, but as a codification of some of our shared attitudes.

Our second conference, EXTRO[2] brought together 133 extropically-oriented people for a weekend of intellectual stimulation, social interaction, and pure pleasure. Prof. Marvin Minsky gave the keynote address and the program was filled out by 12 other sessions. (See back cover for conference audio tapes can be ordered. EXTRO[3] is being planned for summer 1997.

INTERNATIONAL MOVEMENT

The Extropian movement, and the the transhumanist ideas it presents, is certainly not merely a "California Ideology" as one critic has dubbed it. Nationwide coverage of this rapdily growing movement has been increasingly matched by international interest.

Recent media interest has come from both BBC1 (the recent series *Future Fantastic*) and BBC 2 in the UK, CNBC in Canada, several magazines in Brazil, publications and TV crews in Belgium, a major book, Cyberland, in Germany, and magazines and TV in France, Chile, Australia, and



Clockwise from top: Fiorella Terenzi & Roy Walford at EXTRO[2]; Tanya Jones, Ralph Whelan, Rob Michels, & Abe Heward outside conference hotel; Nancie Clark, Mike, Regina Pancake, Keith at Siggraph; Eric Messick, Max More, Ray Sahelian, Marvin Minsky, Steve, at pre-conference reception; Ralph Merkle, Nick Szabo, David May, Max More, Hara Ra, Fred Moulton, Peter Voss, Peter McCluskey, Mark Miller at discussion meeting.

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For details of membership rates, see p.2,

"This is a philosophy of boundless expansion, of upward- and outwardness, of fantastic superabundance. It's a doctrine of self-transformation, of extremely advanced technology, and of dedicated, immovable optimism. Most of all, it's a philosophy of freedom from limitations of any kind."
Ed Regis, "Meet the Extropians", *Wired*, October 1994.

"Extropians remain die-hard rationalists, resistant to revealed truth of any kind, even if it's the truth of their own predictions... The Extropians' is a libertarianism of rare sophistication... [their] vision could turned out to be our best guide through the strange eons to follow."
Village Voice, December 1994.

elsewhere. Here in the US, recent coverage of the Extropian movement has been seen in the *Synthetic Pleasures* technodoc currently showing at theaters, CBS's *Mysteries of the Millennium*, the August debate on *Hotwired* web magazine, and in several books on technology, cyberculture, and the future.

THE FUTURE

Watch out for new projects and developments in the Extropian school of thought and the transhumanist movement. More frequent and detailed updates can be found in our members' newsletter, Exponent, and on our web site. We hope you will join us as an active participant in the Extropian movement. (See p.2 for membership information.) Help shape the future!

Upward and Outward!

Max More
President

EXTROPIAN PRINCIPLES v.2.5

(Full version in *Extropy* #11 and on Web site)

Coming soon: Version 3.0 will appear on the Extropy Institute web site: http://www.extropy.org

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Seeking more intelligence, wisdom, and effectiveness, an unlimited lifespan, and the removal of political, cultural, biological, and psychological limits to self-actualization and self-realization. Perpetually overcoming constraints on our progress and possibilities. Expanding into the universe and advancing without end.

2. Self-Transformation

Affirming continual moral, intellectual, and physical self-improvement, through reason and critical thinking, personal responsibility, and experimentation. Seeking biological and neurological augmentation.

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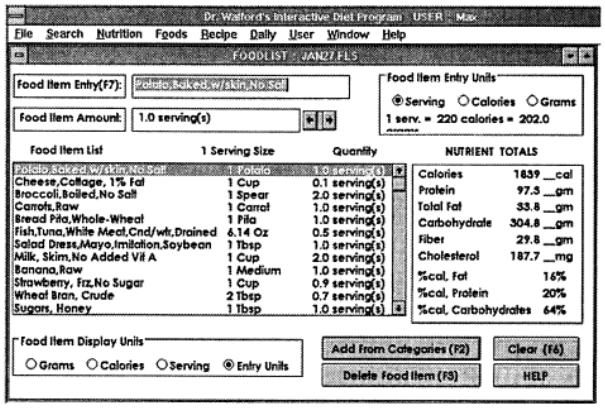
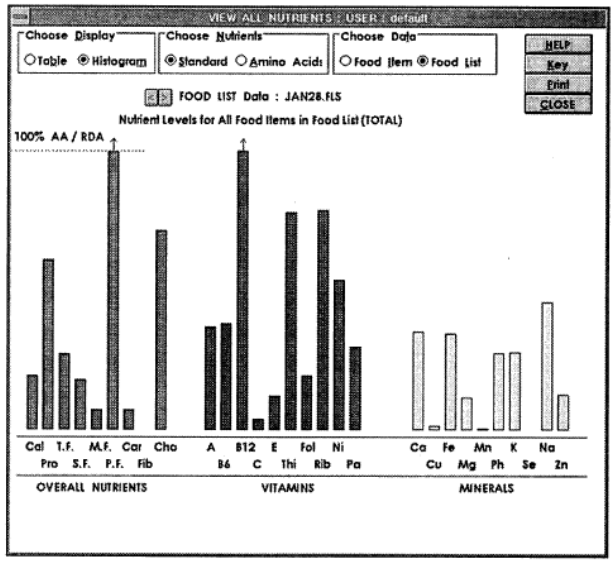
DR. WALFORD'S INTERACTIVE DIET PLANNER





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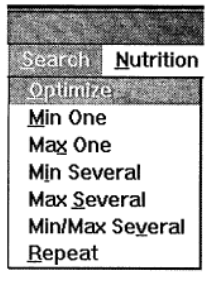

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Definitions: A handy lexicon of extropian terms.

Crucial extropian/transhumanist essays

The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain

Paul M. Churchland

MIT Press, 1995.
329pp, list price $29.95 ISBN 0-262-03224-4

Reviewed byGregory F. Sullivan

Aristotle suggested that the primary purpose of the brain was to temper the heat and seething of the heart, i.e., to cool the blood [1]. The baffling organ which inspired Aristotle's quirkily comical theory is at last yielding to a phalanx of new scientific and computational brain researchers. The philosopher Paul Churchland has written an intriguing and ambitious book in which he attempts to explain how the brain works and discusses the implications of this new understanding. His explanation of brain operation is primarily based on current research work in neural-network modeling.

One might criticize this approach by saying that the explanations proffered simply represent an incomplete snapshot of a still rapidly developing field, and therefore the approach provides a poor foundation for philosophical inquiry. However, Churchland contends that although many details of brain operation currently remain unclear, the main outlines are discernible even now. He summarizes his view as follows:

> In humans, and in animals generally, it is now modestly plain that the basic unit of cognition is the 'activation vector'. It is now fairly clear that the basic unit of computation is the 'vector-to-vector transformation'. And it is now evident that the basic unit of memory is the 'synaptic weight configuration'.

Although this summary description appears to be fairly technical, the book is aimed at a wide audience, and the concepts needed to understand the terms above are carefully and lucidly explained by Churchland. In addition, multiple well chosen and well motivated examples are used to illustrate the concepts. Overall, Churchland presents the powerful neural-network framework using an accessible and compelling style. Longtime *Extropy* readers will already have been exposed to parts of this framework by the series of articles on neurocomputation by Simon D. Levy.

Churchland is an impressive philosopher who clearly wishes to develop a philosophical perspective that is informed by the latest and best scientific thought. When studying consciousness and the brain he does not rely solely on introspection or oddly constructed puzzle-type problems. Instead, he reads the scientific literature and engages members of the community such as Francis Crick, Terry Sejnowski, Antonio Damasio, Hanna Damasio, and his wife Patricia Churchland. This approach allows Churchland to productively attempt to integrate insights from a large number of viewpoints including neurocomputation, neuropathology, neurophysiology, and neuroanatomy.

Churchland is an impressive philosopher who clearly wishes to develop a philosophical perspective that is informed by the latest and best scientific thought.

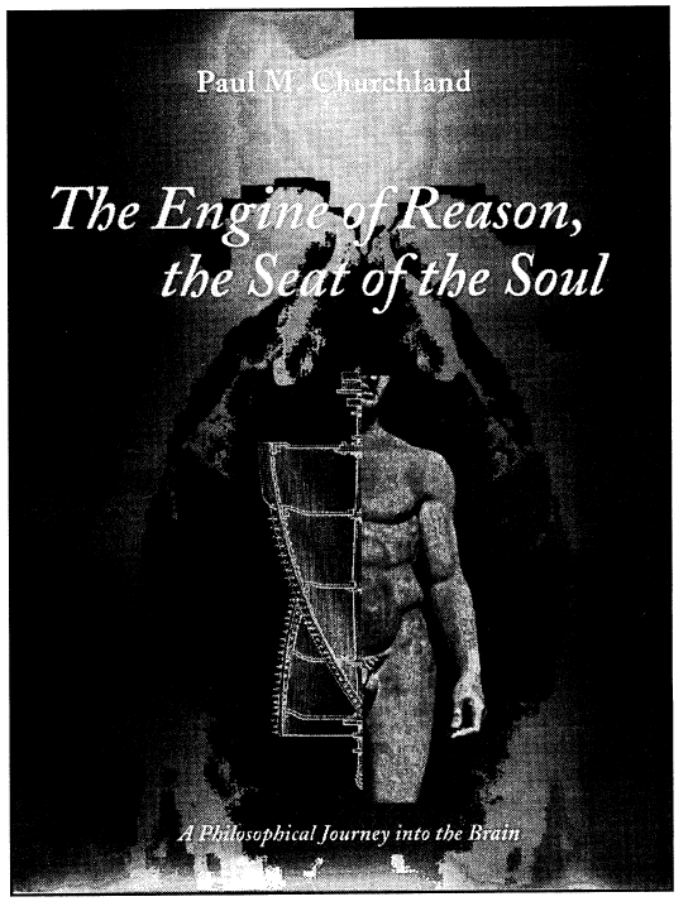
The reader should be aware, however, that some of the ideas about neural-networks expounded by Churchland face substantial criticism. Churchland discusses networks capable of performing well on a variety of tasks such as: mapping letter sequences to phoneme sequences, distinguishing between sonar echoes of mines and rocks, achieving face recognition, performing stereoscopic vision, carrying out

sensorimotor coordination, and performing grammatical discrimination. To accomplish these tasks a learning procedure called backpropagation is typically deployed to train the neural-network models. Churchland is forthright in this book about the problems of backpropagation, but his most trenchant critique appeared in an earlier work [2]:

> This learning procedure is highly effective, but it does have several severe shortcomings, both as an account of how biological brains learn, and even as a technology for training artificial nets. First, the requirement that the correct output be available to the learning network in every case is clearly unrealistic. After failing to solve a problem, real brains do not generally get to look at the correct answers at the back of the book. Second, the brain shows no plausible mechanisms for computing and distributing such globally informed adjustments to its myriad weights. And third, the backpropagation procedure scales upward to large networks only very poorly.

Why then use backpropagation? Can models which use it tell us much about the real brain? Many researchers argue that such models can illuminate brain function [3], but it is an area of controversy. It is also true that Churchland's overall viewpoint about brain operation which is sketched in the first excerpt above does not depend on any specific learning mechanism. Yet, the use of a demonstrably unrealistic training regimen for learning like backpropagation suggests that knowledge in the area is incomplete and immature.

The neural-network research area is a rich, complicated, and contentious area and Churchland arguably presents a deliberately simplified view. There are a wide variety of models including: Hopfield networks, Boltzmann machines, and Hebb rules that differ from the layered networks Churchland emphasizes. When Churchland discusses the change in synaptic connection strength as modeled by the modification of synaptic weights, he does not emphasize the fact that such modifications can occur for different periods of time. For example, post-tetanic potentiation (PTP) may endure for a minute or minutes; whereas, long-term potentiation may endure for a day or days. This variable duration is not represented in the models Churchland explores. Another simplification occurs regarding the complexities of neurotransmitter diffusion. Recent research suggests that the neurotransmitter nitric oxide effects the neural connections within an entire localized region of the brain not just within an individual neuron. Models which represent the topological relationships of connecting neurons, but which ignore the physical proximity of non-connecting neurons may be inadequate. In summary, some simplifications are unavoidable when developing models and time will tell which were wise and which were unwise.



One of the topics of the book I found most interesting was recurrent neural networks which are networks which can loop back upon themselves. Churchland believes that these networks are centrally important in processing temporally extended phenomena, causal phenomena, and ambiguous phenomena. Churchland also provocatively and controversially suggests that the flow of activity along one of these recurrent loops is fundamental to the manifestation of consciousness. In particular, the intralaminar nucleus sends long axons outward to all areas of the cerebral hemispheres. It also receives axonal projections returning from the lower neuronal layers of those same areas. The cortical neurons and their many interlayer connections form a large loop.

Churchland suggests that 'a cognitive representation is an element of your current consciousness if, but only if, it is a representation—an activation vector or sequence of vectors—within the broad recurrent system' identified above. He notes that the brain has many other representations, but states that they would not be part of your active consciousness. This is a fascinating conjecture which no doubt will be tested in the future.

One of the most exasperating parts of the book was the section containing the following paragraph:

> The processes taking place within a hardware neural network are typically nonalgorithmic, and they constitute the bulk of the computational activity going on inside our heads. They are nonalgorithmic in the blunt sense that they do not consist in a series of discrete physical states serially traversed under the instructions of a stored set of symbol-manipulating rules. Nor must all of them be usefully or relevantly approximatable by any physically real algorithmic mechanisms. Instead, they are analog processes, their elements and activities are real-valued, they unfold in parallel, and they unfold in accordance with natural laws rather than at the behest of stored rules.

This viewpoint allows Churchland to sidestep the arguments of those who question the capabilities of digital computers such as Ned Block, John Searle, and Roger Penrose by claiming that neural-network

models are 'nonalgorithmic' and therefore need not suffer from the supposed limitations of algorithmic models. I question Churchland's position because I believe that he is not properly comparing the computational powers of brains, neural-network models, and digital computers.

Let us first consider the so called 'analog' nature of neuronal processes. It is true that many neural-network models use real-valued parameters and real-valued functions. For example, a synaptic weight which models the 'strength' of a synaptic connection is typically a real number. But is this an essential part of the neural-network model and does it accurately reflect the behavior of actual neurons? Note that, an actual individual neuron can be thought of as a bag which contains a finite number of chemical constituents.

This bag is clearly subjected to perturbations in temperature and pressure. It is exposed to a changing mixture of chemicals that flow or diffuse through the brain. Blood pressure can change, and the mixture and concentrations of endocrine molecules that interact with receptors on the neuronal cell surface can fluctuate. Imagine a delicate brain computation that relies on the unbounded precision supposedly embodied in neurons. Would this computation 'malfunction' because an individual steps outside in cold weather and induces a minuscule variation in neuronal temperature? What if an individual climbs some stairs and induces a small variation in blood pressure? How is this supposed infinite precision physically encoded in a neuron?

There is an alternative viewpoint that holds that real numbers and infinite precision are not needed and are not realistic. Instead, finite precision and approximation is adequate. For example, Moravec suggests using 10 binary bits of precision per synapse weight [4]. Indeed, digital computations which usefully approximate the answers to real valued models have been performed for years by computer scientists. An entire field called Numerical Analysis is dedicated to solving problems which are expressed with real and complex numbers using finite precision computers.

Now, consider the parallel nature of neuronal processes. It is well known to computer scientists that a wide variety of parallel computing models can be simulated with serial computers. For example, a PRAM (parallel random access machine) machine can be simulated with a serial computation and a cellular automata can also be simulated. The principle neural-network model in the book is another example of a parallel model which can be approximately simulated using a serial computation. In fact, many of the numerous examples of neural-network applications which form a key part of Churchland's justification for taking neural networks seriously as a model for brain activity were actually simulated using conventional digital computers. The splendid results given for trained neural networks were not actually obtained for parallel analog neural networks they were for neural networks simulated using conventional computers.

Consider the assertion that the brain does not use a stored set of symbol-manipulating rules. This appears to be true, but does it mean that neural-network processes are nonalgorithmic? Note, the simulations mentioned immediately above certainly use a stored set of symbol-manipulating rules. I think Churchland is underestimating the power and flexibility of such systems. An orbiting planet does not use symbol-manipulating rules, but such rules can be used to approximate the orbit with great precision.

Churchland also provocatively and controversially suggests that the flow of activity along one of these recurrent loops is fundamental to the manifestation of consciousness.

Pragmatically, it may turn out that the best way to build a brain-like device involves using analog hardware components and a highly-parallel architecture. This strategy might yield the fastest brain-like device and speed is quite prized. The chess computer Deep Blue which recently played Gary Kasparov uses 256 digital processors running in parallel. But from a philosophical perspective this possible pragmatic fact does not engage the arguments of Ned Block, John Searle, and Roger Penrose. These philosophers do not argue that digital computers would yield excruciatingly slow forms of consciousness through simulation. Instead, they argue that consciousness is impossible to implement with a digital computer. I believe that they are wrong and I am disappointed that Churchland largely sidesteps their arguments using the poorly formulated argument outlined in the excerpt presented earlier. At this point, let me recommend the refreshingly different viewpoint of Ralph Merkle in his *Extropy* article on uploading consciousness from a brain to a computer [5].

In the latter sections of the book Churchland investigates the ramifications of his beliefs about brain function in a wide-ranging collection of areas including psychiatry, linguistics, artificial intelligence, and law. Much of this material is intriguing, provocative and worth reading. Here I will comment on one area in which I have some disagreements with Churchland, and in which the difficulties of applying knowledge about brain function become clear. Churchland suggests that the legal and scientific definition of human death should be refined as we learn more about brain operations and consciousness. While I agree with this sentiment I believe that the task is more complicated then Churchland apparently does.

Currently, most states in the U.S. have adopted a notion of 'brain death' in which an EEG (electroencephalograph) is used to determine if a cessation of brain activity has occurred. When an individual is declared brain dead efforts to maintain the body may be stopped and the body may be allowed to perish. Churchland believes that this is a humane policy, and he would like to see the notion of brain death expanded. For example, if an individual becomes comatose and medical investigation reveals that there has been 'massive cell destruction to the patients thalamus at the center of the brain, and in particular, to the intralaminar nucleus' then Churchland contends that 'the valued self is wholly and irretrievably lost.' Thus, even if the EEG shows some neural activity the body need not be maintained and should be allowed to perish. Another example in which an individual is 'irretrievably lost' according to Churchland occurs during the progression of Alzheimer's disease. This debilitating degenerative

disease causes networks of cells in the brain to be transformed into neuritic plaques and neurofibrillary tangles which are unable to carry on the tasks of the healthy cell networks.

My main objection to this line of reasoning is based on the recognition that a person who appears irretrievably lost using current scientific and technological capabilities may actually be retrievable using future capabilities. Imagine a patient in a coma with a brain lesion that prevents consciousness. Perhaps the lesion severs some neurons which are necessary for carrying signals in the recurrent network that Churchland postulates is necessary for consciousness. However, the lesion does not destroy major portions of the brain that encode the long-term memories of the patient. Imagine further that this patient would be able to survive in a coma for several additional years using current life-support technology. Is this patient irretrievably lost?

Future technology may allow extraordinary interventions. In *Extropy* #16 there is an interview [6] with Ted Berger, Professor of Biomedical Engineering and Neurobiology at the University of Southern California, who speculates on the future possibility of replacing parts of the brain that are damaged. The replacement would utilize computer chips and specially designed interface electrodes. Perhaps such a implant could revive a comatose patient, and allow that patient to access the still intact long-term memories.

In the cryonics literature the notion of 'information theoretic death' has been developed. An individual is dead only when 'the structures in the brain that encode memory and personality have been so disrupted that it is no longer possible in principle to restore them to an appropriate functional state' [7]. The phrase 'in principle' entails consideration of such speculative possibilities as the cryonic preservation of an individual, and the use of molecular nanotechnology to rebuild a brain or to extract information from a brain. If the notion of brain death evolves over time I think it should evolve toward the notion of information theoretic death [8][9].

In summation, Churchland's sharp intellect and fine expository style makes for exceptionally satisfying reading. The progress in brain theory recounted is exciting and compelling, and I look forward to Churchland's next report from the moving battleground of knowledge and thought.

The Six Pillars of Self-Esteem

by Nathaniel Branden

Bantam Books, New York, 1995

346 pages; $22.95 hd (also in pb) ISBN 0-553-09529-3

Reviewed by Peter Voss (p.voss@ix.netcom.com)

"Of all the judgments we pass in life, none is as important as the one we pass on ourselves"

The extropian value of self-transformation expresses in part our desire to improve our knowledge, cognitive ability, emotional well-being and general mental effectiveness—in short, our ability not just to cope with life, but to optimize it. In spite of an abundance of self-help books, there is a real shortage of practical, yet theoretically sound texts. *The Six Pillars of Self-Esteem* more than meets this challenge. It offers a rational, coherent theory of self-esteem while exploring implications in personal and family life, education, work, and society. Moreover, *Six Pillars* goes far beyond the theoretical framework. Practical examples and exercises make this book a most comprehensive tool not just for understanding self-esteem, but for improving it.

Branden starts the book with the essential task of defining self-esteem and contrasting his views from the muddle of various popular (mis-)conceptions of (pseudo-)self-esteem. His definition: "Self-esteem is the disposition to experience oneself as competent to cope with the basic challenges of life and as worthy of happiness". Self-esteem serves as the immune system of consciousness. Self-esteem is a deep personal conviction that we are, in spite of any specific limitations or hardships, fit for living—and flourishing. While self-esteem has always been an essential human need, modern life dramatically escalates its importance. Faced with a plethora of choices and an ever increasing rate of change, coping with the 'basic challenges of life' is anything but trivial and by no means automatic.

Self-esteem is our basic confidence that we are, in principle, able to cope with life. It is not concerned with any specific competence or skill that we may or may not have. Yet, clearly, this confidence cannot be divorced from actual ability. Branden resolves this paradox by equating improved self-esteem with establishing 'a good reputation' with ourselves. As we become more aware and increasingly act in accordance with our beliefs and goals, so we initiate a self-enhancing cycle of improved self-esteem—irrespective of how great or limited our specific skills may be. Self-esteem is how we judge ourselves—not against others—but by our own appropriate standards. The emerging science of psychology provides an additional string to our bow of life competency: improved knowledge of

[1] Aristotle, 'On the Parts of Animals', 350 B.C., translated by William Ogle. URL: http://nifty.bookstore.uidaho.edu/Philosophy/Aristotle/On_the_Parts_of_Animals/2.htm

[2] Paul M. Churchland, *A Neurocomputational Perspective*, MIT Press, Cambridge, 1989, pages 243-244.

[3] Patricia S. Churchland and Terrence J. Sejnowski, *The Computational Brain*, MIT Press, Cambridge, 1992, pages 130-137.

[4] Hans Moravec, *Mind Children*, Harvard University Press, Cambridge, 1988, page 61.

[5] Ralph C. Merkle, 'Uploading: Transferring Consciousness from Brain to Computer' *Extropy* #11, (2nd Half, 1993) pages 5-8.

[6] 'Building Brains: a profile interview with Ted Berger', *Extropy* #16 (1st Quarter 1996), pages 18-21.

[7] Ralph C. Merkle, 'The Molecular Repair of the Brain' *Cryonics*, Vol. 15 No's 1 and 2, January and April 1994. URL: http://merkle.com/merkleDir/techFeas.html.

[8] Max More, *The Diachronic Self: Identity, Continuity, Transformation*, Ph.D. Thesis, University of Southern California. URL: http://www.primenet.com/~maxmore/disscont.htm. This thesis provides many important and valuable insights. Chapter 2 is particularly relevant to the issues raised by the definition of 'death'.

[9] James J. Hughes, 'Brain Death and Technological Change', Second International Symposium on Brain Death, Havana Cuba, February 27-March 1. URL: http://ccme-mac4.bsd.uchicago.edu/CCMEFaculty/Hughes/Hughes.html authors homepage. Interesting perspective from a bioethicist.

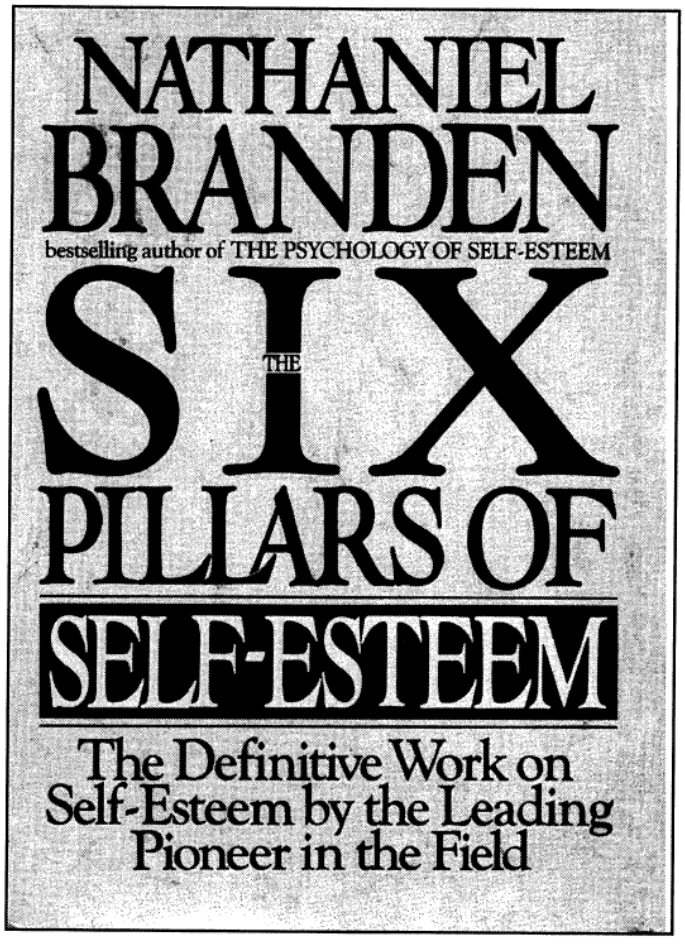
the human psyche together with techniques for mental and emotional self-transformation.

The second essential aspect of self-esteem identified by Branden—the need to feel worthy of our own happiness—is often ignored. It may either be disregarded for being too obvious, or opposed on philosophical grounds. While phrasing it more diplomatically, Branden shows how various cultural trends undermine self-esteem: Hip anti-material achievement 'drop-out' mentality, fashionable cynicism, pessimistic views of mankind, and the dominant socialist sentiment are inherently detrimental to the belief that we deserve the Good Life—that we owe it to ourselves.

"The value of self-esteem is not only that we *feel* better, but that we *live* better"

While the book thoroughly covers the definition and importance of self-esteem, its main focus is on improving one's self-esteem. Branden identifies six fundamental practices that have a reciprocal relationship with self-esteem—these practices foster self-esteem while at the same time being an expression of good self-esteem; a psychological integration of thought and action. The six pillars of self-esteem are the practices of: living consciously, self-acceptance, self-responsibility, self-assertiveness, living purposefully, and personal integrity. There is a fair amount of overlap between various of these practices—for example, self-acceptance is related to being conscious of one's own attributes—yet each one of them focuses on a crucial separate aspect of self-esteem. Branden highlights the inevitable link between self-esteem and ethics without getting bogged down in moral philosophy. His purpose is to concentrate on action (ie. practices) rather than theory, though recognizing that our actions are motivated by our beliefs. The six pillars are practical implications of the more fundamental moral virtues of rationality, honesty, integrity and productiveness.

Living consciously entails actively seeking out knowledge and truth—being aware of the world around me, my goals and feelings and their source. It involves dynamically reassessing myself, my knowledge and goals. Curiously, Branden does not specifically refer to awareness of other people's emotions and reactions, though this is implied in other parts of the book. The practice of self-acceptance includes two basic concepts: firstly a commitment to 'being a friend to myself' and secondly to acknowledge—not necessarily to approve—my own actions and attributes; especially character traits, emotions, beliefs, and habits. The propensity to seek truth about oneself is a prerequisite for motivating purposeful change. Self-responsibility acknowledges both freewill and cause-and-effect—the fact that we have choices and that our choices have consequences. The most basic responsibility we have is for our own well-being and happiness. Practicing self-assertiveness means honoring my wants, needs, and values. It is closely related to the sixth pillar—integrity—but focuses on the more basic aspect of *being comfortable with* having a 'right to exist' rather than *acting in accordance* with our beliefs and values. Identifying goals (and the actions needed to achieve them) is the foundation of living purposefully. Goal-inspired motivation will often be supplemented by self-discipline to actualize goals.



Self-esteem serves as the immune system of consciousness

My only substantive criticism of *The Six Pillars of Self-Esteem* is that little emphasis has been put on the importance and difficulty of defining meaningful goals. Passionate goals can serve as a most powerful motor to drive all six practices of self-esteem—from increased consciousness, to responsibility, to integrity—while giving us the purpose, courage, and enthusiasm to overcome obstacles. However, defining central personal goals is no trivial matter. Perhaps this issue is beyond the scope of self-esteem, though I doubt it.

Each of the six practices are covered from both theoretical and practical perspectives. Vignettes drawn from Branden's rich experience as therapist and from his self-esteem seminars plus candid personal examples serve to concretize concepts. Relevant sentence-completion exercises offer the reader effective tools for self-evaluation and self-transformation. An appendix contains an additional 31 week sentence-completion program. While the book offers inspiration and invaluable aids to improving our lives, it is still up to us to find (or will) the fundamental love of life needed to give us the strength and courage to overcome the laziness and fear that often threaten our growth.

"Low self-esteem dreads the unknown and unfamiliar, high self-es-

teem seeks new frontiers"

I was thrilled about Branden's return to philosophical roots he planted in *The Psychology of Self-Esteem* 25 years ago. *Six Pillars* tackles many controversial philosophical, ethical, socio-political aspects and implications of self-esteem in a most skillful and tactful manner. However, it will undoubtedly offend some religious people and various collectivists. In the third part of the book Branden explores nurturing self-esteem in children (at home and at school), the role of self-esteem at the workplace (including management styles and future employment challenges) and self-esteem in psychotherapy. He politely but forcefully exposes the flaws and dangers in the popular view held by many leading psychologists and educators that self-esteem is primarily an externally generated or social phenomenon. Branden identifies this as pseudo self-esteem.

The final section is the most philosophical and covers the relationship between self-esteem and culture. It specifically denounces relativistic and subjective views of the nature and value of self-esteem—a common approach in today's 'politically correct' multi-cultural, non-judgmental atmosphere. Branden touches on various historic and present cultures and religions identifying their inherent support or opposition to specific aspects of self-esteem and consequences of those beliefs. Extropianism wasn't evaluated, but I guess its principles would rate highly pro self-esteem.

Six Pillars is well-written, organized, and referenced and makes for easy reading—though not necessarily for easy execution of advice. Acquiring and improving the six habits of self-esteem will take substantial motivation and self-discipline. Positive results, while inevitable, may be too slow for the impatient. This book is no general quick fix, though it can provide immediate life-changing insights. The book is by no means limited to self-esteem basket cases. Indeed, medium to high self-esteem individuals are likely to benefit substantially from it by their ability to assess themselves more objectively and from better discipline to do the exercises. I highly recommend this book—especially as a reference book that is regularly reviewed. As futurists we are particularly attuned to the dynamics of life and eagerly seek great tools like T*he Six Pillars of Self-Esteem* to help us optimize surfing the Future-Shock Wave.

Why Government Doesn't Work

Harry Browne

St. Martin's Press: New York, 1995
ISBN 0-312-13623-4

Reviewed by Eric Watt Forste

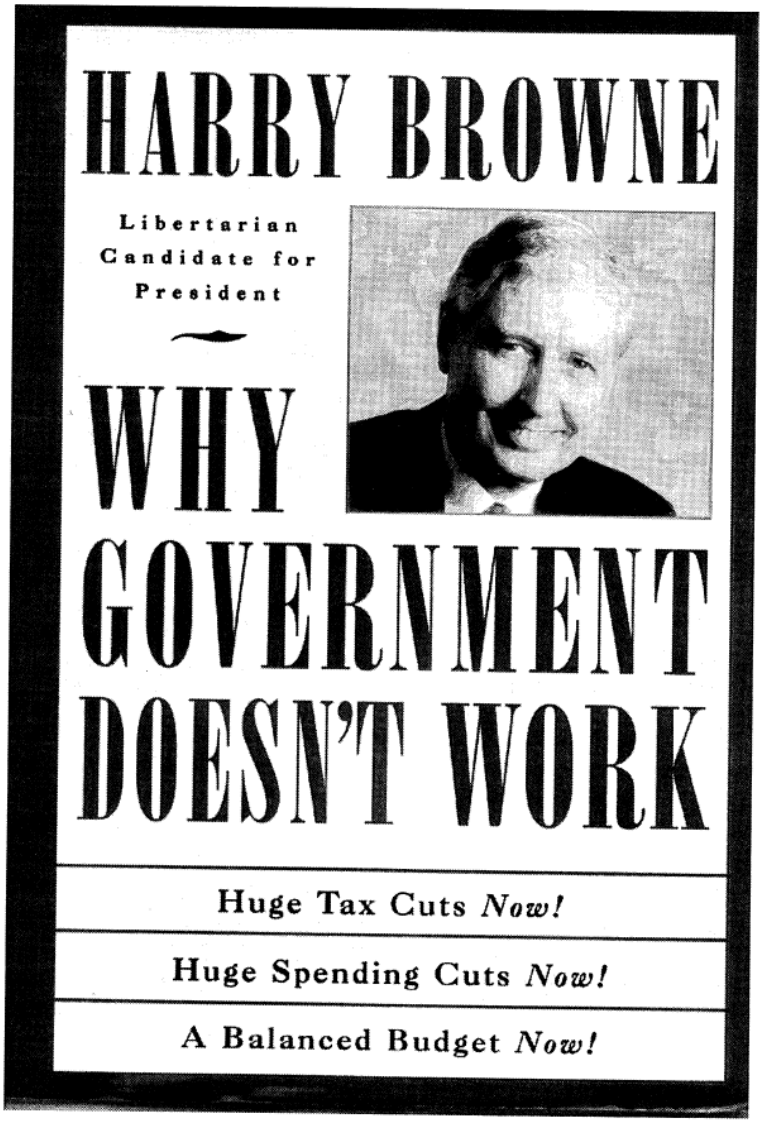
Ah, it's 1996, and in the United States yet another libertarian presidential candidate has written yet another campaign book. But this one surpasses the previous examples of this genre in style, taste, and feeling: whether or not it will surpass them in political effectiveness remains to be seen.

Part One, which bears the same title as the whole book, begins with several chapters stating and restating various economic and ethical arguments against the use of coercion to redistribute resources. The arguments, which are simple and familiar to most readers of *Extropy*, are restated in a variety of perspectives and nomenclatures, and are illustrated with examples taken from the histories of various US Federal government programs in the twentieth century. Those very familiar with these arguments may feel that Browne is repeating himself, but such repetition is necessary to persuade those who are unfamiliar with these ideas, and the effort to present the repetitions as wholly different perspectives on the same problem is well thought through.

Part One continues by arguing that the "Founding Fathers" had an accurate general understanding of the ills of legitimized coercion, derived from the seventeenth-century struggle between the (at the time, relatively libertarian) English Parliament and the absolutist Stuart kings. Like Hayek, Browne understands the American Revolution to be a (classical) liberal resistance to the emergence of governmental absolutism within the ranks of Parliament itself. Browne asserts that the authors of the American Constitution deliberately restricted most governmental powers to the States because they understood that the Federal guarantees of free trade and migration among the States would punish those States whose governments preferred authoritarian policies. The "brain drain" from Europe to the United States during the mid twentieth century illustrates something of the phenomenon invoked. This is why Browne feels that he can mount an effective campaign for liberty from the single Federal office of President; if he can effectively restrain Federal powers, market forces unleashed by freedom of trade and migration among the states of the US will probably keep the local governments in line.

Part One closes with a historical summary of the slipping away of American liberties. He chronicles this in a succession of four major periods of unconstitutional growth in the power of the Federal government: the Civil War, the "Progressive" Era, the New Deal, and the Great Society (which Browne dates from 1961 to 1975). I could find no false assertions of fact in Browne's historical summary, and the simplicity, calmness, and clarity with which Browne makes and defends controversial historical assertions impressed me. (And yes, the book does list reference materials used for evidence, chapter by chapter, in an appendix.) Finally, Browne presents an overview of the state of the people's liberties and the Federal government's power in the present day, leading into his program statement.

Part Two, "Solving Today's Social & Political Problems," contains few surprises for most libertarians. It is tailored to the office for which Browne is running: Federal President. His answer to most social and political problems is to cut federal spending, cut federal taxes, and let either the state governments or the people acting through voluntary association or both act to solve the problem. Browne devotes two chapters each to health care and national defense and one chapter each to education, welfare, social security, crime, regulation, and "family values" (the last is devoted to arguing for a separation between legislation and mo-



rality, asserting that the rollback in traditional American morality is largely due to the catastrophic failure of several Federal programs that attempted to codify and enforce moral standards).

From my personal viewpoint, the most moving and reassuring words in Browne's entire book were in a section called "What is War?" toward the end of his first chapter on national defense. The length allotted for this review forbids my quoting this compassionate denunciation and repudiation of the "glory" of war, but it is a beauty.

Summing Up

The book is more than anything else an assertion and an example of Browne's thesis that success in democratic elections need not be incompatible with correct political principles. While he takes care throughout the book to make his arguments and examples comprehensible even to those who have adopted wholesale the political principles of their parents without reflection, he never quite stoops to dishonesty, intellectual sloppiness, or demagoguery. Even those who are ardently seeking evidence of demagoguery in the pages of this book will find their arguments strained. When the majority of the American people have a deep emotional attachment to a document like the Constitution which is clearly better than the political system under which we are now living, Browne takes advantage of that emotional attachment. But it seems clear to me that he is trying to take advantage of emotional attachments in order to further the political principles that he has deeply studied and sincerely believes are correct, and not to further his own political career. Most libertarians will be naturally and deeply suspicious of any politician: this is the emotional contradiction that has long hindered the Libertarian Party. Browne, more than anyone I know of in the generation in which the Party has existed, is aiming squarely at this difficulty in the hopes of dissolving it.

The old truism that you can't please everyone certainly applies here. Libertarians do not fit within the one-dimensional political spectrum of liberal vs. conservative, but they include many people of conservative temperament and many people (such as myself) of liberal temperament. There are many issues on which US libertarians disagree in the particulars but do agree on the fundamental political point: it is no business of the Federal government's. These issues are familiar and need not be listed here. An aspect of Browne's book that will trouble many people is that Browne adopts rhetoric with regard to each of these issues that is calculated with an eye toward political success. But nowhere is his principled insistence that the Federal government should play no role in the decision of these issues shaken. Browne understands that this insistence is what is fundamental for the particular task he is undertaking (running for US Federal president), and is therefore unafraid to use rhetoric that may be more appealing to people conservative by temperament here, or rhetoric that may be more appealing to people liberal by temperament there. He knows that these usages do not compromise his principles, given the specific task he has in mind.

Overall, given my understanding of Browne's goals, the book is remarkably effective. It reflects a deep understanding of the political principles which unite today's libertarians in the United States, and it does not betray or compromise them. It is written at a level of sophistication easily accessible to most voters in the United States today. It focuses relentlessly on the application of these principles to the office of President of the United States and its legal powers. It presents a clear political choice, and sets forth the reasons for making this choice remarkably well. It even reaches into the wellsprings of emotional attachment which have done so much to preserve the political principles of liberty in the United States, without ever losing touch with the intellectual integrity that was responsible for the discovery of those principles in the first place. Though I can easily find fault with this book, I am all too aware that I have difficulty imagining a book that would be free of those faults I can find, or equal ones. Failure of imagination never constitutes an argument, but Browne's book is full of good arguments, and the review need not repeat them all.

Creatine

The Muscle Builder

Ray Sahelian, M.D. & Dave Tuttle

128 pages, $9.95

Reviewed by Max More

Extropians seek to become smarter, wiser, and more vital. Many of us focus on the intellectual aspects of overcoming our limits. Some of us have also a strong interest in overcoming our physical limits: we want to become stronger, fitter, more robust, either to improve our survival chances or to enable us to enhance our performance and our enjoyment of our bodies.

Creatine appears to be one of the very few true performance enhancers currently available that doesn't come with the penalties associated with anabolic steroids. Even if you're not interested in increasing your physical power, you should take a look at creatine, especially if you're at risk for heart disease. Studies have shown a significant reduction in total cholesterol levels in those taking creatine for 56 days. The reductions lasted for four weeks after discontinuing supplementation. Even better, were results for triglycerides (fatty acids) and very-low-density lipoproteins: "Levels of these blood components dropped by 23 percent after four weeks of creatine supplementation and remained 26 percent below their original levels four weeks after the test subjects were taken off creatine."

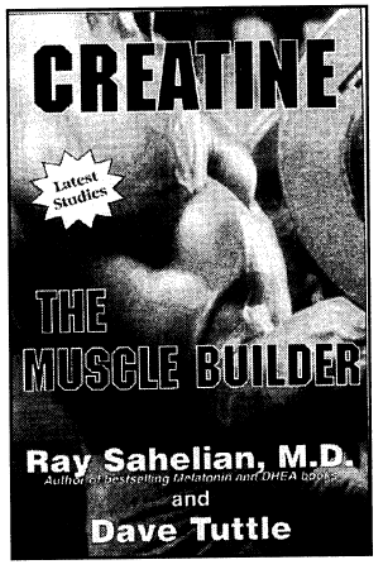
Creatine promotes physical power. For endurance athletes it has limited appeal, having little or no effect on the ability to perform lasting activity. For explosive, power-using sports and activities, creatine is ideal. It can improve capabilities in bodybuilding, powerlifting, sprinting, throwing, track and field events, swimming, soccer, and the martial arts. In sports like basketball, where considerably endurance is called upon, creatine still provides major benefits when it comes to the need for sudden, explosive movements.

Dramatic claims have been made for numerous "ergogenic" aids, but few of them have any real scientific backing. Creatine, by contrast, clearly works. It helps build power and strength. It's a crucial component of one of the muscular system's three energy pathways. While playing a lesser role in glycolysis, and no role in aerobic energy metabolism, creatine forms a core part of the ATP-CP (adenosine triphosphate, creatine phosphate) system. My personal experience reinforces the assurances of the studies: In 8 weeks I gained 10lbs while continuing my high-intensity, relatively short-duration weight-training program. Some of this no doubt was increased intracellular water (one effect of creatine), but the simultaneous increase in strength demonstrates that I made real gains. For instance, my leg press went from 580lbs to 650lbs, while my barbell biceps curl weight went from 90lbs to 110lbs.

Dramatic claims have been made for numerous "ergogenic" aids, but few of them have any real scientific backing. Creatine, by contrast, clearly works. It helps build power and strength.

Sahelian and Tuttle's book is presented in a pleasingly accessible style. *Creatine* combines conciseness with highly practical and densely packed information. This short book includes a muscle physiology primer, information on loading and maintenance doses and on how to take creatine, scientific studies, anecdotes from users, survey results, and an interview with a creatine expert researchers. The book concludes most helpfully with "Top Ten Things to Know About Creatine."

If you enjoy physical activities involving explosive, powerful motions, you will find *Creatine: The Muscle Builder* an excellent source of information on a supplement that really works. Of course, anabolic steroids really work too. (Some medical "authorities" claim otherwise. Please! I live down a mile from Gold's Gym. Don't tell me those people got that big simply through training and good genetics!) But steroids are expensive and risky. Creatine yields significant results even while promoting good health.



For other books by Ray Sahelian, including first chapters of each, see: http://www.primenet.com/~sahelian

Out of Control:
The Rise of Neo-Biological Civilization

by Kevin Kelly

Addison-Wesley Publishing Company, 1994
521 pages, $28, ISBN: 0-201-57793-3

Reviewed by Anders Sandberg

A William Patrick Book
Publication Date: June 21, 1994
Price: $ 28.00/hardcover/527 pages
ISBN 0-201-57793-3

Networks of the world, unite!

A specter is haunting the world—the specter of complexity. Some lament it and long for the good old days when everything was linear and predictable, others enthusiastically proclaim the new age of the Net and want to surf the chaos. Kevin Kelly clearly belongs in the latter group with his much hyped book *Out of Control*; a reviewer in the Swedish magazine *Fri Teknik* even went so far to call the book the *Das Kapital* of the 21st century.

Kelly's book covers a tremendous range of subjects, from ecology and genetics over artificial life and evolutionary theory to virtual reality, cybernetics and digital cash, linked together in the same nonlinear networked way that Kelly sees as the symbol of the new age. One is reminded of the hypertextlike structure of Marvin Minsky's *The Society of Mind* where each chapter in some sense is independent of the others and still linked to many of them; the real subject emerges from the parts (see? the buzzwords are catching).

The central theme of *Out of Control* relates how we are moving towards a technology, economy, and society dominated by *vivisystems*—networked, complex, lifelike systems where strict control and predictability are sacrificed for flexibility, robustness and decentralization. Kelly finds examples of this tendency in many places: in the growth of the Internet, in the theory of genetic algorithms, neural nets, subsumption architectures in robotics, artificial life, and digital cash. As he writes on page 1: "The realm of the *born*—all that is nature—and the realm of the *made*—all that is humanly constructed—are becoming one. Machines are becoming biological and the biological is becoming engineered."

The main problem with the design of large systems is that they easily become unstable and brittle. So far we have built devices, programs and systems attempting to make them as specific and simple as possible, since we need to keep their complexity manageable. As systems grow larger, we have to modularize them to keep up with the growing complexity, but at the same time the probability of bugs increases, and even the most modular program will become unstable due to bugs and logical errors. The larger the system, the more brittle and unstable it becomes. But we need large systems and depend on them:

For more than a decade, the FAA has been working to replace this antiquated system. Sadly, the alternative, the Advanced Automation System with its million-plus lines of code written since the early 1980s, is riddled with bugs. And six years late. Computer scientists from two leading universities have had to comb through it to see if any code is salvageable. Faced with software that's too unreliable to trust in life-and-death situations, the FAA must rely instead on its old and collapsing (but well understood) air-traffic-control system.
(From the December 1995 issue of BYTE magazine)

What Kelly (and others) propose as a solution is to let go. Instead of trying to understand the entire system and *build* it as a whole, let it start as simple units and *grow* itself into a whole.

Here is the generic recipe for distributed control that Brook's mobot lab developed. It can be applied to most creations:

1) Do simple things first.
2) Learn to do the flawlessly.
3) Add new layers of activity over the results of the simple tasks.
4) Don't change the simple things.
5) Make the new layer work as flawlessly as the simple.
6) Repeat, ad infinitum.

This is not as revolutionary as it may seem, the bottom-up programming paradigm has been taught in introductory computer science courses for years. But Kelly acknowledges something important: as systems become complex they *will* exhibit new and unexpected emergent behaviors, it cannot be avoided so we will have to live with it. "The old cameras were easy to fail, and easy to repair. The new cameras fail creatively."

A more far reaching vision involves the widespread use of evolutionary algorithms to create complex systems. Instead of trying to come up with simple units that

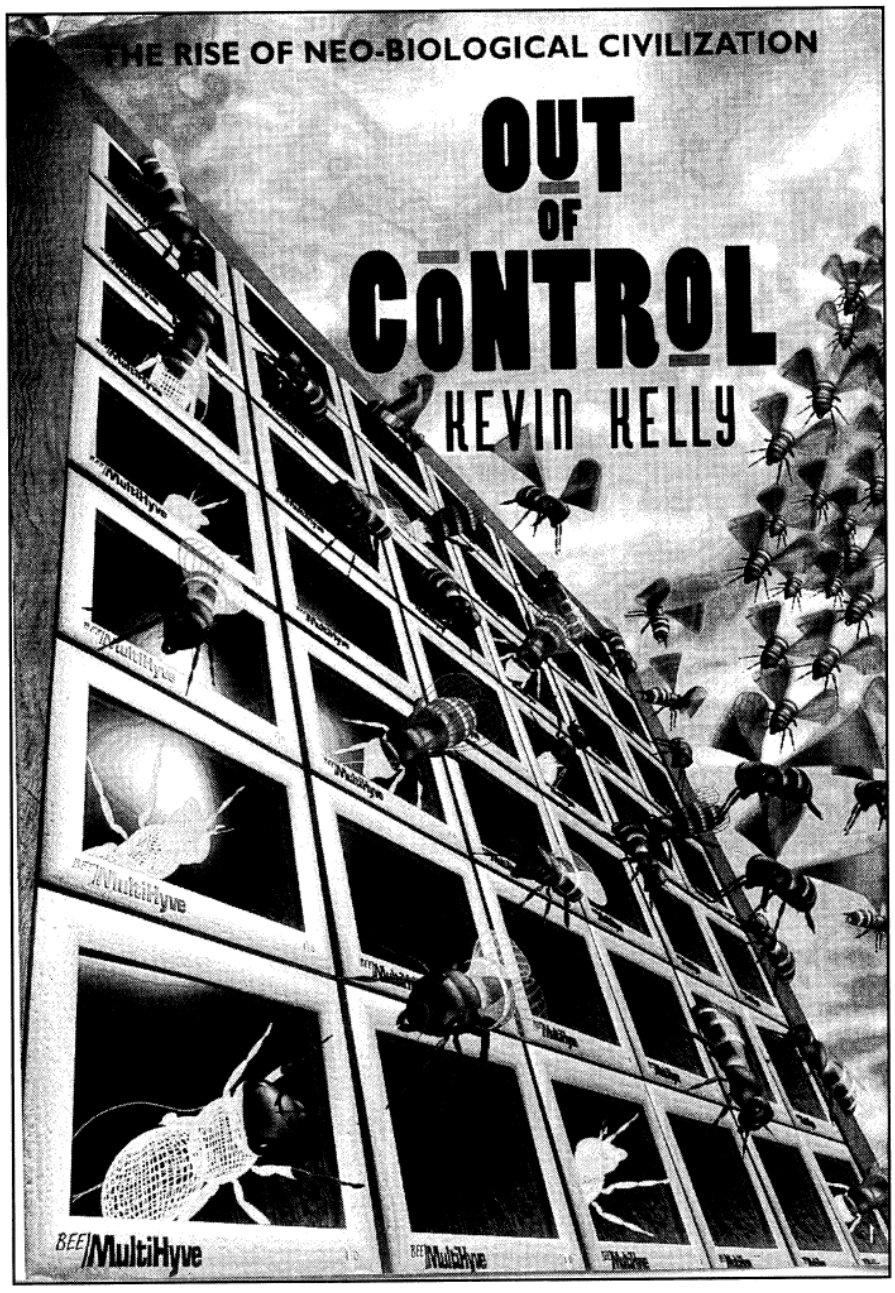
will seed a desired behavior, the entire system could be evolved using genetic algorithms. The result would be utterly messy but flexible and (hopefully) robust systems. But as everyone involved in artificial life knows, making the system do what you want is simple, the hard part is avoiding having it do what you *don't* want.

This brings up the important difference between the "atomic" view of things (essentially a product of the industrial revolution) and the "net" view Kelly espouses. Future historians may regard the twentieth century as the century of control: from the beginning we have been seeking more control over everything, learning how control systems work and how they might be applied in all situations. But control also leads to rigidity and brittleness, since many things cannot be controlled ("It is, by the definition of the word, impossible to prepare for the unexpected!").

As an alternative, Kelly proposes life-like adaptation and evolution: if something works, use it even if it is inefficient. If something doesn't work, change or adapt it and see what happens. In an isolated system this approach would be disastrous since it might spend forever seeking a solution, but in a large network it might work; the various agents all seek their own solutions and adapt to each other, and when a sufficiently good or stable solution has been found it quickly spreads. The stability of ecosystems and success of genetic algorithms testifies to the power of this approach, and I have no doubt extropians see the application to the market.

Kelly outlines the fascinating properties of vivisystems by looking at many examples, such as restoration of the prairie ecosystem, building closed ecosystems (from brine shrimps and algae in a glass globe to Biosphere II), genetic algorithms, and industrial ecology. Each chapter looks at another kind of complex system, trying to link it to the main theme.

I find two strange omissions in this respect. The mind seems to be perhaps both the most complex and networked system we have encountered so far. Strangely, Kelly does not mention it much. Kelly's other omission is that he really only looks at the first half of his program: "Machines are becoming biological and the biological is becoming engineered."



He does not particularly deal with biotechnology or how we are learning to integrate life with technology in the more literal sense. Of course, neither are absolutely necessary for Kelly's case, and the book may have been twice as long if they had been included. As it is, *Out of Control* suffers a bit from lack of focus, although shortening such a broad book might have made it too dense to read.

In addition to the main theme Kelly also outlines an even more ambitious quest: to understand and control complexity itself. Kelly believes in some general rules of complexity, and he tries to formulate some of them in the final chapter, hubristically named "The Nine Laws of God". At the same time clearly we are far from understanding complexity judging from the list of unsolved questions he asks in the penultimate chapter, which are probably more powerful than the rather vague laws/heuristics of God.

The book is not a scientific monograph, but it is not popular science either. It is maybe best seen as a reportage from the cutting edge of complexity, where Kelly tries to divine the future directions of change and synthesize some kind of picture of what is happening. It is not impartial (for example, he appears uncritically positive about the Biosphere

II project) or all-inclusive, but that does not seem to be its goal. Kelly appears to be more interested in sharing his enthusiasm (it is very catching) and fascination for the various subjects with the reader.

The most readable chapters are those describing concrete phenomena or organizations, such as the chapters about ecological restoration, the Biosphere II project, Survival Research Laboratories and digital cash. When Kelly turns to the more abstract or esoteric problems of complexity, neodarwinism and artificial life he tends to become philosophical, with a tendency for mysticism. The chapter about how evolution may evolve suffers from a tendency to anthropomorphize evolution itself, but is also one of the most stimulating from a transhuman point of view:

Organisms, memes, biomes—the whole ball of wax—is only evolution's way to keep evolving. What evolution really wants—that is, where it is headed—is to uncover (or create) a mechanism that will most quickly uncover (or create) possible forms, things, ideas, processes in the universe. Its ultimate goal is not only to create forms, things, and ideas, but to create new ways in which new things are found or created. Hyperevolution does this by bootstrapping itself into a layered strategy that continually increases its reach, continually creates new libraries of possible places to explore, and continually searches for better, more creative ways to create.

Kelly might not have a messiah complex, but he probably wouldn't mind being a prophet. His style tends towards aphorism, which creates many quotable sentences like

"As computers become assistants, toasters become pets."

"It seems to be an universal property of life that all successful systems attract parasites."

"IBM and E. Coli both see the world in the same way."

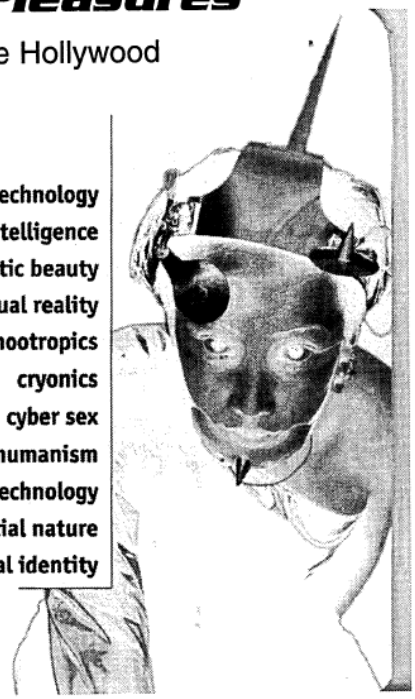
"A system is anything that talks to itself"

I have little doubt that many of his aphorisms will become used for a long time. Unfortunately many of them just sound wise, being really semantically empty or just elaborating on simple facts, like the last example. That does of course not lessen their memetic impact.

Hype aside, I found *Out of Control* readable and inspirational, a book that gives a grand vision of a very different future. Its real strength lies in that it covers so much ground while trying to link it together into some kind of wholeness. It might not succeed perfectly, but is certain to expand the mental network of the reader.

Synthetic Pleasures

Reviewed by Susie Hollywood



Synthetic Pleasures documents an underground world of physical and mental piercing and an above-ground panoply of technological wonderments.

Exhibited for the first time at the Toronto Film Festival in 1995 and in competition at Sundance in 1996, its screening list of festivals is too lengthy and impressive to roster. *Synthetic Pleasures*, through its own distribution company, Caipirinha Productions, has sought theatrical distribution. It's running in over 100 cities in USA, and foreign distribution will cover Canada, Germany, Switzerland, UK, Germany and France.

Synthetic Pleasures is the epitome of a documentary. This non-fiction film depicts real-life situations with individuals describing introspection, conscience, and wisdom about technology and the future. The unrehearsed manner comes across with ease and only during the repeated interviews with the piercers and street sages do we start to feel imposed upon.

A downside of the film is sitting through frame after frame of transexuals and piercers philosophizing off the top about the future. This might have been a marketing gimmick for the producer, but the weak content distracts from the film.

Many of the interviews do have merit. Cyber-celebrities such as Timothy Leary, Max More, Harold Rheingold, and John Perry Barlow offer in-depth projections of how technology will modify society. Their skillful erudition gives the film some tangible substance, enough to have kept me interested and enthusiastic about what future technologies have in store for our culture.

Director Iara Lee transforms a series of collage-type images and talking head sequences into a viable documentation of an emerging culture. Initially, the project grew out of a short film on technologically controlled environments; but later Iara decided to develop the project into a feature techno-doc. "We decided to expand the project and make it into a full length film on how we use technology to control the environment, body, and mind." It's an independent non-union film, privately funded, about $1M or so to make.

The overall filmic quality of the documentary looks like a collage of high-8 video images with alluring filters, SF clips, 50's cartoons, designer graphics and stylized computer animation edited together. Nice. The visual impression parallels the storyline. We are in the midst of creating our realities. We are the voyeurs of our dreams and the technologists making them come alive. Some of it rough around the edges, some of it highly refined. Nonetheless, we are on our way to combining the artificial and the sacred natural.

For the film-viewing crowd that has never been on the Internet, Rave, Melrose Avenue, SoHo, or even Prague, *Synthetic Pleasures* will be an spine tingling, silver-tongued and unforgettable experience. For those of us Extropian transhumans whose minds are far beyond introductions to technological enhancements and augmentations, we might blink an eye.

Regardless, *Synthetic Pleasures* touches on some profound and evoking data. There is something wonderfully exciting about skiing down a human-made slope, swimming in an electronic ocean, automorphing our bodies and brains. Aside from a few glitches in the techno-doc, *Synthetic Pleasures* does a impressive job at marketing. The producers have created quite a spin off of ideas presented in the film: CDs, fashion and books. What's next? Iara says, "... the next step would be to own a movie theater ..." With the type of focus Lee has demonstrated, I wouldn't be surprised. Check out: http://www.syntheticpleasures.com

BOOK NOTES

Unrugged Individualism: The Selfish Basis of Benevolence

by David Kelley
Institute for Objectivist Studies, 1996, 65 pages, ISBN 1-57724-000-6 http://www.ios.org

The best kind of philosophical analysis of ethics: a practical approach that bases ethics in the real world and the requirements for humans to survive and flourish. Kelley is the leading philosopher of the more open Objectivists. This booklet succeeds in filling in a missing element of Ayn Rand's view of ethics. Kelley argues that benevolence is a major virtue, analyses the values at which this virtue aims and the facts on which it is based, and explores why we should practice civility, sensitivity, and generosity.

The Truth Machine: A Speculative Novel

by James L. Halperin
Ivy Press, Inc., Dallas, Texas, 1996, 332 pages, $19.95 ISBN: 0-9651041-0-9 http://www.truthmachine.com

Explores what the world might be like if there existed a machine that could tell whenever anyone is lying.

Axiomatic

by Greg Egan
Millennium Books, London, 1995
368 pages. ISBN: 1-85798-309-2

A superb collection of short stories exploring numerous issues of fascination to *Extropy* readers. "Learning to be Me" combines uploading, personal identity issues, and an immortal posthuman society. Egan excels at writing stories that explore technological and philosophical issues such as the consequences of neural implants on our choices and worldview.

The State of Humanity

edited by Julian L. Simon
Blackwell Publishers, Cambridge, MA/Oxford UK, 1995. 694 pages. ISBN: 1-55786-585-X

An update of The Resourceful Earth. This treasure trove of a volume contains 58 essays addressing (from a resourceful, positive direction) Life, Death, and Health, Standard of Living, Productivity, and Poverty; Natural Resources; Agriculture, Food, Land, and Water; Pollution and the Environment; Thinking About the Issues.

Back Issues

#1-16: $7 each from
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#16 vol.8 no.1 (1st Qu. 1996): Advances; Intelligent Information Filters & Enhanced Reality; Neuroscience Pioneers: Building Brains, Intelligent Assistants, DNA Computers, Memory and its Improvement; Imaging the Brain; Fuzzy Logic and Neural Nets; Complacency and Conservation; Idea Futures on the Web; Smart Contracts: Building Blocks for Digital Free Markers; Reviews: Better Sex Through Chemistry; NANO; River Out of Eden: A Darwinian View of Life; Dr. Walford's Interactive Diet Planner; Permutation City. Columns on Melatonin; Enigma; How the Internet is Like a Baby's Head.

#15 vol.7 no.2 (2nd-3rd Quarter 1995): Future Forecasts by Benford, Bridge, Drexler, FM-2030, Miller, More, Szabo; Introduction to Digital Cash, by Mark Grant; Thoughts on the Economics of "Digital Money", by Lawrence H. White; Hayek's *Denationalisation of Money*, by Max More; Ecological Experiments, Space Habitats, & Long Life: An Interview with Roy Walford, M.D. (Part 2) by David Krieger; Profile: FM-2030; Bio-Enhancement Update: Melatonin, by Dr. Ray Sahelian; Enigma: Squared Deal, by Mark Wolf; Mindsurfing: The Internet Adapter, by Yow; Consciousness: Spontaneous Orders and Selectional Systems, by Reilly Jones; Reviews of *The World of 2044*, *The Theory of Free Banking*, *The Millennial Project.*

#14 vol.7 no.1 (1st Quarter 1995): Utility Fog, Part 2; Methusaleh's Kitchen: An Interview with Roy Walford, M.D. (Part 1); Evolutionary Architecture and Extropian Consciousness; Lilliputian Uploads; Bio-Enhancement Update: Prozac and the Next Generation; Reviews of *The Physics of Immortality*, *Morals By Agreement*, and *Bright Air, Brilliant Fire: On the Matter of the Mind.*

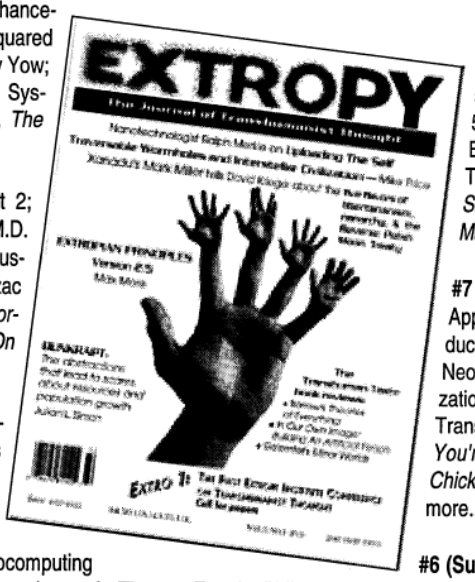
#13, vol.6 no.2 (3rd Quarter 1994): Boundless Constellations: The Emergence of Celestial Civilization; If Uploads Come First: The Crack of a Future Dawn; Utility Fog, Part One; Two Questions for Extropians, by Charles Platt with response by Max More; Souls, Cyberspace, Sins, and Singularity: A Conversation with Dave Ross, Part 2; Neurocomputing 7: Sequential Neural Nets; Humor: Galactomatic-1000; reviews of *The Origins of Order: Self-Organzation and Selection in Evolution*, *Good Mood: The New Psychology of Overcoming Depression.*

#12, vol.6 no.1 (1st Quarter 1994): A Practical Look at Ocean Colonization; The Last Free Place on Earth; Logical Languages: A Path to Posthuman Rationality?; The Open Society and Its Media; God and Man at Yale: A Conversation with David Ross, pt.1; Forum: Nanarchy (automated police and defense systems). Wormhole Warfare; Reviews of *Fuzzy Thinking: The New Science of Fuzzy Logic*, and *The Children's Machine.*

#11, vol.5 no.1 (2nd Half 1993): Uploading Consciousness, by Ralph Merkle; Extropian Principles v.2.5, by Max More; Traversable Wormholes: Some Implications or Contact! A Post-Singularity Phase Change; A Conversation with Mark Miller, Part 2: The Day the Universe Stood Still; "Bunkrapt": The Abstractions that Lead to Scares About Population and Resources, by Julian L. Simon; Reviews of *Theories of Everything*, *In Our Own Image: Building an Articial Person*, *Mirror Worlds.*

#10, vol.4 no.2 (Winter/Spring 1993): Pigs in Cyberspace, by Hans Moravec; Protecting Privacy with Electronic Cash; Technological Self-Transformation, by Max More; Mark Miller interview, Pt.1: Creole Physics & the Credit Theory of Identity; Nanocomputers: 21st Century Hypercomputing; The Transhuman Taste (Reviews): Two books on Ayn Rand & Objectivism; *Nanosystems; Genius.*

#9, vol.4 no.1 (Summer 1992): The Extropian Principles, 2.0; Extropy Institute Launches; Persons, Programs, and Uploading Consciousness; Nanotechnology and Faith; The Making of a Small World (fiction); Genetic Algorithms; Time Travel and Computing; Futique Neologisms 3; Exercise and Longevity; The Transhuman Taste (Reviews): *The Anthropic Cosmological Principle*, *The Blind Watchmaker*, *The Ultimate Resource, Population Matters, The Resourceful Earth*, *Bionomics.*



#8 vol.3 no.2 (Winter 1991-92): Idea Futures: Encouraging an Honest Consensus; Dynamic Optimism; Neurocomputing 5: Artificial Life; Futique Neologisms 2; Extropia: A Home for Our Hopes; Human-Transhuman-Posthuman; reviews of *David's Sling*; *Unbounding the Future*; *The Silicon Man.* (Photocopy of original.)

#7 vol.3 no.1 (Spring 1991): A Memetic Approach to 'Selling' Cryonics; Privately Produced Law; Order Without Orderers; Futique Neologisms; Neurocomputing 4: Self-Organization in Artificial Neural Networks; Forum on Transhumanism; Reviews of *Smart Pills*, *Surely You're Joking Mr Feynman*, *Great Mambo Chicken and the Transhuman Condition*; and more...

#6 (Summer 1990): Transhumanism: Towards a Futurist Philosophy; The Thermodynamics of Death; The Opening of the Transhuman Mind; The Extropian Principles; Neurocomputing Part 3; Forum on Arch-Anarchy and Deep Anarchy; Reviews: *Order Out of Chaos*, *The Emperor's New Mind*, *A Neurocomputational Perspective*, *Loompanics Greatest Hits, The Machinery of Freedom*; Extropian Resources, and more.

#5 (Winter 1990): Forum: Art and Communication; Leaping the Abyss; Arch-Anarchy; Deep Anarchy; I am a Child; Perceptrons (Neurocomputing 2); On Competition and Species Loss; A Review of Intoxication; Intelligence at Work; Extropian Resources; The Extropian Declaration; Our Enemy, 'The State'.

#4 (Summer 1989): Forum; In Praise of the Devil; Neurocomputing; Why Monogamy?; What's Wrong With Death?; Reviews: Are You a Transhuman? Postscript to "Morality or Reality"; Efficient Aesthetics; Intelligence at Work: Advances in Science.

#3 (Spring 1989): Forum; Love as a Contractual Relation; Love as a Sharing of Values; Agapeic Love; Sexual Information; Psychedelics and Mind-Expansion.

#2 (Winter 1989): Review of *Mind Children*; Darwin's Difficulty; A Truly Instant Breakfast; Wisdomism; Nanotechnology News; Weirdness Watch.

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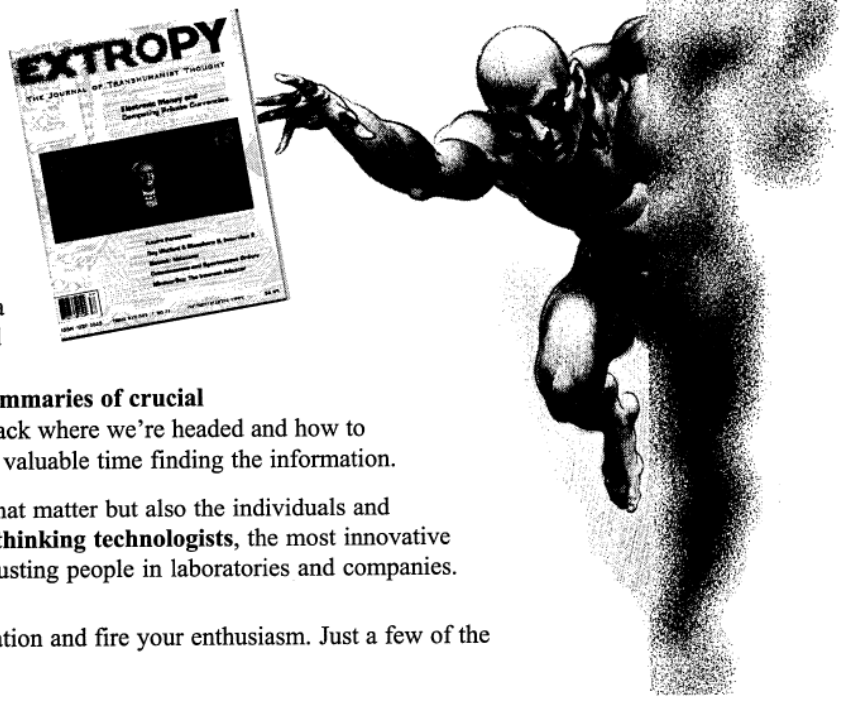

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SOCIAL CHOICE AND THE FUZZY TAX FORM[1]

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Here is one way to cure AIDS: Give $10 billion to the first person who finds a cure. If that does not work give $100 billion. Such a prize would motivate scientists far more than would the pay raise that might come from landing a large research contract. The question is how to pay for such research bounties.

A fuzzy tax form is one way. Just check off the box for the AIDS bounty. A fuzzy tax form is not a flat tax or a higher or lower tax. It is revenue neutral. It lets you say where some of your tax monies go.

The tax form would work this way at the state or federal level. Right now you pay taxes and the state spends the money on what it wants. All tax money goes into "general revenues." That need not be all or none. It can be a *fuzzy* matter of degree.

Suppose just half the money goes to general revenues. Then the other half goes to some degree to ten or more categories like basic research, AIDS research, smart cars, debt relief, help for the homeless, or environmental clean-up. You fill in the fuzzy percentages. You may want 20% to go to debt relief, 30% to build more court houses, and 50% to help cure AIDS. The percentages must sum to no more than 100%.

[1] An earlier version of this article appeared in the 17 April 1995 issue of the *Los Angeles Daily News*.

Prof. Kosko discusses this issue more fully in his new Broadway/Bantam book, ***Heaven in a Chip***.

FUZZY TAX FORM

You owe _____ in tax. Half of that amount will go to general revenues. The other half will go to the social categories of your choice.

Enter whole number percentages next to the categories of your choice. You may write in only one new category. All the percentages must sum to 100%. Else the government will normalize your choices (by dividing each percentage by the sum of all the percentages.) All tax monies go to general revenues if you leave the categories blank.

AIDS Research....._____
Basic Research....._____
Cancer Research....._____
Computers for Kids....._____
Debt Relief....._____
Disaster Relief....._____
Environmental Clean-Up....._____
Foreign Aid....._____
Health Insurance....._____
Homeless Food and Shelter....._____
Global Warming Research....._____
Infrastructure Repair....._____
Law Enforcement....._____
National Defense....._____
Public Transportation....._____
Space Research....._____
United Nations....._____
Welfare....._____
Other:_____....._____

Total (must equal 100%): _____

You could still choose a binary tax form. Just write 0% in each category or leave them all blank and let the state spend all your money as it wants. You do that now but not by choice.

A fuzzy tax form would give a say to those who pay. How could a politician argue against that in public? And Clinton or Gingrich would surely argue against it since it shifts some of their power to "the people." Lobbyists would here work against the state and pull to see a fuzzy tax form pass. Each pressure group would want a chance to put the press spotlight on their cause and increase the odds that we checked off their box on the form.

The rest of us would have less to complain about since we helped choose where our taxes went. We might also get a cure for AIDS or lung cancer or toxic wastes for our troubles.

Professor Bart Kosko is author of *Fuzzy Thinking* (Hyperion 1993) and *Fuzzy Engineering* (Prentice Hall 1996) and Director of USC's Signal and Image Processing Institute.

MURDER AT THE LIAR'S CLUB: SOLUTION

Although it seemed to some people that Archer would have to be the murderer, since there appeared to be no other person identified with the murderer in the clues, this was, of course, not the case—and there is enough information to identify the real murderer. First, there aren't a whole lot of possibilities; since there are seven men, each of whom might be a liar (L) or truth-teller (T), there are $2^7 = 128$ possibilities. Of these, 58 do not have the required minimum of three liars and three truth-tellers, and can be ruled out, leaving 70 remaining possibilities.

From Archer's statement, we can see that if Archer is telling the truth, then Davis is a liar; if Archer is a liar then Davis might be either, since we don't know whether Flint is a liar. Thus, Archer and/or Davis is a liar, and we can rule out the 14 possibilities in which Archer and Davis are both truth-tellers, leaving 56 remaining possibilities. Since Archer and Davis canot both be non-members, anyone who claimed them to both be non-members would be lying; thus Brown's statement, in effect, claims that Hart would agree that Clark was a liar. This means that if Brown is telling the truth, eiher Hart or Clark is a liar, but not both of them; or, if Brown is lying, then Hart and Clark are either both liars or both truth-tellers. Thus, we can rule out another 27 possibilities which do not agree with these conditions, leaving 29 remaining possibilities.

Clark, in his statement, claims that Davis and Brown would agree; thus if Clark is a truth-teller, Brown and Davis have the same membership status. Nine out of the 29 remaining possibilities, in which Clark is telling the truth but Brown and Davis disagree, can be eliminated, leaving 20 remaining possibilities.

Flint's statement means that either {Flint=T, Brown=T, and Archer & Clark do not have the same status}, {Flint=T, Brown=L, and Archer & Clark have the same status}, {Flint=L, Brown=T, and Archer and Clark have the same status}mor {Flint=L, Brown=L, and Archer and Clark do not have the same status}. In short, if Flint and Brown have the same status, then Archer and Clark don't, and vice versa. Knowing this allows us to eliminate another 12 possibilities, leaving only 8 remaining possibilities, which are as follows:

	A.	B.	C.	D.	E.	F.	H.
1.	L	L	L	T	T	T	L
2.	L	L	T	L	T	L	T
3.	L	T	L	L	T	L	T
4.	L	T	L	T	L	L	T
5.	L	T	L	T	T	L	T
6.	L	T	T	T	L	T	L
7.	T	L	T	L	L	T	T
8.	T	T	L	L	L	T	T

Based on these eight possibilities, can Edgar's statement be true? In 1., 3., and 5., Clark is lying, so Brown and Hart must *not* agree that Flint is a member; but in 3. and 5., they both tell the truth and Clark is a member, while in 1., they both lie and Clark is not a member. Possibilities 1., 3., and 5., then, can be eliminated. In possibility 2., Edgar and Clark both tell the truth, but Brown and Hart do not agree, so 2. can also be ruled out, leaving only 4., 6., 7., and 8.: therefore, Edgar must be one of the liars.

Edgar's statement also eliminates possibility eight. If Edgar and Clark are both lying, then Brown and Hart must agree that Flint is a member; and although Brown and Hart are both truth tellers, Flint is not a member. This leaves us with only possibilities 4., 6. and 7.

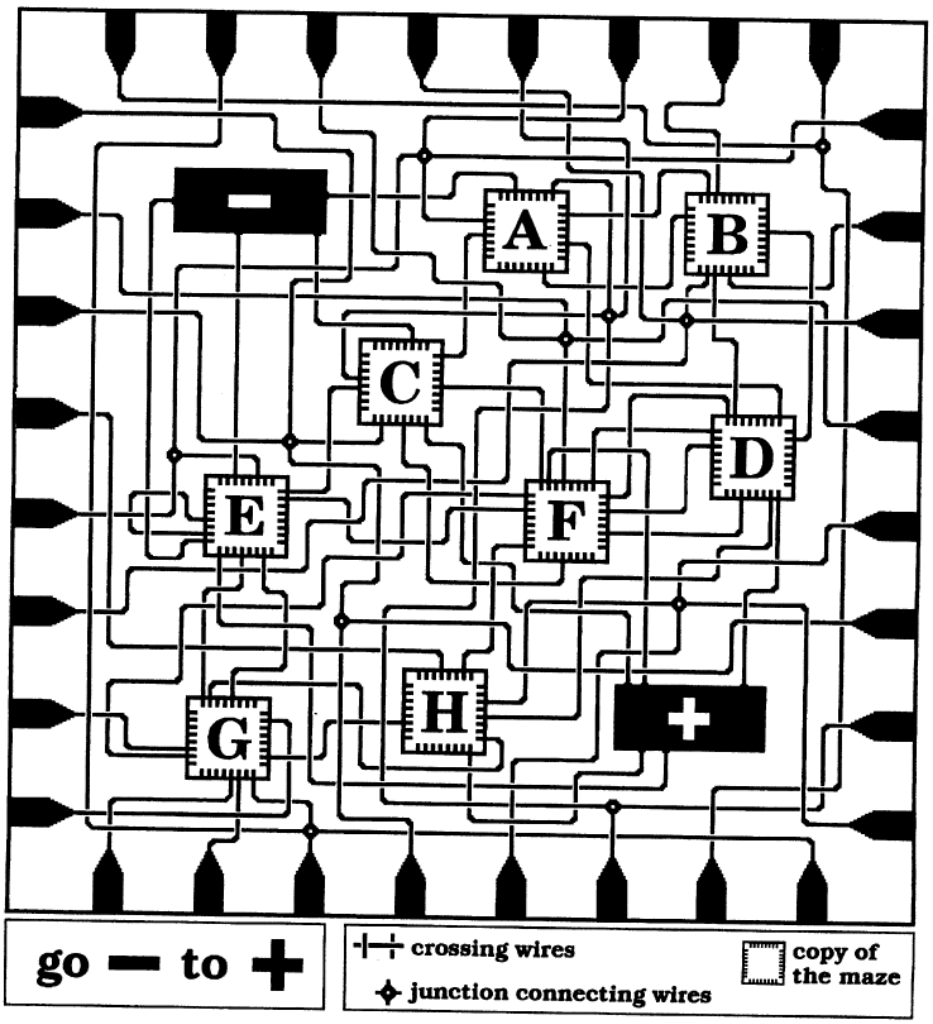
Possibility 4., however, can be ruled out because of an internal contradiction; if Davis and Brown tell the truth, and Clark and Edgar are liars, then Clark's statement boils down to the fact that the murderer is *not* a member (hence it is a lie that that Edgar, a liar, would agree to something which is true). But in possibility 4., Hart is a trueth teller and accuses Archer of killing him—and Archer *is* a member.So possibility 4. contradicts itself and can be ruled out. And finally, Davis's statement is true for both 6. and 7., so Davis must be a truth-teller, and possibility seven can be ruled out.

Thus, Archer, Edgar, and Hart are the three Liar's Club members, while Brown, Clark, Davis, and Flint are truth-tellers and nonmembers. So who is the murderer then? Since Hart is lying, Archer cannot be the murderer, and from Clark's and Davis's statements, we know that the murderer is a member. Since Archer is ruled out and Hart did not commit suicide, Edgar must be the murderer.

FRACTAL MAZES

by Mark J. P. Wolf

The maze afficionados of Merm have long since tired of traditional mazes, which, they point out, can always be solved by brute force methods. Every path which is not the correct path is either a dead end or a loop of finite length, so given enough time, one can explore every path of the maze. Fractal mazes, however, have wrong-way paths that are infinitely long, making them neither dead ends nor loops; they are much harder to recognize as the wrong way. The fractal maze is fractal because it has identical copies of itself embedded within it, which can be entered (in fact, you'll have to enter them, in order to solve the one below). In the fractal maze provided, begin at the MINUS and



make your way to the PLUS... When you enter a smaller copy of the maze, be sure to record the letter name of the copy, as you will have to leave this copy on your way out. You must exit out of each nested copy of the maze that you have entered into, leaving in the reverse order that you entered them in (for example: enter A, enter B, enter C, exit C, exit B, exit A). Think of it as a series of nested boxes (or "pushing" and "popping". If there is no exit path leaving the nested copy, you have hit a dead end.) The eight pins on each of the sides of the maze represent these connections to the outside of each copy (obviously, you cannot go outside the main maze itself). Watch your entrances and exits, and go from MINUS to PLUS...

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