COVER

EXTROPY #8

Winter 1991/92

BACK ISSUES AVAILABLE:

EXTROPY: The Journal of Transhumanist Thought,
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#s 1, 2 - $2.50 each ($4.50 overseas); #s 4, 5, 6 - $3.00 each ($5.00 overseas); #7 - $4.

#7 (Spring 1991): "A Memetic Approach to 'Selling Cryonics'" by H. Keith Henson & Arel Lucas; "Privately Produced Law" by Tom W. Bell; "Order Without Orderers" by Max More; "Futique Neologisms"; "Neurocomputing 4: Self-Organization in Artificial Neural Networks" by Simon! D. Levy; Forum on Transhumanism by Bruce Harrah-Conforth & Max More; Reviews of *Surely You're Joking Mr. Feynman*, *Great Mambo Chicken*, *Smart Drugs*, and Futique Magazines.

#6 (Summer 1990): Includes "Transhumanism: Towards a Futurist Philosophy" by Max More; "The Thermodynamics of Death" by Michel C. Price; "The Opening of the Transhuman Mind" by Mark Plus; "The Extropian Principles" by Max More; "Neurocomputation Part 3" by Simon!D.Levy; Forum; Reviews of *Order Out of Chaos*, *The Emperors 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," by Gregory Benford; "Arch-Anarchy," by A; "Deep Anarchy," by Max O'Connor; "I am a Child," by Fred Chamberlain,"; "Perceptrons," by Simon D. Levy; "On Competition and Species Loss," by Max O'Connor; "A Review of *Intoxication*," by Rob Michels; "Intelligence at Work," by Max O'Connor and Simon D. Levy; "Extropian Resources," by Max O'Connor and Tom W. Bell,"; "The Extropian Declaration," by Tom W. Bell and Max O'Connor; "Our Enemy, 'The State'," by Max O'Connor and Tom W. Bell.

#4 (Summer 1989): Forum; "In Praise of the Devil," by Max O'Connor; "Neurocomputing," by Simon D. Levy; "Why Monogamy?" by Tom. W. Bell; "What's Wrong With Death?" by Max O'Connor; Reviews of "*Are You a Transhuman*?" by Mark E. Potts and Max O'Connor; "Postscript to 'Morality or Reality'," by Max O'Connor; "Efficient Aesthetics," by Tom. W. Bell; "Intelligence at Work: Advances in Science" by Max O'Connor.

#2 (Winter 1989): "Review of *Mind Children*," by Max O'Connor; "Darwin's Difficulty," by H. Keith Henson and Arel Lucas; "A Truly Instant Breakfast," by Steven B. Harris M.D.; "Wisdomism," by Tom W. Bell; "Nanotechnology News" by Max O'Connor; "Weirdness Watch," by Mark E. Potts.

#1 (Fall 1988): a brief overview of extropian philosophy and an introduction to some of the topics we plan to address: AI, Intelligence Increase Technologies, Immortalism, Nanotechnology, Spontaneous Orders, Psychochemicals, Extropic Psychology, Morality, Mindfucking, Space Colonization, Libertarian Economics and Politics, Memetics, and Aesthetics; "Morality or Reality," by Max O'Connor.

(Note; "Max O'Connor" is now known as "Max More".) #3 (Spring 1989) is permanently out of print.

EDITORIAL

Extropy Expands:

In the six months since the last issue, *Extropy* and related extropian activities have been expanding. The Editorial Committee continues to grow, helping to ensure accuracy and quality in the material appearing here. As circulation continues to grow and distribution through retail outlets expands, the appearance of *Extropy* is being refined. Next issue is likely to see a move to the larger, standard format of 8.5 x 11".

As a journal of transhumanist thought, it would be anachronistic if *Extropy* were limited to traditional paper media. The emergence of the Extropians e-mail list in the summer of this year was therefore especially appropriate and encouraging. Several of us — Extropians connected by e-mail — had discussed the idea of an e-mail list; Perry Metzger was the one to set it up on an MIT host computer.

The forum was an immediate hit, at first almost overwhelming the participants with sometimes over a hundred messages a day. The volume of input has now calmed down to manageable levels but continues to serve as an excellent nexus for the exchange of information on smart drugs, cryonics, life extension techniques, books of appeal to Extropians, and for engaging in conversations on uploading, memetics, spontaneous orders, and innumerable other tantalizing topics.

The common features of the participants are a fundamental agreement on an Extropian approach to life, and a high level of intelligence and learning. If you want to be on the extreme leading edge of evolution, the Extropians e-mail list is the place to be! We are all grateful to Perry, and now David Krieger, for putting in substantial time managing the list. Information on how to join can be found on p.48.

One result of the networking enabled by the e-mail list was the genesis of local Extropian celebratory gatherings — social occasions for Extropians to meet each other in person and have some fun. I held the first of these in Los Angeles, and we continue to meet here, the latest occasion will be the *Extropy* #8 Release Party. East Coast Extropians have met and plans for a group in England and various parts of the U.S.A. are underway. If you would like to know if there other Extropians near you, contact me. As current participants can attest, meeting a group of people with whom you have so much in common is certainly a refreshingly different experience.

Another expansion of Extropian activity into the electronic realm is in the early planning stages: An electronic *Extropy* is being planned, the first issue of which may be available for #10, due out in November 1992. This will be available both in Macintosh HyperCard Stack and in Windows Toolbook formats. In response to several requests, I will try to make *Extropy* available on disk during 1992. If you would be interested in these versions, please let me know.

EXTROPY and TRANSHUMANISM: EXTROPY — the process of increasing intelligence, information, energy, life, experience, diversity, opportunity and growth. Extropianism is the philosophy that seeks to increase extropy. The Extropian Principles are: (1) Boundless Expansion; (2) Self-Transformation; (3) Dynamic Optimism; (4) Cooperative Diversity.

TRANSHUMANISM— Philosophies of life (such as Extropianism) that seek the continuation and acceleration of the evolution of intelligent life beyond its currently human form and human limitations by means of science and technology, guided by progressive principles and values, while rejecting dogma and religion.

To provide Extropians with an effective instrument for exchanging information and developing shared interests, and to accelerate the advance of extropian ideas and projects into the rest of the world, a new organization will be formed. The Extropy Institute (EXI — pronounced "ex-I") will apply for incorporation in early 1992 and should be operational by the time *Extropy #9* appears in May.

Although making progress financially, *Extropy* is still running at a loss, and the incorporation of EXI will incur further expenses, though costs will be limited by incorporating without using a lawyer. I encourage you to support and join our efforts in proportion to their value to you and your projects. One way is to take out a five-year, ten-year or lifetime subscription (see p.2), or to make a donation towards EXI office equipment. As EXI gets underway, we will develop a range of services and activities for both Extropians and potential Extropians. Stay tuned!

This Issue:

The sunburst on the cover represents the brilliance of the future being created by Extropians as well as the Principle of Dynamic Optimism which I analyze and explicate. The Extropian Principles are not now, and never shall be, in final, perfected form. In accordance with the Extropian emphasis on continual improvement, refinements to this statement of our philosophy will continue to be made whenever appropriate.

Robin Hanson, AI researcher and social epistemologist, contributes "Idea Futures" - an innovative, insightful and exciting application of spontaneous orders to the search for more accurate and rational ways of reaching a consensus on scientific and technical questions. EXI can function an appropriate instrument for the implementation of real idea futures as a means of optimizing the social use of information.

Simon! D. Levy explains *artificial life*, one of science's increasingly successful attempts to replicate and surpass nature's evolution of lifeforms, a field that raises questions about the boundary between life and non-life, and between simulation and reality. "Futique Neologisms 2" expands the lexicon of useful and playful terms for transhuman-

ist thinking, while my "Human-Transhuman-Post-human" suggests guidelines for some of these core terms. Tom W. Bell's "Extropia" presents a sweeping vision of a possible future for Extropians wanting to be free to maximize their values in an ever-evolving community. This issue is rounded out by reviews of the new popular book on nano-technology by Eric Drexler (and co-writers Peterson and Pergamit), and two highly extropic SF novels, as well as selected items of news.

Extropy #9 (Summer 1992) dates:

Deadline for written
submissions: February 29 1992

#9 to be mailed: Early May 1992

Forthcoming in #9 and beyond:

An overview of the Extropy Institute (EXI) — our purpose, goals, method of organization, and opportunities for your participation; Following this issue's analysis and explanation of the Extropian Principle of Dynamic Optimism, #9 will develop the Principle of Self-Transformation; A new version of the Extropian Principles is also likely (the original version appeared in *Extropy #6*, Summer 1990); Simon! D. Levy's informative Neurocomputing series will continue, this time explaining genetic algorithms — one of the ways in which computer programs are becoming more lifelike.

Other topics to look for are the present and future of electronic communications, the evolution of human-computer integration, critical vs uncritical attitudes towards nanotechnology, computer data encryption, molecular computing, and a weighty section of book reviews and news of important technological advances.

Until next time — be *excellent!*

Max More
Editor

Idea Futures
Encouraging an Honest Consensus

by Robin Hanson

INTRODUCTION

Are you fascinated by some basic questions about science, technology, and our future? Questions like: Is cryonics technically feasible? When will nano-assemblers be feasible and how quickly will resulting changes come? Does a larger population help or hinder the world environment and economy? Will uploading be possible, and if so when? When can I live in space? Where will I be able to live free from tyranny? When will A.I.s be bucking for my job? Is there intelligent life beyond earth? If you are like most *Extropy* readers, such questions matter to you.

Now how do we, as a society, go about answering such questions? People who have an appropriate background, and who are interested enough in a particular question, can research that subject in depth themselves, and come to a considered opinion. And people who happen to know, respect, and trust such a person can simply take those opinions as their own, avoiding all the hard work. But what is everyone else to do, people whose actions often implicitly depend on such questions?

In practice, people usually defer to larger social institutions on most questions, institutions which combine and evaluate contributions from many specialists, and which offer apparent institutional consensus estimates on many different questions. These consensuses may be uncertain and temporary, and individuals may prefer to combine the results of several institutions, but basic need for such estimates remains.

For example, popular media choose what they consider to be ranges of reasonable and noteworthy opinions on noteworthy issues for presentation. Peer-reviewed academic journals and societies offer more detailed, though less accessible, consensuses about which opinions are reasonable and in favor. Government agencies often try to form and act on such consensuses, as the U.S. E.P.A. does for health risks of pesticides. And there are many other such consensus institutions, such as opinion polls.

How well do these institutions work? How many of us are confident that, when a technical controversy arises, a widely visible consensus will quickly emerge representing society's honest best estimate on the issue, reflecting the relevant insights of the relevant experts? Or that those with foresight will eventually be rewarded for advocating positions which later become accepted?

People who have little contact with an existing social institution, or who have a position of power within it, may feel things are basically okay. But those "in the trenches" typically voice more skepticism. Your opinion on the trustworthiness of newspapers probably changed for the worse the last time you read about an event in which you were personally involved. Since subjects like cryonics and nanotechnology have often been unfairly treated by most current institutions, I expect at least a few *Extropy* readers to be dissatisfied with such institutions.

Skeptics about current institutions are not typically focused on methods, often the center of philosophical discussions, but on incentives. Skeptics see too many rewards for bias, and too few for honesty and care, and so distrust official statements. People often promote beliefs which serve their self-interest, and try to appear more confident, original, and knowledgeable than they are.

People don't correct for standard human biases [Kah], such as wishful thinking, overconfidence, and belief fixation. They massage evidence, suppress criticism, and just plain lie. Fashion, eloquence, and politics often dominate expert consensus. Rewards often go to those whose ideas are popular now, rather than those who are later proved correct [Tul]. Paid advocates distort the consensus we perceive by using raw media exposure, bribes, and by exploiting human biases [Cia]. An honest consensus of relevant experts is often lost from public view.

Many existing social institutions, such as investigative reporting, due process, public debates, and peer review, claim to address these problems. But there is room for improvement. To improve the way ideas evolve, many people try to reform existing social institutions, and a few try to invent new ones [Li, Kan, Han88]. In this paper I suggest a new social institution, called "idea futures", which can create a visible expert consensus with clear incentives for honest contribution.

CONCEPT

Idea Futures is intended to aid the evolution of a wide range of ideas, from public policy to the nature of the universe, and in particular should be able to help us predict and understand our future. The basic concept is to combine two phenomena, convergence and markets, and so make "a futures market in ideas".

Disagreement is rarely as fundamental as it seems. In the long run, beliefs often converge. For example, in science the steady accumulation of evidence eventually settles most debates. We take the advice of experts, because we think we would come to believe what they believe, if only we were to study what they have studied. Randomly selected juries usually reach a unanimous verdict, even more often than seems rational. Theory [Se] and experiment [Li] indicate that the people's beliefs should and do converge. In sum, we generally trust in a convergence of human judgment. If people wait long enough for evidence to surface and then apply enough effort to study and debate a specific enough claim, they often come to agree. When the people are reasonable, knowledgeable, and detached enough, and when they avoid subjects like religion, they usually agree. When such a group is diverse and independent enough, we believe we would probably also agree.

Markets are a way to create a consensus about the value of an ownable item, i.e., the "price". Futures markets are a way to create an immediate consensus about future consensus. For example, a market in corn creates a price in corn, so that most buyers pay about that price. A futures market in corn creates a futures price, which is an immediate estimate of what the actual price of corn will be in, say, nine months. Traders have clear incentives to make honest contributions to the consensus; you "put your money where your mouth is". A trader who believes the future price will be higher than the market indicates buys, and in so doing

Figure 1   Some Controversial Claims

• By 2030, the greenhouse effect and other causes will have raised the average world sea levels by 1 meter.

• Cold fusion of deuterium in palladium can produce over 10 watts/cc. net power at STP.

• By the time we have surveyed our galaxy in the infrared to the 25th magnitude, there will not be any evidence of another technological civilization in our galaxy.

• By the time world GNP is four times the 1990 level, 1000 people will have physically lived in space over 90% of the time for the previous seven years.

• By the year 2000, over 20,000 people in the U.S. will commute to work in Vertical Take-Off and Landing (VTOL) aircraft they park in their garage and drive down the street.

• The rest mass of the electron neutrino is greater than .01eV in ordinary space.

• If labor saving device X were widely used in industry Y, industry employment five years later would be less.

• Death-bed confessions or other evidence will eventually show that person X was murdered.

raises the consensus price. Those who are right make money from those who are wrong.

Of course markets have limitations. Ideally, items to value should be of wide interest, exclusively ownable, cheaply transferable, and have many identical copies. How can we apply this to ideas? By creating coupons whose value depends on whether an idea is validated. For example, a coupon which says "Exchangeable for $1 should a person land on Mars by 2020" is a direct tie between an idea, people on Mars, and money, a well-known unit of incentive. Such coupons can be thought of metaphorically as futures, and more literally as bets, a metaphor often used to describe both investments and science.

> ## Like cryonics, idea futures is another way to take advantage now of the fact that the future should be rich with power and knowledge.

If convergence creates a future consensus in ideas, and if futures markets can create an immediate and honest consensus about a future consensus, then futures markets might be able to create an immediate and honest consensus in ideas. If the market price for a "$1 if person on Mars" coupon were 23¢, then that would typically represent a consensus that there was about a 23% chance of this happening. Anyone could express their opinion on the subject by trading coupons, or could just read the "market odds" to see the best present estimate. This market consensus would compare favorably to other methods of forming perceived consensus, such as by advertising, opinion polls, or elite committees. An idea futures consensus could be simultaneously open, egalitarian, universal, expert, honest, self-consistent, and cheap.

A mature idea futures market could offer coupons on many claims about the future of technology and society. The consensus prices would describe a consistent set of probabilities for various possible future events, and conditional probabilities for some events given others. Investors there should be as diverse as investors are elsewhere, with a mix of short-term and long-term focuses, large investment houses and daring do-it-yourself individuals, each contributing their specialized knowledge about an issue or the connection between two issues to the total consensus.

Like cryonics, idea futures is another way to take advantage now of the fact that the future should be rich with power and knowledge. We create good incentives now by letting the future settle our bets.

To make the whole idea more vivid let us consider an simple (fictional) scenario.

SCENARIO

Pat Thgisni was not a model student. A knack for making experiments work is probably what got him into graduate school — it certainly wasn't his grades. Worse, he was unkempt and had a disturbing habit of bending people's ears with one harebrained idea after another. Definitely not one of the rising stars of the University of Toledo Physics Department.

In his second year, 1992, Pat hit upon his best idea yet, "superscattering". If a neutrino could scatter off all the nuclei in a crystal at once, the interaction could be a billion billion times more powerful, perhaps allowing neutrino telescopes [Web]. Pat showed his calculations to Prof. Ezra Puccuts, a local and renowned neutrino expert, though rusty on scattering. Prof. Puccuts explained to Pat that a similar idea had occurred to him, but he had found it conflicted with an accepted formula. Such a negative conclusion wasn't worth a publication.

Pat persisted, however, bringing out his pages of calculations. After ten minutes of going through the first page, and finding three glaring, though irrelevant, math errors, Prof. Puccuts lost his patience. "I do not have the time to correct your math for you", he declared, and shut the door. Over the next few months Pat redid his calculations several times, but Prof. Puccuts was not interested and other professors referred Pat back to him. Pat

submitted his work for publication anyway, and then waited; he did not have the $100K he figured it would cost to do an experiment.

That Christmas in L.A., Pat told the story to his family. His brother Al, a sports fanatic, suggested that Pat dare them to make a bet. Before Pat could object, Al described how idea futures were revolutionizing the oil industry, and were a new way for the little guy to contribute to the world of ideas. After a few more drinks, Pat saw the light.

Pat wrote up a precise statement of his claim, and then stopped by the idea futures mart in Las Vegas[1] on his way back to Toledo. He paid $100 to have a reputable judging group decide if it was precise enough for them to judge in 2013 (which it was), $20 to the Bank of Vegas so they would issue coupons on it, and another $20 to have a computer market set up. Finally, he funded an automated market maker with $200 in seed capital, and set the initial market odds at 30%. Back at the university, Pat set his computer up to track the market, and then spread the word, causing an epidemic of giggles. One of Prof. Puccuts smirking students agreed to put up $20 against him, and a half dozen other students joined in, mostly at $2 each.

It worked like this. While Pat bought coupons which said "$1 if superscattering" from the market maker for around 30¢, the other students bought "$1 if no superscattering" from the market maker for around 70¢. Whoever was right in the end would make money on the deal, receiving the $1 plus 7% interest per year, compounded. Every time Pat bought a coupon the market odds went up, and every time the other students bought the odds went down. The market maker got these coupons from the bank, who would sell the pair of coupons "$1 if superscattering" and "$1 if no superscattering" to anyone for $1 a pair. The bank made money on transaction charges, and risked nothing because exactly one of the pair will be worth $1 (plus interest) in the end. The bank also bought such pairs back for $1, allowing people to sell coupons back to the market maker. Many students took advantage of this feature in the next few weeks, as some professors made it clear they were not amused.

In 1995, Pat earned an early Ph.D. Like most students, he could not find an academic position and went to work in industry. A year later he finally published his superscattering article in a vanity journal. Over the years, Pat had tried to follow the literature to see if anyone else had the same idea, but without success. Meanwhile bets slowly trickled in, with the odds hovering around 15%. In 1997 the market told Pat of another bettor, in Peru, who made a number of publicly declared purchases, or "public bets", of superscattering coupons. The Peruvian had also published on the idea, but in an obscure Peruvian journal. Someone else created a market on whether there would be a compact neutrino telescope, which became popular with amateur astronomy clubs. Certain traders even specialized in keeping these two markets in rough correspondence. By 1998, the total value of all coupons out on superscattering, the "market capital", reached $8K.

That year an aide to Nevada Senator Sue Toshgib, member of the Senate Committee on High Tech, noticed the high odds for neutrino telescopes, and traced it to Pat's claim. Sue saw an opportunity to push Nevada's fledgling idea futures industry, and made an issue of the fact that the markets had apparently discovered a number of potential new technologies. For example, she said, if there was a 15% chance of superscattering, why wasn't this possibility being pursued in the labs?

Wheels turned, but Prof. Puccuts' technical explanations did not satisfy Senator Toshgib. Fed-

PAT'S TIMELINE

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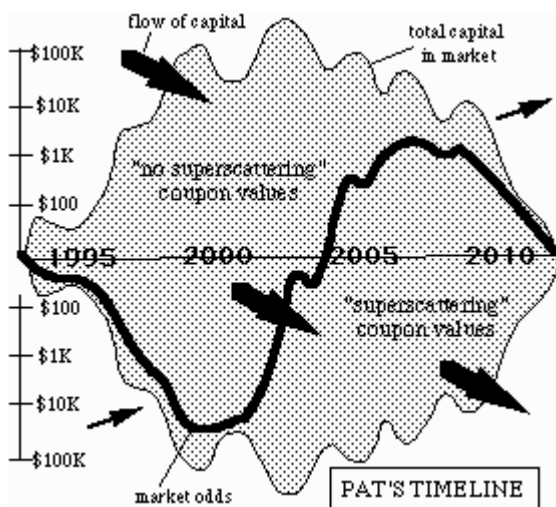
[1] Actually, science bets are illegal in Nevada.

eral funding agencies wanted to avoid a confrontation, but also wanted to protect their turf from every senator's whim. So they prodded the administration of the University of Toledo, to quietly make a few bets with university overhead funds. This infusion of capital overwhelmed what Pat and a few others could scrape up. The odds fell to 2%, and the issue was dropped.

But the $100K now in the game raised the interest of a few experienced speculators looking for an angle. They hired a few grad students to try the superscattering calculations, and the odds crept up to 6% over the next year. About the time the university realized there might be no limit to the capital required to keep the odds down, Prof. Puccuts published a paper showing why superscattering was impossible. The hired grad students were intimidated, and the odds fell to 1%. Six months later a student from across the hall over heard Prof. Puccuts mention that an equation in his paper was an ad-hoc approximation. So he re-tried the calculation, and got a rather different result. He told his old professor, Prof. Yikkul, and they jointly wrote a paper. As rumors spread, the market odds shot to 20%.

In 2001 the first experiment was started. The odds fluctuated under the influence of some false rumors, and some experimenter's friends made extra income by trading before the experimental results were revealed. In 2005 the market odds were at 70%, and by 2008 the issue seemed pretty much settled, with the market odds at 98%. Pat, who had doggedly stuck with superscattering, sold his coupons to reap a total profit of $700K on his $20K investment (which was all his spouse would let him risk). This profit came from selling "$1 if superscattering" coupons for 98¢, after buying them for as little as 1¢, and from the 7% interest the Bank of Vegas had agreed to pay on the money it held. Just before the coupons were to be judged in 2013, the last traders sold their coupons to avoid paying a judging fee. The market was closed down and the judges were never needed.

Pat was still not offered an academic position, as Prof. Yikkul became the celebrated discoverer of superscattering. So Pat started a new market, to be judged by a detailed historical study in thirty years, on who was the first discoverer of superscattering. Certain universities vowed to let professors defend their own ideas. Prof. Puccuts, who never bet any of his own money, still has tenure.

SCOPE

Mechanisms like idea futures have been used for a long time to create consensus about corn prices, stock dividends, life expectancy, marine accident risks, horse races, and football games. So clearly it can work for some topics. But the vision offered here is to make much wider use of such mechanisms. Some areas of science and technology seem similar enough to horse races to suggest betting will work there also, but what about everything else?

There are a number of parameters which indicate when a claim will be more difficult to handle, including the time and expense required to resolve a claim, the probability it will never be resolved, the strength of emotions on the issue, the lopsidedness of the odds, and the scarcity of interested traders. The procedures described below are intended to allow idea futures to handle as many claims as possible. I hope to make the case for wide applicability plausible enough to inspire interest and experiments.

PROCEDURES

In idea futures markets people would exchange coupons like those attached to the beginning of this paper (Anti-gambling laws require that these be void, unfortunately.) Each coupon is issued by a bank, and specifies a judging organization who will decide the issue "beyond a reasonable doubt". Coupons have the basic form "$X if A", where A is a claim and $X is a "conditional value". A claim includes a sentence, such as those in Figure 1, and any clarifications on word meanings. The claim part of a coupon also specifies who will judge the claim, a judging date, and any declarations about the decision criteria or process to be used. There can be many coupons on the same claim, each to be judged by different judges on different judging dates.

Coupons also specify a total judging fee and

a maximum percentage judging fee. The judging fee is obtained by reducing the face value of each coupon in the market on the judging date by whatever percentage is necessary given the total market capital. If this would violate the maximum percentage judging fee, then the banks must try to create enough market capital by gambling the existing capital in an "audit lottery". If the coupons win the lottery, enough capital is created to support judging, and coupon face values are increased. If not, coupons are worthless and judging is not needed.

The judging fee creates an incentive to "settle out of court" by selling before the judging date, as happened in Pat's superscattering market. Audit lotteries preserve incentives for honest evaluation even when an issue is of only limited interest and very expensive to judge [Pol], such as whether your daughter would make a good doctor, if only someone would pay her way through medical school. Pat specified that an audit lottery be used, if necessary, to fund the historical study on who discovered superscattering.

Judges' verdicts should be "beyond a reasonable doubt" and are expressed as percentages to be paid off to each side. Judges have additional incentives to be careful if they agree to spend some fraction of their judging fee to keep the market price of an "appeals" coupon near that of their verdict. Appeals coupons are on the same claim, but judged much later by independent judges with a much larger budget.

If there is not yet enough evidence or funding to decide a question, judges may be allowed to postpone judging to a new date with a new, perhaps larger judging fee. They could in the process offer some clarification of the question, and would use up some portion of the max percentage judging fee to pay for their trouble. Markets can also be set up so that if no decision can be agreed on, judges can declare "all bets are off".

The conditional value part of a coupon, the $X, specifies a standard investment instrument, such as a stock, bond, or mutual fund, and gives specifics like amount, date of purchase, interest rate, etc. There should be a liquid market in such instruments, so that it is always clear what the equivalent cash value is. In the superscattering example, bonds issued by the Bank of Vegas paying 7% interest were used. There can be coupons with different investment instruments for each claim and judge combination described above. By building on standard investments, an idea futures investor can expect a better rate of return than he could get with any standard investment alone.

Banks are long-lived financial institutions trusted to properly report judging fees. A bank's main function is to split and join coupons. For example, the claim "True" can be split into "A" and "not A". Imagine giving a bank one share of General Motors (GM) stock. The bank would see this as a "1 GM share stock if True" coupon and exchange

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Figure 2. Idea Futures Home Version   1) Choose a claim like "I will win this hand of stud poker". 2) Get a pencil, and some chips. Let red chips be "$10 if claim", blue chips be "$10 if not claim", and something else be money. 3) Give each person $100. 4) At any time players may buy or sell pairs of red and blue chips for $10. 5) Place the pencil across the bar below between 5 and 6 on the CLAIM side. This means the market maker will sell one red chip for $6 or buy it for $5. 6) Whoever yells first, such as "buy red for 6", can trade one chip at the offered price. The pencil then immediately moves in that direction, such as to 6-7. Repeat till market settles. 7) Reveal new information, like the next card, and repeat step 6. 8) If the claim was right in the end, reds are worth $10, blue $0. If wrong, blue is $10, red $0. Have fun!

it for the coupon pair "1 GM share if A" and "1 GM share if not A". The bank would hold on to the pair and if A wins, give the 1 GM share to any holder of a "1 GM share if A" coupon. While the bank held the 1 GM share betting stakes, the wealth it represents would, we hope, be put to productive use by GM. An "A" coupon can be further split into "A and B" and "A and not B". Using certain combinations of such coupons, one can bet on the conditional probability of "B given A" and be insensitive to the verdict on A.

A visible consensus would immediately form on a wide range of hotly debated issues. This consensus would be relatively universal, expert, honest, self-consistent, and cheap.

Each type of coupon must have at least one public market for trading coupons. Preferably, such markets will be continuous bid/ask markets allowing anyone to post or take offers via computer. A single computer could implement thousands of low-activity markets.

To increase liquidity and reduce price fluctuations and spreads, anyone can fund automated market makers [BI], computer programs always available for trading. A simple market maker algorithm exists which can function indefinitely and not be cheated by clever combinations of traders (see Math Appendix). The degree of price smoothing it provides depends on the amount of sacrificial cash it starts with. This provides a way to subsidize a market, as does offering to pay part of the judging fee. Pat funded such a market maker to promote trading in his market.

If the odds on different claims are inconsistent, i.e., do not adhere to the standard axioms of probability, then arbitrageurs can make money by buying or selling "Dutch books" [De]. This profit comes at no risk if the final verdicts can be trusted to be consistent. Therefore arbitrage activity should keep the total social consensus roughly self-consistent.

Other market innovations, such as options, baskets, and hedges, allow investors to specialize in details they think they know about and ignore other issues. Options allow bets on price volatility, independent of the way the price moves. Baskets allow one to ignore differences; one can buy a basket of all types of coupons on a certain claim, and ignore differences in judges, investment instruments, etc. Hedges allow bets on price differences, such as when investors kept the odds on superscattering and compact neutrino telescopes in rough correspondence. For example, one could correct for the human bias of overconfidence by betting that on average the odds are not as extreme as the market odds.

While Pat had to risk a substantial portion of his wealth on one question, a more typical scenario would include larger private research labs whose salaried employees direct investment in many questions.

Idea futures markets could be integrated with one or more publishing media or "registries". People could make "public bets", where they buy a coupon for a claim, write a statement of support, and commit to having registries reveal both of these at a pre-specified date. Track records could be compiled from such information and used as reputation scores. People with high scores could become investment advisors, making a public bet with each piece of advice. An advanced publishing medium [Han88] would allow anyone to post evidence and arguments and link them to the disputed claim.

ADVANTAGES

Idea Futures offers many possible advantages. A visible consensus would immediately form on a wide range of hotly debated issues. This consensus would be relatively universal, expert, honest, self-consistent, and cheap. Such a consistent consensus might allow society as a whole to approach the level of rational consistency that is now only expected of individuals.

The market consensus could carry social

weight, serving as a coordination point for thousands of independent conversations. In each discussion, the market odds on an issue could be assumed as the default unless specific arguments were presented to the contrary. Dissenters could be given the time-honored challenge to "put up or shut up". In the same tradition, those willing to put themselves on the line would be given due respect and attention. I have observed that the challenge of a bet makes people noticeably more cautious about what exactly they are claiming.

As debates become settled, they would leave a trail of agreed upon statements. These could be used to counter bogus statements, often made by those ignorant of solid expert consensus. Visionaries like Pat would have a new way to try to convince others of a revolutionary claim; they could throw all available capital into bets. If this were enough to change the market odds, they could point to these odds in arguments. If not, they would at least expect to make a healthy profit, and gain social credit for being serious. True cranks would end up subsidizing leveler heads.

The weight of consensus could help to damp many presently distorting biases. It would be harder for popular media to create consensus by sheer repetition of a claim; they would have to convince those willing to bet. A sincere public relations campaign could make a public bet, but an insincere one would know they were throwing money away. And an insincere attempt to throw enough money away to change the market odds runs the risk of the word getting out and the market ending right back where it started. Finally, hedge bettors can correct for standard biases in individual judgment.

Individuals would have clear monetary incentives to be honest and careful in contributing to the market consensus. If the odds you believe are different enough from the market odds, you believe you will on average make money, even more than with a standard investment like a stock index fund. And compared to stocks, idea future bets are precise and modular. In stock bets one must usually bet on a combination of ideas, such as the company's product, marketing strategy, production techniques, etc. In idea futures you can bet on

exactly the issue you think you know something about.

It might be fun! Imagine a page in the newspaper like the stock page, showing this week's odds on controversial issues. Imagine coming home from an enlightening discussion to change your investments. Imagine reading something you disagreed with, and stopping for a minute to make a bet against it. The knowledge you created while reading would be directly useful to society and yourself, instead of thrown away as is usual now.

Non-scientists could have a direct, even if small, influence and personal stake in science to heighten their interest, like the amateur astronomy clubs in the story of Pat. Amateur trading would induce scientific research by traders seeking an edge, subsidize professionals who can better predict, and might even fund research by judges. Savings would be encouraged and research would be directed more at issues of general interest. Capital and hence intellectual effort would flow to markets where there is broad interest, strong disagreement, and relevant data obtainable for a modest effort or a short wait.

Idea futures markets create information, combining what individuals know. A market with more capital will probably have better information, as people will see there is more to win by figuring out the answer. By subsidizing a market you can pay to create information, though you won't get exclusive access. This might be a better way for government to fund scientific research, instead of the usual grant-giving approach [Han90]. In fact, governments might use odds from subsidized markets as factual input for government decisions. We could all have our say about whether projected usage would justify a new mass transit system, or whether a death was suspicious enough to justify an autopsy. Schools might even admit students based on the market odds of candidates getting a high G.P.A. if they attend.

Idea futures can also provide insurance. A risky business venture based on a new technology might bet against that technology to reduce total risk. Idea futures can be a foundation for reputation systems, providing another way to encourage experts to give honest advice, and allow other ex-

perts to disagree. Idea futures offers all these benefits without requiring any coercion or taxation. Unlike patents, it requires no international enforcement or litigation about the origins of an idea.

CRITICISMS

By now you probably have in mind at least one objection to idea futures, and will not be entirely comfortable with it until this objection is addressed. Longer papers on this subject [Han90] consist largely of detailed responses to such objections. Space limitations preclude such detail here, so figure 3 just gives a list of some issues addressed in those papers. The editor of *Extropy* willing, I could respond to the specific concerns of *Extropy* readers in future issues.

RELATED WORK

In Bayesian decision theory, an agent's degree of belief in A is often defined to be the price they would be willing to pay for a "$1 if A" coupon [DeF]. Idea futures just applies this definition to a society as a whole to find our consensus degree of belief. In the presence of a market, agents appear to agree [Kad].

As was mentioned before, markets similar to idea futures exist in commodities, finance, insurance, and sports betting. Science and technology bets are frequently made between individuals [Hal,Ti,WSJ], as they have been through history [Deb]. The idea of betting on a wide range of legislative and technological issues is raised in a recent science fiction novel [Bru,Ve], and scattered proposals [Fa,Ho,Lea,Ze] have been made to formalize bets in science.

Business schools widely use such markets to teach M.B.A. students about markets [Fo]. In economic theory, the coupons I have been describing are called "contingent assets", and are often used as a foundation in analyzing financial investments [ShW] and the effect of uncertainty [La]. Ideally, there would be a "complete market",

Figure 3 A Few Concerns about Idea Futures

Isn't gambling illegal? Isn't betting a useless zero-sum game? Does anyone ever bet this way? What about compulsive gambling? Is there enough interest in science questions? Will these markets be too thin? Doesn't betting only work for clear cut questions like horse races? How often do beliefs really converge? What if beliefs never converge? What do convergent beliefs have to do with truth? What about badly worded claims? Can't wrong ideas still be useful? What if the fine print differs from the summary? What about sucker bets? Don't science questions Resolve too slowly? Why should I trust the judges? Won't judging cost too much? Won't wealthy people have too much Influence? Won't the market be dominated by fools? Won't advertising manipulate opinion? Aren't markets full of cheats and thieves? What about insider trading? What about "moral hazard"? What about incentives to start false rumors? What about incentives to keep information secret? Won't an apparent consensus create a crowd mentality? Will the new incentives slow or stop convergence? Won't different claim wordings, judges, and base assets confuse the consensus? Won't the consensus reflect risk preferences as well as beliefs? Won't betting challenges discourage creativity? What's the point of a "consensus" that people disagree with? Isn't it better for people to argue out their own disputes? Won't this have the same problems as patents? Wouldn't anonymous trading screw up reputation statistics? If this is so great, why hasn't it happened already? Won't greed sully the pure pursuit of ideas? Does a few dollars of compensation in the end really help a rejected visionary? Doesn't this presume there is some absolute truth? Won't convergence be culturally relative? Isn't consistency unhealthy? Doesn't organized crime take over anything having to do with gambling? What about libel and national security? What about "Nuclear war will destroy 90% of the world by 2020"? Won't different claim wordings, judges, and investment instruments fragment the market? Why should verdicts be consistent with one another? Won't judges be reluctant to contradict the market? What if the probabilities get very small? Why not do without judges?

with assets contingent on every possible state of the world. In reality markets are not complete, and various sorts of "market failure" are traced to this fact.

Incompleteness is usually [Hir] explained as due to judging difficulties, finite transaction costs, and market thinness. In fact, these authors are often unaware that such markets are almost universally prohibited by anti-gambling laws, as joint-stock companies, life insurance, and commodity futures [Ros] were prohibited before special interests managed to obtain exemptions. Though unevenly enforced, such laws prohibit public science bets between strangers in all of the U.S. and in most of the world.

Only Great Britain, to my knowledge, allows such bets, and then only for the last three decades. English bookmakers perceive little demand for science bets, and so take them mainly to induce popular articles mentioning the going odds on unusual subjects [ShG]. This publicity brings in new clients, who may then switch to the "real" betting on sports. Because of this, bookies prefer small bets on subjects "in good taste" that anyone can understand, like UFOs, Yetis, and Moon landings. They avoid subjects that seem too esoteric for the general public, like the recent "cold fusion" claims, and subjects that won't very clearly resolve themselves, as a judging industry has not yet evolved.

Bookmakers traditionally prefer to set prices and stick to them, rather than setting up markets, letting prices fluctuate, and playing market-maker. Because of this, they are usually unwilling to offer bets on claims where they do not know how to estimate the odds, and few bookies have advanced science educations. As a result, they mainly take safe bets, siding with the scientific establishment against "crazy" outside theories, which doesn't help the image problem betting has in many quarters. One cannot even subscribe to a publication listing the going prices on science questions. It should be possible to improve on this.

AN APPEAL

Idea futures is mainly just a curiosity to most people, even those convinced of its feasibility and desirability. It would require substantial effort to implement, and in some sense is a trivially obvious idea, given the appropriate theoretical background. I think the only people who might actually be willing to work to make it happen are people who are particularly unhappy with current methods of forming and communicating scientific consensus, and how those methods have treated issues dear to them. People perhaps like *Extropy* readers, sympathetic to markets and subjects, like cryonics and uploading, which current consensus institutions deal poorly with. I fear it will require more effort than I alone can muster to make it real. It may well be that if you don't do it, no one will; what do you say?

There are many options for pursuing idea futures. I have worked to gain the attention of "science policy" academics [Han92], and idea futures will soon be a known, if oddball, suggested alternative mechanism for science funding. I have mostly developed a board game and to a lesser extent an email reputation game. Legal research is probably the most important task, but it is on hold for a lack of funds.

CONCLUSION

I have argued that futures markets in ideas could help the evolution of ideas by creating a visible consensus of relevant experts, and better incentives for honesty and care when making contributions. Idea futures might offer these and many other benefits cheaply and without coercion. Though some problems remain, it seems worth further study.

I leave the reader with this challenge: Can you think of a question where 1) you think the answer will eventually become clear, or would with enough study, and 2) you think you disagree with some generally perceived majority opinion? If so, imagine creating a market in that claim and then making a few trades.

MATH APPENDIX

VARIABLES:
P(A) = Market probability of A
J(A) = Judge's verdict probability of A
$X = An investment with a current market value of X dollars.
C = Total value of distributed coupons on a claim
F = Total budget available for judging

f = Maximum percentage judging fee

IDENTITIES: $X = "$X if True"

"($X if A) if B" = "$X if (A and B)"

EXCHANGES: (These remain valid if change $X to "$X if A", or multiply all $ by a constant)

Split/Join: $1 <-> "$1 if B", "$1 if not B"

Trading on A: $P(A) <-> "$1 if A"

On A given B: $P(A given B) <-> "$P if not B", "$1 if B and A"

Cash in with Judges: "$1 if A" -> $J(A)   "$1 if not A" -> $(1 - J(A))

DUTCH BOOK EXAMPLE: If P(A) + P(not A) < 1, then can buy "$1 if A" and "$1 if not A" for less than $1, sell the pair to the bank for $1, and make a profit.

JUDGING FEES:

1) If f*C >= F, pay $F to judges, reduce coupon values $X -> $X*(1-(F/C))

2) If f*C = 0, no judging happens

3) If 0 < f*C < F, Take C and play a lottery: With probability C*f/F, increase value of coupons $X -> $X*F/(C*f) and do 1) Otherwise $X -> $0 and do 2)

MARKET MAKER ALGORITHM: (See Figure 2)

Choose a function M(i) from integers to [0,1] such that M(i) > M(i+1),   M(0) = 1/2.

Choose a transaction quantity Q.

Market starts at j = 0.

Offer "$Q if A" -> $(Q*M(j)) and if taken j -> j+1 Offer "$Q if A" <- $(Q*M(j+1))   and if taken j -> j-1

If M(i) = 1/(1 + exp(i/k)), total loss <~ $Q*k/2.

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DYNAMIC OPTIMISM
Epistemological Psychology for Extropians

by Max More

Abstract:
The Extropian principle of Dynamic Optimism (D.O.) is analyzed and shown to be a valuable empowering element of this philosophy of life. The distinctive features of a dynamically optimistic attitude are explored and distinguished from those of faith. Dynamic optimism is shown to be a rational and practical approach to life. The pervasive temptation for humans to slide into passive faith is examined and some preventive measures suggested.

One of the four fundamental principles of Extropianism is Dynamic Optimism (D.O.), which can be defined as: "A positive and empowering rational attitude toward our individual and collective possibilities." This definition must be taken in the context of the following discussion since "optimism" has been used in a variety of senses. A major objective of this essay is to clarify the nature of a type of optimism appropriate to a rational extropian philosophy, and to distinguish it from the very superficially similar attitude of faith common to religions. Explication of D.O. will make it obvious how it mutually supports the other Extropian Principles, especially Boundless Expansion and Self-Transformation.

Optimism vs Pessimism.

"I'm neither an optimist nor a pessimist; I'm a realist." This reasonable sounding expression is intended to convey a commitment to truth, good judgement, and rationality. The problem with this claim is that it assumes the terms to refer to purely epistemological policies — policies of underestimating, correctly estimating, and overestimating good outcomes respectively. But optimists and pessimists both believe they are realists; the fact that they don't refer to themselves that way hints that these terms are psychological as well as epistemological. To borrow an awkward but useful term from Ayn Rand, optimism and pessimism are psycho-epistemological traits.[1] That is, they are more than detached assessments of objective probability; they are commitments to a particular mode of cognition and action.

Optimism and pessimism are personal characteristics having both psychological and knowledge-related aspects integrated into action-guiding attitudes. They profoundly affect a person's thinking, behavior, happiness and achievement. Extropianism, as a philosophical approach to life, must require or encourage some form of either pessimism or optimism; the question is whether such a philosophy will affirm a psycho-epistemological position implicitly or explicitly, in full awareness of its effects on the lives of those who affirm its principles. To explain this important aspect of the Extropian perspective, I will set out eight components and contributing causes of optimism — specifically Dynamic Optimism — and contrast them with pessimism. The eight aspects of D.O. are set out such that the first four apply also to other types of optimism. In the following section I will distinguish D.O. from passive and dogmatic forms of optimism by focusing on features 5-8.

(1) Selective focus: Any form of optimism, rational or irrational, involves a focus on the positive aspects of life and a de-emphasis of the dark side. This means the individual will see more of what he or she regards as good. This need not

require a denial of pain, difficulty or frustration; rather it may be a matter of spending less time on unpleasantness, and of apprehending unpleasant things in a masterful, empowering way instead of a helpless, victimizing way. Optimists attend to the downsides of life only insofar as doing so is likely to enable them to move ahead. Optimists are too occupied with entertaining encouraging, empowering thoughts to dwell on miseries that they cannot control.

"A pessimist is one who feels bad when he feels good for fear he'll feel worse when he feels better." (Anonymous). Pessimists have a filter reversed from that of optimists. Pessimists are fixated on everything that could possibly annoy them, or frustrate them, or hurt them. If something goes well, it is not to be believed. If it goes badly, it shows that things are getting worse. Extreme pessimists are filled with despair because every option open to them is imagined as being crowded with waiting traps.

(2) Stoicism: Optimists are rarely heard to complain; when they do it's because something is truly wrong and complaining may rectify it. They notice, seek out and cultivate the parts of life that are good, enjoyable, rewarding, beautiful, exhilarating. They don't whine and moan about things that are past or out of their control. When truly suffering they are stoic and practical in coping with their situation. Pessimists find it difficult to communicate anything without conveying a sense of burden and futility. Dignified pessimists don't complain about their world to others, but cannot help projecting a sense of gloom and casting a shroud of cynicism over the confident enjoyment of others.

(3) Questioning of limits: Optimists' dislike of obstacles to their plans leads them unreflectively to deny limits (passive) or to be skeptical of entrenched and unquestioned beliefs regarding limits (dynamic). Optimists will question and probe at any entrenched limiting assumptions, especially where these appear to lack a rationally convincing basis. Only an iron-clad demonstration of impossibility (such as Godel's incompleteness theorem) will stop them; even then optimists will be careful not to draw unnecessarily frustrating conclusions. This means accepting limits as limits-within-a-context and then widening the context to step around the obstacle. For example, an optimist may accept the Second Law of Thermodynamics but will resist unproved consequences such as the impossibility of achieving an infinite amount of life and thought.[2]

Optimists are especially suspicious of purported limitations that are said to be "sacred", "natural", or part of "God's plan". The passive optimist may deny limits by reference to revelation and dogma; the dynamic optimist will challenge limits through a directed application of reason, analysis and creative thinking to a problem. Either form of optimism contrasts with the pessimist who accepts all limits without question, being more comfortable with the given, and lacking the drive to search for solutions.

(4) Energizing: Viewing the world optimistically is energizing; it encourages cheerfulness and activity. In the higher-energy optimistic state you want to tackle tasks because you expect to enjoy the activity and make *progress* at it. A boostrapping effect is likely to operate: The increase in enthusiasm resulting from optimism tends to lead to effort and progress which generates more optimism, in a virtuous circle. Pessimistic thinking enervates, discouraging activity, resulting in stagnation and deeper pessimism.

(5) Self-improving: Optimists are constantly engaged in an evolutionary process of growth, self-correction, and improvement. Since optimists have supportive expectations of their actions, they are not paralyzed by fear of failure, or being wrong, or making mistakes, as are pessimists. Pessimists will be static and conservative, avoiding uncertain changes because they entertain all the possible undesirable outcomes. This aspect of dynamic optimism connects it with the principle of Self-Transformation: The dynamically optimistic self-conception will be one of the self as a *process* rather than fixed state. Optimists expect to keep improving everything that matters to them.

(6) Experimental: Related to the previous aspect, the dynamic optimist is constantly experimenting, searching for better solutions to blockages and barriers. An optimistic attitude encourages openness to new sources of information and

new methods of improving life. A well-integrated attitude of positive expectation programs the brain to apprehend opportunities and possibilities. This open, experimental attitude is creative, analytical, critical, and empirical. The dynamic optimist will be the first to examine means of extending lifespan, enhancing intelligence, and improving health, such as life extending nutrients and drugs or scientifically constructed diets, nootropics, cryonics, uploading, and non-traditional lifestyles. The dynamic optimist eagerly learns from culturally entrenched practices, but puts no faith in them, evaluating and rejecting them when appropriate, and implementing new practices if these offer advantages.

The contrasting practice of the pessimist involves clinging to the old and familiar, the authorized, regulated and approved. Pessimists will be the last to adopt superior practices and will deny any reason to change where this will disrupt their indolence and secure conservatism. The massive and growing encrustation of statist institutions — regulatory agencies, liability rules, taxation, compulsory welfarism — all are reflections of pessimism and conservatism.

(7) Self-confidence: Self-confidence is inseparable from dynamic optimism. Dynamic optimism and self-confidence both involve our belief that good things are possible because we can and will bring them about. Self-confidence generates the force to persist in the face of hardship and to continue making the effort, finally to overcome. Pessimists, believing desirable goals to be unattainable, do not persist; in giving up so soon and thereby failing, they reinforce their sense of personal inefficacy. Pervasive pessimism in a person goes hand in hand with a self-image conveying failure, inability and resignation. The drive towards self-improvement and the willingness to experiment with non-standard practices cannot exist without self-confidence.

(8) Personal responsibility: Dynamic optimism entails personal responsibility since it is the attitude that goals are achievable through personal effort. This aspect of D.O. may partly explain why Extropians are almost always highly libertarian. Libertarians favor a society where everyone is free to make their own choices, and to bear the costs of their own mistakes rather than shift those costs onto someone who has not made those choices. An illustration of this is the libertarian's rejection of laws banning drugs: Such laws are, in part, intended to protect persons from themselves but result in harm to others, such as when a desperate drug abuser steals from uninvolved parties in order to finance a habit made vastly more expensive than it would be without the laws. Pessimists are much more comfortable depending on the nanny state's promise of a stifling security. Libertarians hold that individuals can and should take responsibility for their choices in the market and for the direction of their lives. Extropian values such as continuing personal growth and transformation must be actively pursued; they will not happen by default.

The principle of Dynamic Optimism has appeared in various forms elsewhere, such as in Ayn Rand's contrasting of those who seek the positive with those who avoid the negative. The former are those who pursue positive values to enhance their lives; the latter are paralyzed by fear, expending their energies in an attempt to avoid the undesirable rather than in seeking the desirable. In Rand's thought these opposed tendencies are related to holding a premise of either a benevolent universe or malevolent universe. Dynamic optimism might be described as embodying a benevolent universe perspective because it proclaims existence to be full of possibility and says that we should regard ourselves as essentially free to make of life what we want. The malevolent universe perspective, held by the pessimist, sees activity as futile because the universe will always frustrate our Promethean efforts. The malevolent universe view permeates many cultures, from the stories of the Tower of Babel, Icarus and Phaeton to environmental doomsaying and crisis-mongering.

Active Optimism vs. Passive Faith.

Optimism of any kind involves positive expectations of the future. These expectations may relate to a person's own life or to their view of the possibilities for a wider group of persons. Beyond

this, "optimism" can refer to two importantly different attitudes. The psychological and epistemological gulf between the two meanings of the word explains why I prefer to talk of *dynamic* optimism. The basic distinction is between a dynamic, active optimism and a passive form, which I will refer to as "faith". Later sections will examine the strength of the psychological border between them and how it might be maintained.

"Faith" is sometimes used in a way that is compatible with dynamic optimism and rationality. This is the sense in which "I have faith in him" means "I trust him (due to past experience)" or "I believe he can do it (due to past experience)". But the sense of "faith" I am using is the one intrinsic to religious and dogmatic thinking. Faith in this sense, the sense incompatible with dynamic optimism, is a persistent belief in something in the absence of supporting evidence or reasons, or in the face of conflicting evidence or reasons (where the evidence or reasons have not been been defeated). In contrasting faith with D.O., I am interested only in *optimistic* faith regarding beliefs rather than in any neutral belief held with faith. Dynamic optimism and optimistic faith can be accurately distinguished by observing how they differ over some of the features listed in the previous section, especially the first, and the fifth to eighth.

Starting with the first characteristic — selective focus — already the two varieties of optimism can be differentiated. A person is passively optimistic when they turn away from what they don't want to see, believing that events will *somehow* work out for them. This kind of cognitive filtering comforts the person but fails to address the problem. Dynamic optimism will also encourage you to reduce negative incoming data when such data is not conducive to solving a problem. This means not spending time worrying over events or situations that you cannot affect or that you judge not worth involving yourself in. A dynamic optimist faces a difficulty squarely when this is necessary to understand and tackle it. But even here selective focus is used to reframe the difficulty so that it is regarded as a *challenge* rather than a *problem*, and is viewed in a context of possibilities and resources for overcoming the difficulty rather than

fixing on the difficulty alone.

In terms of the fifth aspect — self-improving — dynamic optimists identify themselves not with a particular set of beliefs and practices but with the active process of learning, correction and improvement. This means that they are not afraid of being wrong, and they boldly keep trying new strategies for winning — they implement the advice of Thomas Watson, founder of IBM: "The way to succeed is to double your failure rate." This aspect of D.O. is what fosters active thinking, thinking receptive to new ideas, new methods and strategies. Being corrected by new information is welcomed because it means a step in the right direction. Successful living is understood by dynamic optimists as a cybernetic process of continual error-correction. This perspective makes it difficult for them to resent corrections from others.

Compared with the experimental aspect (6) of dynamic optimism, optimistic faith is much more static. Rather than conceiving of their selves as processes of continual change fideists identify with particular beliefs and practices, substituting dogmatism for critical experimentation. Correction is painful to fideists and so they are likely to ignore, dismiss, or brand as immoral differing beliefs and methods. Dogmatic beliefs are held to be *certainly* true, removing any need for alternatives. This attitude, in a religious context, has been stated in a particularly unapologetic and extreme form by the Church father Tertullian:

> After Jesus we have no need of speculation, after the Gospel no need of research. When we come to believe, we have no desire to believe anything else; for we begin by believing that there is nothing else which we have to believe."[3]

The dynamic optimist rejects faith, valuing reality and progress over comfortable delusion. Some may prefer not to *believe* any difficult, controversial or uncertain theory, regarding them instead as working hypotheses. This is not merely a verbal difference but reflects different cognitive practices. Belief involves identifying a theoretical model with reality, whereas a working hypothesis is a tool by which understanding is improved and which may or may not be a fully accurate representation of

reality.[4] The dynamic optimist realizes that a theory, be it trivial or grand, is not guaranteed to be true simply because it "works". A theory can produce many useful results while being radically false: Consider the concept of mass in Newtonian physics. This intrinsic property of objects is no longer part of physics, having given way to the relational concept of mass defined in General Relativity. Despite the non-existence of intrinsic mass, the concept was used to successfully predict a vast number of observations. Further back, we can see similar examples with Aristotle's notion of impetus, and concepts of phlogiston and caloric.

Dynamic optimists practice an empirical and rational approach to life — testing new approaches and critically examining purported answers. They are primed to notice and take advantage of new and better means of advancement. Fideists see no reason to be open to alternatives, for their faith involves the certainty that all truth has already been discovered through some "infallible" method such as revelation; no need is seen for experimentation and critical analysis. Indeed, these are to be discouraged, the fideist believes, because they will inevitably lead one into error and evil.

We have seen that D.O. necessarily involves self-confidence, the belief that one is able to persist and succeed. Faith is likely to generate confidence too, but it is less *self*-confidence than confidence in forces outside the individual. This externally directed confidence is more likely to result in passivity since the belief in success or fulfilment need no longer be founded on a commitment to personal effort. Passivity may occasionally be avoided in some aspects of a religious life if the tenets of the faith happen to order the person to engage in particular productive activities. But, as explained above, even then the person will pursue advancement in a rigid, uncritical manner. Personal responsibility will be undermined by the fideist's blind trust in external (and invisible) forces, forces that announce supposedly certain truths and require the sacrifice of individual judgement, analysis and choice.

As an illustration of the profound difference between dynamic optimism and faith, consider the responses of dynamic optimists and fideists to the threat of death. Fideists assuage their fears by an ungrounded but psychologically certain belief in a non-physical afterlife. To overcome death requires nothing more than belief in the "correct" dogma or, at most, requires following a prescribed set of practices and perhaps making financial and other sacrifices to the institution associated with the dogma. Dynamic optimists reject any such passive and comforting yet futile approach. They investigate and adopt any promising strategy for postponing or eliminating death. They study how most effectively to exercise and then engage in it. Dynamic optimists will look at dietary means of life extension, use of nutrients and drugs, cryonics and other personality preservation techniques, and uploading.

Faith need not be associated with religion but religion is its natural home, providing systematization and reinforcement. Systematized faith in particular doctrines is dogma. Religions by their nature require dogma: An unquestioning belief, a surrender of probing reason, an abdication of cognitive responsibility. This is the appeal of religions to most people. Submitting yourself to religious faith saves you from the search for better understanding, from the burden of intellectual autonomy, from experimentation and the search for solutions to life's challenges, and it offers you ready-made answers and invests responsibility not in you but in a God or divine forces beyond your control. Religious faith relieves you of personal responsibility for making real choices whether intellectually or morally, instead handing you the answers. This passivity is bolstered by the certainty with which you are imbued once you join the system. It is also, or course, the religious individual's unquestioning faith and intellectual and moral passivity that makes him or her an easy target for manipulation by religious institutions.

Where faith is essential to religion, dynamic optimism is intrinsic to the tranhumanist philosophy of Extropianism. The principle of Dynamic Optimism expresses an extropian optimism which differs drastically from the optimism to be found in religious faith. D.O. encourages us to see ourselves as continually changing and improving and

questioning the status quo; it supports our self-confidence and promotes our critical and probing search for ever better means of advancing ourselves, and it affirms our personal responsibility. These characteristics, so at variance with dogmatic optimism, can only promote tolerance of experimentation and diversity, and welcome change instead of fearing and attacking it. The principle of Dynamic Optimism is what allows Extropianism to be a guide and a spur to action and to focus our thoughts and efforts while avoiding the dogma common to religious philosophies of life.

Keeping Optimism Dynamic

There is no sharp dividing line between dynamic optimism and faith, so it is our responsibility as Extropians to continually guard against sinking into faith. The distinction between the two is not one of the strength of beliefs, for faith can be weak — though this is an unstable state — and many very ordinary beliefs are extremely strongly held, e.g., my belief that I currently live in Los Angeles, that the Earth orbits the sun and that I am biologically male. The foregoing discussion indicates that it's more a matter of attitudes to disconfirming evidence or contrary arguments and of a willingness to maintain an activity of searching, critical experimentation, and personal responsibility for cognitive activity.

There can be neither final personal nor institutional guarantee against creeping faith and intellectual passivity but certain habits and practices might be adopted by Extropians to guard against it. In developing the Extropian philosophy, we should always stress that it is to be understood in terms of attitudes and tendencies encouraging us to move forward, upward, outward rather than as a set of fixed beliefs about particular goals and particular means to those goals.

Reinforcement of dynamically optimistic thinking can be built into regular meditation and planning sessions. Regular sessions for the purpose of setting personal goals and priorities provide an opportunity for a reality check: They are a time for reassessing personal long-term and short-term goals and the effectiveness of the means

being used.[5] These planning sessions can be used for both the motivational and critical aspects of D.O.: Optimistic and ambitious goal setting and visualization in addition to a regular critical evaluation of the efficacy of current beliefs and methods.

Another way of maintaining a high level of optimism while avoiding intellectual passivity and certainty is to subject your ideas to evaluation by other extropically-minded persons.[6] Such individuals and groups are likely to support the same general values and goals and so will not be hostile, but will restrain unbridled flights of fantasy. Testing your ideas in groups that are fundamentally opposed to your goals, or who cannot comprehend them, is neither encouraging nor enlightening. Testing your ideas in supportive yet critical and analytical intellectual communities is *vital*.

Faith, Optimism, and Uncertainty

"Many people would sooner die than think. In fact they do." Bertrand Russell's barbed observation applies forcefully to extropian issues of life extension and physical immortalism. Most humans exhibit a deep need for certainty. Certainty of belief, even if it reduces the chances of achieving important goals, is more comfortable than uncertainty. Certainty is soothing since it requires no action. If you are certain an event will occur you need not contribute to bringing it about; if you hold a belief with certainty you need not look for contrary evidence and can ignore evidence presented to you.

All current human cultures exhibit this desire for certainty. It infests the prevailing cross-party political economy of welfare statism and is thoroughly at home in all religions with ideas of heaven, merging with "the Godhead" or dispossession of the ego. But this entropic temptation spreads even into science, with many scientists adopting a dogmatic Establishment stand rather than a critical yet receptive inquiry.[7] Certainty-seeking threatens extropian goals both externally and internally to our "virtual community". Externally the desire for certainty results in anti-extropian resistence to social and technological innovation. Ignorant anti-cryonicists and biological fundamen-

talist opponents of genetic modification are salient examples of the harmful practical effects of this psychological trait. (The internal threat I will discuss in the next section.)

In advancing the desirability of radical life extension and means such as cryonics and uploading, we encounter a depth of incomprehension and hostility. Whether the person being addressed is religious or atheistic, resistance to a serious and open consideration of immortalism stems from a desire to avoid the discomfort of uncertainty, possibility and choice. For the religious, a dogmatic belief in an effortless, blissful afterlife allows them to avoid confronting death. All that is required of them, they feel, is to believe. Few or no actions are necessary to secure the certain continuation of life, and any prescribed actions (such as worship) that may be necessary guarantee indefinite and effortless life.

Some of the non-believers in an afterlife, from the non-philosophical to the humanists, from the deathists who say death is natural and therefore good to the ephemeralists who assert death's "inevitable" evil, share a dogmatic certainty. If you are unable to delude yourself into a religious belief in a non-physical afterlife — either being insufficiently dishonest or being constrained by a non-religious sub-culture — your alternative to living with uncertainty is to accept death as absolutely inevitable, "as inevitable as death and taxes". The certainty of death allows you to stop thinking about it, to reconcile yourself to your fate, and to ignore the annoying and difficult claims of immortalists. Deathists present personal extinction as the delightful culmination of life, in the absence of which life would lose its meaning. Ephemeralists don't pretend annihilation to be good but agree with deathists that death should be accepted gracefully. And the humanist ephemeralists make a philosophical and psychological virtue of this acceptance.[8]

To avoid misinterpretation I wish to say that I am *not* claiming that everyone other than transhumanist immortalists has succumbed to the temptation of dogmatic certainty. The comparative youth of transhumanist philosophies such as Extropianism and of practices like cryonics means

that most of the world is unfamiliar with non-religious alternatives to certain death. A fraction of those who believe death to be certain and human limitations to be inevitable would be willing to reconsider upon discovering our ideas. It is only those who *refuse* to reconsider who lack courage and rationality. Those with a stronger drive to live and grow will accept the possibility of indefinitely extending life and the concomitant need for careful and continuous thought and action to actualize the possibility.

Extropian ideas of unlimited lifespan and somatic and cognitive augmentation are especially liable to arouse dogmatic responses in non-Extropians. To consider the possibility that extropian goals might be possible and even desirable requires an enormous alteration in a person's worldview. It may require changing habits affecting health, learning about the many possible life-extension measures, going against family and community norms by making cryonic suspension arrangements and altering wills and burial plans, changing the way time and resources are spent, and re-examining all priorities to make them compatible with extropian values. So long as extropian ideas are shared by so few, the threat of isolation and alienation from normal culture and friends may be too daunting. How much easier it is to reject these heretic ideas out of hand. If the prospect of radical alteration of world-view is particularly frightening to some timid persons, they may even denounce the Extropian heresy as evil. At the very least, they will say, it must be *unnatural.*

Uploading, Cryonics, and Faith

So tempting is certainty of survival, and so distressing uncertainty, that even transhumanists may fall prey to it. I have noticed tendencies towards dogmatic certainty among some cryonics and uploading enthusiasts. Having found a possible present or future means of avoiding death and having made changes in their view of life, these persons are tempted to stop searching for ways of improving their chances. There are those who agree that cryonics has a reasonable chance of working, but who choose not to make suspen-

sion arrangements believing that before they need suspending they will be uploaded into more durable hardware. Some of these people are not young, and have, in my view, unrealistic beliefs regarding when uploading will be possible. Given that no one has yet been able to demonstrate clearly what kind of device will be necessary to preserve our selves fully, and given the significant chance of accident or disease, their extreme confidence that they won't need suspending is, in my judgement, foolish.

There is a related tendency in these cryonicists and uploaders to talk about uploading or revival from suspension as if it will suddenly and totally eliminate any difficulties with life. We are given the impression that transhuman or posthuman existence will be one of constant bliss, without need for effort or struggle as a result of dramatically enhanced intelligence and superior

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So tempting is certainty of survival, and so distressing uncertainty, that even transhumanists may fall prey to it.

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bodies. A Pollyanna view like this turns the idea of uploading or revival from suspension into a variation on the Christian Rapture in which the faithful ascend to heaven and leave behind all the problems of the World.[9] But realistically we can expect life to continue to be full of challenges requiring thoughtful attention and action, though the challenges will not be the same as today's and the possible rewards will be much grander.

Dynamic Optimism does not sanction these tendencies toward dogmatic passivity and faith. D.O. requires us to treat no practice or solution as final or certain to succeed. Faith that uploading or cryonics will certainly work and work in time for us is deadly. It will discourage both the search for ways to improve the probability that cryonics and

uploading will work and the search for superior alternatives. The tendency towards certainty may partly explain why too many cryonicists and uploaders fail to take charge of their health. It's much easier to believe that you have a sure escape route in the future from death than to control your diet and exercise in the present.

Some transhumanist practices and beliefs are more prone to the error of certitude and intellectual passivity than others. Uploading seems to be one such idea because of the radical and discontinuous nature of the transformation, which gives it the tone of a Rapture. This is one reason why I concur with Thomas Donaldson in preferring an expectation of gradual metamorphosis to that of discontinuous uploading. The process of metamorphosing will require us to carefully and continuously select and integrate the optimal somatic and cognitive upgrades. Uploading promises a radical change that requires no effort on our part.

Cryonics is, at present, protected to a degree simply because its very survival as an activity requires its practitioners to improve their technical and organizational abilities and to justify its practicability to indifferent or hostile outsiders. One particularly vulnerable belief system is Universal Immortalism (UI). The Order of Universal Immortalism (OUI)[10] is an outgrowth of the Society for Venturism. Venturism itself might be thought of as similar to a small part of Extropianism,[11] in that it is defined in terms of seeking the technological abolition of involuntary death through technological means. Universal Immortalism goes further in that it is committed to returning to life everyone who has ever died.

This goal, if theoretically and practically feasible at all, is so extremely remote from current possibility that it may tend to induce either indifference or certainty. Furthermore, Universal Immortalism may tempt some to reduce their efforts to secure indefinite life because of the belief that other Universal Immortalists will eventually recreate them. Neither of these negative effects will *necessarily* follow from Universal Immortalism, yet this doctrine is much more prone to these effects than is cryonics.

If we are to continue advancing toward

better ways of achieving extropian goals such as indefinite life, augmented intellectual and physical capacities, and expanding personal freedom, we must remain on guard against creeping certainty and dogmatism. In part we should work on changing our self-conception away from that of someone who must be "right" and instead identify ourselves with the process of learning, growing, and transforming. We will each have our favored means of pursuing our common goals, but we are responsible for remaining open to alternatives and to new information. We will either remain flexible and live with uncertainty, or we will stagnate and perish.

Possibility and Belief

Extropianism is defined by principles including Self-Transformation and Boundless Expansion and characterized by a desire to continually overcome limits. We must therefore be concerned with the question of how far we can go in pursuing these goals. What is possible to us and what is impossible? Dynamic optimism encourages us to question traditional limitations. But what limits are we to accept in our planning and imagining? We need some principles to ensure that in rejecting pessimistic beliefs about limitations dynamic optimism does not push us into absurdity. A satisfactory treatment of the rational bounds to optimism would require a separate paper, or an entire book.[12] Nevertheless, some suggestions need to be offered here to ward off misunderstanding of dynamic optimism from the beginning.

In asking ourselves, or being asked by non-extropians, whether any goal is possible we can break the question down into categories of technical possibility, empirical (or scientific) possibility, and logical or conceptual possibility, though whether these categories are always sharply differentiated is open to doubt.[13] I will primarily discuss the most important distinction for our purposes here — that between technical and empirical (scientific) possibility.

To say that a goal, such as landing humans on Mars or constructing a nanotechnological assembler is technically possible is to say that it can be accomplished with current technology. But this is still somewhat indeterminate; does it mean possible with machines currently in existence? Or machines either in existence or on the drawing board? Or possible with technology that exists elsewhere, whether we know of it or not? Something that is thought to be technically impossible may still be empirically or scientifically possible. Something is empirically possible so long as it is not ruled out by the known regularities of nature.[14] An example of an empirically impossible goal is the construction of a perpetual motion device because of the First and Second Laws of Thermodynamics.

Technical impossibility need not frighten off Extropians from their goals. Complete control over the aging process is technically impossible now, but we have no reason to judge it to be empirically impossible. We might hold, as a guide to action, a principle that says "anything that is empirically possible will eventually be technically possible", on the condition that technological progress continues. This seems to be a reasonable working principle so long as we don't make *short-term* decisions on the assumption that something now technically impossible but empirically possible will become technically possible soon despite our having no idea how this thing could be accomplished.

An objection might be raised to the effect that many empirically possible things will never be technically possible because the technical problems involved are too hard for human brains to ever solve. Though this might be true of some goals, omniscience would be required to *know* it to be true of any specific goal since all possible routes to the goal would have to be ruled out in advance. No matter how many means to a technological goal fail, tomorrow someone may think of a new method that works. Furthermore, the objection makes the typically non-extropian assumption that we will always be limited to the capacities of human brains.

Some things may seem to be conceptually possible, i.e., conceivable, even though empirically or scientifically impossible. Some people think that faster-than-light (FTL) travel and backwards time-travel fall into this category. Others would say that the apparent conceivability results from having only a superficial grasp of the concepts involved. Suppose we assume that a goal such as

FTL travel is conceivable but agree that it's scientifically impossible. Is it reasonable to believe that we will one day be able to achieve FTL speeds? If the scientific paradigm that rules out FTL has been around for a long time, has demonstrated enormous explanatory and predictive power, and has withstood many attempts to disconfirm it, then it would surely be unreasonable to make practical plans on the assumption that FTL would eventually be possible. A high degree of confidence in the prevailing theory would be justified.

However, scientific theories are never certain. Part of what makes a theory scientific is vulnerability to refutation by sufficient contrary evidence (and the availability of an alternative theory). No matter how well-established a theory is, there is always some minimal possibility that it will have to be revised. Such a possibility is too remote to justify practical planning and action but it may justify pure speculation, for this may lead to research which might revise the current paradigm. A reasonable principle governing how we spend our time and effort might instruct us to apportion our time and effort in seeking desired goals in proportion to their degree of possibility or probability multiplied by their desirability.

Mechanisms of Empowerment.

The mechanisms by which Dynamic Optimism promotes effective behavior are implicit in earlier sections, but this section will make these mechanisms explicit. One category of methods by which D.O. empowers can be referred to as "reframing".[15] Reframing involves altering the meaning or context of a situation or event in order to change one's emotional and behavioral responses. There are content and context reframes, though the distinction is a matter of degree.

A dynamically optimistic *content* reframe places a more positive, empowering interpretation on an event. For a simple example, Robbins (1986) cites a general who, in a heavy enemy attack, announced to his troops: "We're not retreating, we're advancing in another direction." Such content reframes can be self-delusive rationalizations, but they can also be helpful interpretations of events for which the "correct" interpretation is unknown. If you have been insulted, for instance, you can either frame this to mean that you really are bad in some respect, or that the person issues the insult because of some deficiency of their own.

A *context* reframe accepts an event for what it is or appears to be but changes cognitive focus in order to alter the context in which the event is seen. This kind of reframe is unlikely to require rationalization or denial of facts. Rather, it will involve concentrating on what can be learned from the event, what opportunities it opens up, and what benefits can be drawn from it, instead of seeing the event as an unpleasant, annoying, impossible obstacle.

Context reframing allows an apparently unpleasant or frustrating event to be a means of learning. An unhealthy response is to focus exclusively on the frustration, building it up, allowing it to fill your mind, and exaggerating its badness. A positive reframe involves concentrating on what can be learned from the event, and how its recurrence can be prevented. Most people realize in the abstract that advancing requires some frustrations and setbacks, yet this is too often forgotten in practice. You cannot find out what works without often taking paths that lead to a dead end. If you focus on the goal, regarding setbacks along the way as learning experiences and progress, you will be far more motivated and persistent in trying again until you succeed. Practicing dynamic optimism means stopping yourself from moaning about and exaggerating problems; it means spending your time confidently looking for ways to solve the problems.

Some people characteristically respond to challenging situations by withdrawing, complaining, and "catastrophizing" while others smile, rub their hands, and rise to the challenge with enthusiasm and creativity. It may appear that those in the first category can never move into the second. However, there are a number of techniques capable of changing habitual behaviors.[16] A simple one is this: As soon as you become aware of yourself engaging in self-defeating thinking and behavior say to yourself "STOP!" Then deliberately relax all your muscles and breathe deeply and

slowly, retaining each breath to oxygenate your brain and promote clarity of thought. Then ask yourself: "How can I respond most effectively?" This procedure is more effective when you have previously engaged in visualization sessions in which you see yourself following the procedure and imagine some effective responses. Exercises of this kind build an ability to remain in charge, immunized against uncontrolled negative emotions and unproductive reactions. They will promote an attitude that sees obstacles as challenges rather as problems.

Apart from reframing occurrent situations, dynamic optimism also involves being primed in advance to always be on the lookout for opportunities and possibilities. It involves cultivating critical and analytical thinking, mutually beneficial friendships, and access to resources. Experiments in cognitive psychology have demonstrated that people are better at recognizing patterns for which they have been primed. Spending some time on a daily basis meditating on your goals and forming a commitment to achieving them will put your brain in a state where it will be more alert to effective means to those goals. Frequent recall of goals and visualization of yourself progressing toward them will reinforce a self-image of achieving, persisting, succeeding. Self-image acts as a cognitive map; your brain checks the map when selecting "fitting" emotions, behaviors and responses. Deliberate creation and reinforcement of a dynamically optimistic self-image is therefore tremendously important for success.

Dynamic Optimism in Our Culture

Much of contemporary culture, in both Europe and America, is permeated by negativity, especially when the topic at hand is humankind's place and direction. Too many environmentalists promote a view of humankind as a pestilence on the face of Gaia. Our suggestion that the species should strive to extend its lifespan, and push back other natural and inherited limitations evokes dismay and incomprehension amongst these entropists. Movies invariably portray the future as a harsh and mean place with terrible environmen-

tal problems. And too many people find the idea of life extension and cryonics repulsive because of these culturally reinforced entropic world-views.

Not everyone accepts or promotes such a destructive attitude yet even those who don't buy into it find themselves weighed down by those who bow down to entropy. Since our goals require enormous technological advances and bold scientific quests, we Extropians have a particular need to reverse these entropic cultural trends. The purpose of this essay has been to make explicit a core element and motivating force of the shared world-view that we affirm as Extropians. With a fully conscious awareness of the importance of dynamic optimism perhaps we Extropians can resist the tide of gloom with increased efficacy, and infect those around us with a more enjoyable, productive and liberating attitude.[17]

Notes

[1] Rand's definition is "Psycho-epistemology is the study of man's cognitive processes from the aspect of the interaction between man's conscious mind and automatic functions of his subconscious." Ayn Rand, 1971, p.190. Nathaniel Branden discusses psycho-epistemology in more depth in Ch.6 of Branden, 1969.

[2] See Dyson, 1988, Ch.6 and Moravec, 1989, Ch.6. Dyson offers a definition of optimism as "the philosophy of people who welcome challenges".The Second Law does not rule out immortality because "in an expanding universe, life of any fixed degree of complexity can survive forever upon a finite store of energy" by slowing down as temperature drops.

[3] Tertullian, *The Prescriptions Against the Heretics*, quoted in *Classical Statements on Faith and Reason*, edited by L. Miller (New York: Random House, 1970), p.3.

[4] See Robert Anton Wilson, 1986.

[5] A helpful approach to goal-setting and life management is offered in Alan Lakein's *How to Get Control of Your Time and Your Life*.

[6] One of the best forums for critical but supportive analysis of Extropian ideas by intelligent people is provided by the computer networks. Various intersecting virtual communities specialize in particular areas of discussion. Currently, those of most relevance are the e-mail lists Extropians and Cryonet, and the newsgroup sci.nanotech.

[7] For an excellent treatment of the Science Establishment, see R.A. Wilson, 1986. I think Wilson goes a little too far in his liberality towards some non-standard beliefs, but he provides a welcome counterpoint.

[8]Even Nathaniel Branden, an exponent of a normally life-affirming philosophy and psychology, takes the ephemeralist line. See ch.13 of his *Honoring the Self* (Branden, 1983) which I otherwise recommend.

[9]See related points made by Thomas Donaldson in "The Apocalypse Has Been Called Off", *Cryonics* #107, Vol 10 (6), June 1989.

[10]Founded by Michael Perry in 1990.

[11]However, full membership in the Society for Venturism requires that one have completed arrangements for cryonic suspension. In contrast, one can rightly describe oneself as an Extropian without having suspension arrangements. Neither will this be required as a condition of membership of the Extropy Institute. Although being an Extropian requires certain tendencies, the absence of very specific requirements is a deliberate safeguard against dogmatization and stagnation.

[12]An informative and entertaining overview of thinking that pushes the limits is *Great Mambo Chicken and the Transhuman Condition* by Ed Regis (Addison Wesley, 1990, ISBN: 0-201-09258-1).

[13]These distinctions are clearly defined and explained in John Hospers' *An Introduction to Philosophical Analysis*.

[14]I say "regularity" rather than "law of nature" since we have no reason to believe there is a legislator of the universe dictating the principles to be discovered by physics.

[15]See Robbins, 1986, especially ch.XVI.

[16]See Robbins, 1986, and the books by Dyer.

[17]My thanks to Simon! D. Levy and Connie Gergen for helpful comments on the first draft of this essay.

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Neurocomputing 5: Artificial Life

by Simon! D. Levy

Did you ever watch a flock of birds in flight and wonder how they do it? Even though the flock may be spread out over hundreds of meters of airspace, each bird seems to know exactly what direction the others are moving. The birds never collide; they manage to avoid obstacles, and in general they exhibit all sorts of behavior that suggests some massive control program for the entire flock.

An answer to this kind of question, and to the issue of large-scale complex behavior in general, is being formulated in an exciting new framework called Artificial Life. In contrast to the *top-down*, goal-directed models of the Artificial Intelligence movement that flourished during the 80's, Artificial Life (or A-Life) seeks to model complex, lifelike behavior through a *bottom-up* approach. Instead of giving their programs complicated tasks and massive rule arsenals to solve these tasks, A-Lifers tend to create small programs based on a few simple rules. The idea is to let a whole bunch of these programs loose and see what develops. If you think that this sounds suspiciously like a free-market, laissez-faire approach to computing, I'd say you're on the right track.

Because A-Life is such a comparatively new field, it's difficult to come up with a set of definitions or standards by which everyone operates. (This situation contrasts with the field of neural nets, where many algorithms have been described in exhaustive mathematical detail. See my articles *Neurocomputation 1* through *4* in previous issues of this magazine for an introduction.) Instead, it is instructive to look at a small number of examples of what people are doing in A-Life, and to hear what some of the leaders in the field think about the directions that A-Life may take in the future.
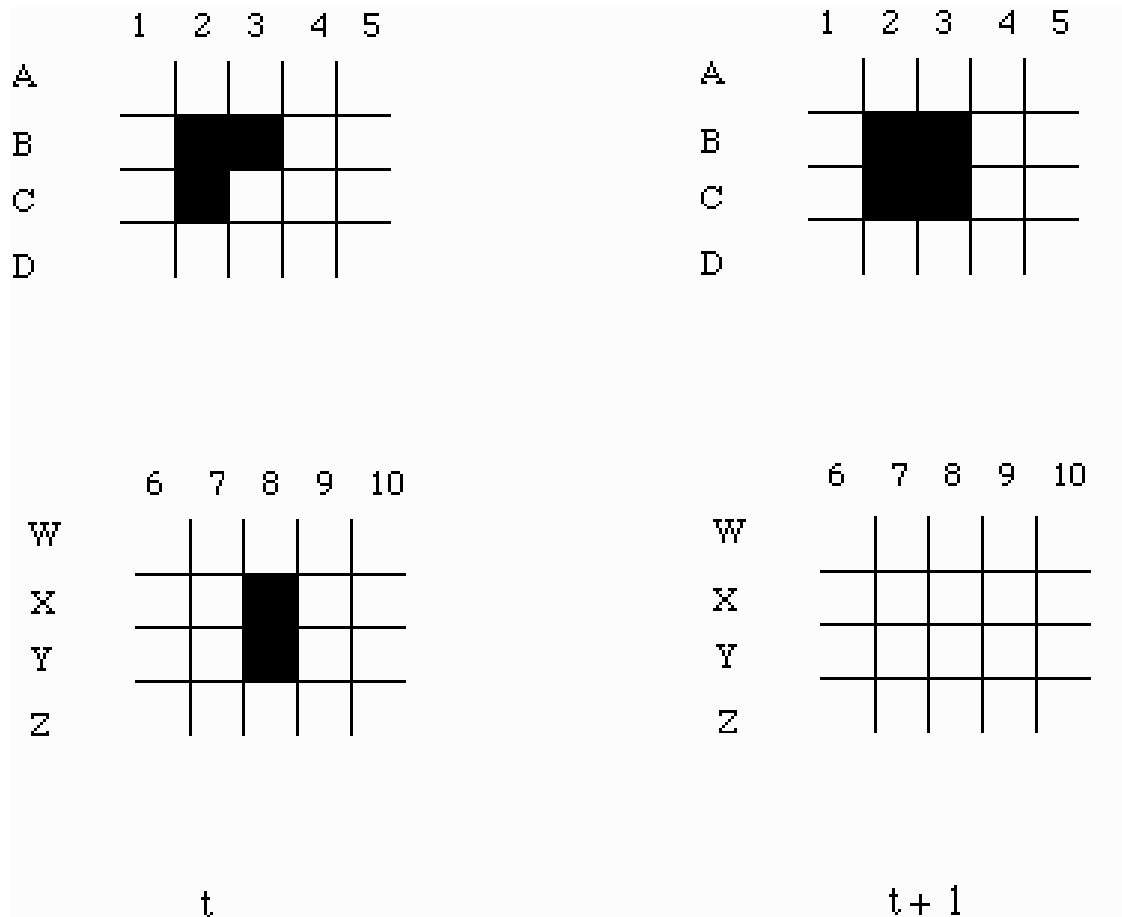
The Game of Life

One of the simplest and most famous A-Life programs is the Game of Life (or simply "Life"), invented by John Conway, a mathematician at the University of Cambridge. This game, which is part of a general class of programs called *cellular automata*, takes place in an infinite two-dimensional lattice of cells. Each cell is either on or off. Whether a cell is on or off is at a given time is determined by two simple rules:

(1) If a cell is off at time t, it is turns on at time t+1, if and only if exactly three of its neighbors (adjacent cells) are on at time t.

(2) If a cell is on at time t, it turns off at time t+1, if and only if fewer than two or more than three of its neighbors are on at time t.

To make this a bit clearer, take a look at the following figure (p.31), which shows the states for two different parts of a lattice at times t and t+1. (Rows are labeled with arbitrary letters, and columns with arbitrary numbers.)

As you can see, each cell has eight neighbors (three above, one on each side, and three below). At time t, cells B2, B3, C2, X8 and Y8 are all on, and the rest of the cells are off. At time t +1, Cell C3 has switched on, because exactly three of its neighbors (B2, B3, and C2) were on at time t.

Two regions of the Game of Life lattice at successive times

Cells X8 and Y8 have switched off, because neither cell had two or three neighbors on at time t.

Now, you might ask, what's the big deal about all this? Why should anyone care about some cells that switch on and off? Well, the answer is that these cells, with their two simple rules, produce some fairly complicated behavior. The most well-known example is the *glider*, a pattern of cells that moves diagonally across the lattice by the distance of one cell for every four time steps. There's even a *glider gun*, which sends a glider across the screen every 30 time steps. Since the rules are always the same, the whole secret is to start off with the right configuration of on and off cells in the lattice. Of course, Life isn't useful for any real-world applications (except maybe screen-saver programs), but it does provide us with an elegant example of generating complex behavior from a small number of simple rules.

Boids and Bugs

Moving farther from the abstract geometrical world of Life, one encounters a host of programs designed to model behavior in real populations. My favorite of these is Craig Reynold's "Boids," a graphics program that simulates the flocking behavior mentioned earlier. As in Life, the set of rules governing Boid behavior is small and simple, and is expressed at the level of each individual Boid. Similar programs have been developed to model the behavior of microbe and ant populations.

In contrast to the virtual world of such programs stand the very solid (and, one presumes, crunchy) artificial creatures being developed by Rodney Brooks and his colleagues at MIT's Insect Lab. These bugs range from a foot-long, six-legged "cockroach" that can climb over small objects, down to a 1.3-cubic-inch gizmo that likes to hang out in the dark. Brooks and his crew are even

talking about developing tiny "gnat robots" whose entire structure, motors and all, would fit on a microchip. The implications for nanotechnology are obvious: Program a zillion gnats for a specific task (say, repairing tissue damage), and let them do their thing. Equally exciting is the idea of letting a bunch of A-Life critters set up their own colonies on other planets, free from the biological requirements that limit human beings. I am intrigued by the idea of how members of these artificial societies might evolve a means of communicating with one another, creating a true artificial language (as contrasted with man-made languages such as Lojban and Esperanto).

What all these A-Life investigations have in common is a very anti-cognitive design philosophy. Nowhere is there an explicit, symbolic model of the world; rather, behavior that *could* be modeled as symbolic computation emerges as the result of the interaction of a number of simple "sub-behaviors," such as keeping a minimum distance from one's neighbors (in the case of Boids), or lifting one's leg when it comes in contact with an obstacle (in the case of the six-legged robot). Again, this approach to behavior strikes me as very Extropian, both in its anti-dualism and its insistence on *spontaneous* orders.

Strong A-Life

The response of many people to all this would probably be that A-Life is an interesting, perhaps even "correct" way of *modeling* what goes on in living systems, but just a model, not the real thing. Such an attitude could be called the "weak" version of A-Life. If there is a "strong" version of A-Life, it is exemplified in the thinking of Christopher Langton, one of the field's most eloquent spokesmen. In his opening article to the Proceedings of the First A-Life Conference, in Santa Fe, New Mexico, Langton writes:

> The dynamic processes that constitute life — in whatever material bases they might occur — must share some universal features — features that will allow us to recognize life by its dynamic *form* alone, without reference to its *matter*. This *general* phenomenon of life — writ-large across all

possible material substrates — is the true subject matter of biology.

This attitude toward life strikes me as very similar to Hans Moravec's attitude toward consciousness and its uploading: If there is some fundamental *formal* property of consciousness, independent of a material substrate (i.e., brain tissue), it may be possible to transfer one's "self" to a more robust, longer-lived machine, without losing any identity in the process.

Certainly such attitudes are likely to generate controversy. First, it remains to be seen that the formal properties of life, or of consciousness, can emerge on any large scale from a non-carbon substrate. This objection is essentially empirical. As Langton says, it is unlikely that non-carbon life forms will present themselves as a refutation of the objection, so it remains a task for A-Life to demonstrate more sophisticated, lifelike behaviors in artificial media.

A second objection has more to do with the philosophy of science: A very interesting question — perhaps *the* fundamental question about the origin of life — is how life and consciousness arose from precisely the material conditions that existed on earth a few billion years ago. Now, practitioners of A-Life might shrug off this objection, saying that other researchers (biochemists, geologists) are already investigating such issues. Nevertheless, I would hate to see A-Life go the way of AI. (Remember *The Fifth Generation* ?) AI people avoided the study of *learning* in favor of the study of knowledge representation, only to fade into the background as neural networks entered the limelight. A-Lifers may be making the same mistake in shirking the material substrate question to get at what they consider the formal properties of life.

This is not to say that A-Life has ignored the question of how rules of behavior may evolve. In the next issue of *Extropy* I'll discuss genetic algorithms, a field closely allied to Artificial Life, but where individuals compete and evolve. For those who are wondering what A-Life has to do with neurocomputation, genetic algorithms should provide some insight.

Futique Neologisms 2

AEONOMICS — (from *aeon* and *economics*) n. The study of the economic problems of immortal existence. [Mark Plus; August 1991]

A-LIFE — n. Artificial life: The modelling of complex, life-like behavior in computer programs. A-Life forms can evolve and produce behaviors not contained within rules set by the programmers.

AMORTALIST — n. A person who opposes death.

ATHEOSIS — n. The process of recovering from belief in God. [Mark Plus; August 1991]

AUGMENT — n, A person whose physical or cognitive abilities have been technologically expanded beyond the range of natural humans. [David Brin, *The Postman*]

CEREBROSTHESIS — (from cerebral and prosthesis) n. An electronic device interfaced with the brain to overcome a neurological deficiency, such as normal human intelligence. (Cf. *neuroprosthesis* - see *Extropy #7*). [Mark Plus; August 1991]

CONNECTIONISM — n. The approach to cognitive science that gives a fundamental explanatory role to neuron-like interconnections rather than to formal or explicit rules of thought.

CRYOCRASTINATE — v. To put off making arrangements for cryonic suspension. [Mark Plus; August 1991]

CYBERCIDE — n. The killing of a person's projected virtual persona in cyberspace. This may be part of a VR game, or may be an act of vandalism. [Max More; August 1991]

CYBERFICTION — Science fiction embodying the technological ideas of cyberpunk, without necessarily embodying cyberpunk's amoralism or nihilism. [Max More, May 1991]

ECOCALYPSE — (from ecological and apocalypse) n. A projected ecological catastrophe which would destroy all life on Earth. [Mark Plus; August 1991]

EUPSYCHIA — n. A society specifically designed for improving the self-fulfilment and psychological health of all people. A culture or sub-culture made up of psychologically healthy or mature or self-actualizing people. A Eupsychian sub-culture is "decentralized, voluntary yet coordinated, productive, and with a powerful and effective code of ethics (which works)." (Maslow.) [Abraham Maslow, 1954]

EVOLUTURE — n. An organism produced through evolution; the antonym of *creature*. [Mark Plus, June 1991]

EXTROPIA — n. An abstract conception of evolving communities embodying Extropian values of Boundless Expansion, Self-Transformation, Dynamic Optimism, and Cooperative Diversity. May be instantiated in virtual cultural communities such as those on the Net, or in future actual communities such as Extropolis or Free Oceana. [Tom W. Bell, 1991]

EXTROPOLIS — n. A proposed Extropian community located in our solar system, probably at L-4 or L-5 orbits, or the Asteroid Belt. [Max More, 1991]

EXTROPY - n. The process of expanding personal, social, psychological, and spatial freedom, expanding intelligence, wisdom, opportunity,

lifespan, personal power and diversity. The collection of forces which oppose entropy. [Tom W. Bell, 1988]

EXTROPIAN — n. One who affirms Extropianism, or anyone who consciously promotes extropy.

EXTROPIC — a. Any action or process that promotes extropy.

IMMORTECHNICS — n. Collectively, the technologies which are applied to attempt radical life extension, such as calorie-restricted dieting, cryonics, uploading, etc. [Mark Plus, July 1991]

INFOMORPH — n. A uploaded intelligence, or information entity, which resides in a computer. See Charles Platt, *The Silicon Man*, p.109. [1991]

NANARCHIST — n. Someone who circumvents government control to use nanotechnology, or someone who advocates this. [Eli Brandt, October 1991]

NEUROCOMPUTATION — n. The study of how natural and artificial neural networks process information.

PARTIALATE — n. A partial personality used as a personality surrogate (see *persogate*). [Max More, July 1991. See *Cryonics*, November 1991]

PERSOGATE — A portable expert system used as a personality surrogate (as in Bruce Sterling's *Schizmatrix*). [R.E. Whitaker, June 1991]

SINGULARITARIAN — n. One who advocates the idea that technological progress will cause a singularity in human history. (cf. *Singularity* in *Extropy #7*.) [Mark Plus, August 1991]

TRANSBIOMORPHOSIS (TRANSBIOLOGICAL METAMORPHOSIS) — n. The transformation of the human body from a natural, biological organism into a superior, consciously designed vehicle of personality. [Max More, August 1991]

TRANSCLUSION — n. A thing existing in more than one place at once; virtual copying of information used in hypertext systems, such as Xanadu. [Ted Nelson, *Byte*, September 1990.]

VIRTUAL COMMUNITY — n. A community of persons not located in close physical proximity but forming a cultural community across computer networks.[1]

VIRTUAL RIGHTS — n. Rights given for convenience to a partial; these rights are really rights of the person whose partial it is, rather than of the partial itself. Similar in some respects to currently existing corporate rights. [Max More, July 1991; See *Cryonics*, November 1991.]

[1]Both Max More and Tom W. Bell have been using this term in recent months but they may have unknowingly picked it up from elsewhere.

Neurocomputing 5: Artificial Life
Continued from p.32.

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Extropia
A Home For Our Hopes

by Tom W. Bell

Abstract

Hope for the future plays an important role in Extropian thought. In order to protect our hopes from apathy and doubt, we ought to begin working now to create a community where we can pursue Extropianism freely. We can best imagine this community—call it Extropia—as the social realization of Extropian principles. Extropia's primary feature is the requirement that all who join it explicitly agree to do so. Founding a series of social organizations, each one of which offers us greater opportunities to practice Extropianism than the one before, will help us to bring Extropia into being.

I. Introduction

We Extropians share an especially intimate communion with our hopes. To a large extent, they define our characters. Extropians dare to seek for more than most people even dream of: freedom from statist meddling, new and better bodies, vastly greater intelligences, life without end... As a consequence, our hopes risk seeming too far from realization to merit any current action. More dangerous yet, they may seem too grand to fit in any plausible future version of current society.

The apathy and cynicism threatening our hopes threaten us, too. We must protect them in order to protect ourselves. Self-defense calls on us to imagine a new world - one real enough to touch now, yet fantastic enough to hold our boundless ambitions. Let us therefore set forth to find a safe home for our hopes - an extropian utopia we shall call *Extropia*.

II. Where are we headed?

Put in the most basic of terms, Extropia is the *social realization of Extropian principles*. This means that Extropia should both provide an environment in which its individual members can freely pursue Extropian ideals and, insofar as it is possible for a social organization to do so, instantiate those ideals itself.[1]

Max More has offered a convincing account of the principles that frame the Extropian worldview.[2] To get a clearer picture of the ideal home we're seeking, let's examine the specific features that will best allow Extropia to embody each of these four Extropian Principles.[3]

1) Boundless Expansion: Clearly, any society that promotes boundless expansion must seek out new frontiers. The plan for developing Extropia that I will outline below thus has us experimenting with new forms of social organization, expanding into uninhabited areas of Earth, and eventually escaping this planet altogether. Extropia must also allow and encourage its individual members to explore personal frontiers such as those of lifespan, intelligence, and interconnectivity.

2) Self-Transformation: Valuing the principle of self-transformation leads to Extropia's most important structural feature: Extropia must be a *free* community. All who join it must explicitly agree to do so. By eschewing growth through conquest, we guarantee that each member is free to choose his or her own path of development (so long as that path does not unjustly hinder another's development). Guaranteeing members' rights to self-transformation also ensures that Extropia will undergo self-transformation itself. Because it will thrive and grow only by obtaining the consent of its members,

Extropia will constantly face critical reappraisal and undergo rational change.

This means that *Extropia will not be a State*. At most, statists can claim only to have the implied or hypothetical consent of those who fall prey to their institutionalized coercion. Extropia, on the other hand, will be a society based on *real consent*. This requirement will have a huge impact on the path of Extropia's development, for to fully protect members' rights to self-transformation will eventually require that we escape statist interference entirely.

3) Intelligent Technology: Extropia's need to expand along frontiers of space and society will call for us to develop and apply new technologies. We cannot, of course, demand that all members use science in an intelligent manner. But we can and should provide an environment where they will have the freedom to better their lives through technological advances and have every incentive to do so.[4]

4) Dynamic Optimism: Extropianism encourages us to view the future with a positive, empowering attitude. Although Extropia itself cannot possess such a cognitive state, it can provide we Extropians with a powerful means of expressing and developing our own dynamic optimism. Planning for and creating Extropia will encourage us to develop new strengths and seek out new opportunities. And with each step we take towards our ideal home we will grow more optimistic about the likelihood of fulfilling our Extropian hopes.

Although applying the Extropian Principles in this manner allows us to paint our subject in broad strokes, the very nature of Extropia prevents us from portraying it in great detail. Many of Extropia's specific features will appear only in the consensual agreements that will develop between those who will become its residents. Hence my saying that we must *find* a home for our hopes: because a great deal of Extropia will arise out of the free actions of individual agents, its exact form cannot be predicted. Much of Extropia is a spontaneous order awaiting our discovery.

Nonetheless, we can still speak of *creating* Extropia. To foster the growth of the spontaneous orders that will give Extropia its content, we must set up several sorts of planned orders: a program of development, designs for the artificial islands on Earth and in space, and a social organization compatible with the Extropian Principles. Discussing plans for *creating* Extropia will give us a still clearer picture of our home-to-be, thereby also helping us to *find* Extropia.

In what follows, I outline a three-step program for developing Extropia. I begin with the Extropy Institute, a private non-profit organization that will serve as a research center and launching pad for later Extropian projects. I'll then argue on behalf of establishing Free Oceana, a free and sovereign community on Earth's high seas. Finally, I'll conclude with Extropolis, a space-based community that will liberate us from Earth's grip and prepare us to expand boundlessly into the waiting universe.

III. HOW DO WE GET THERE?

A. The Extropy Institute (EXI)

Every good home needs a sound foundation. Extropia will have a private non-profit one: the Extropy Institute (EXI).[5] Plans for taking this first step towards Extropia are already in motion. Because EXI will serve many purposes besides establishing Extropia, its full description deserves a separate article. Here I will only sketch its basic features and relate them to the project at hand.[6]

EXI will advance Extropianism on three broad fronts: educating the public, supporting research, and offering charitable support to Extropian causes. In order to educate the public about Extropianism, EXI will continue to publish *Extropy* while simultaneously advancing into other media.[7] EXI may also spread our ideas by establishing an Extropian library, supporting computer bulletin boards and databases, offering classes and seminars, and sponsoring conferences and celebratory gatherings.

EXI could support many types of research,

given the broad range of fields that attract Extropians' attention. Here I'll merely note that EXI would take particular interest in experiments that test the application of Extropian Principles to social organizations. These experiments will begin as "dry runs" in models and at Extropian conventions. Later they will graduate into full-scale field experiments such as Free Oceana and Extropolis.

As a charitable organization, EXI would help to satisfy the special needs of Extropian individuals and groups. It might, for example, offer scholarships for students of subjects such as nanotechnology, neurological augmentation and memetics. EXI could also sponsor competitions and offer awards for works of art that espouse Extropian views. EXI might even offer personal identity storage as a service to its members. More to the point, EXI could help to support pioneers laboring towards the creation of Extropia.

B. Free Oceana

Once we have firmly established EXI and developed a sophisticated model of an Extropian community we will be ready to test our ideas in the real world. The freedom to engage in such research requires that we escape the grasp of meddling statists. But where can we go? Statists now claim jurisdiction over every continent and island on Earth. Unjust though that may be, we are in no position to convince them to forsake such claims. Ideally, we would escape to outer space. Although that should remain our eventual goal, it is likely to remain beyond our reach for quite some time. The technology and the capital for building a space habitat probably won't fall into our hands before the year 2020.

But we need not wait decades to act on our hopes for a better world. We can start building Extropia right here on Earth, *right now*. With careful planning and good luck, we will win for ourselves a sovereign community, a source of vast amounts of revenue, *and* an ideal launch site for our eventual migration into space.

How? By exploiting a loophole in the international law of the sea. Whether due to practical limitations on their powers or to their mutual interests in keeping shipping lanes open, statists forego claims to jurisdiction over the high seas. We might think of the high seas as *res nullius*—no one's property.[8] This legal vacuum may leave room for us to establish a free community on the high seas by declaring the sovereignty of a ship, floating island, or sea platform.[9]

But let's not kid ourselves. Experience has shown that it is extremely difficult to escape the clutches of statism.[10] Others trying to do so have generally tried basic four approaches: 1) armed force; 2) financial power; 3) legal battles; and 4) going underground.

None of these four routes to sovereignty fits our capabilities and goals, however. Although we will certainly want to have enough firepower to defend Free Oceana from pirates and the like, we cannot reasonably hope to fend off determined statists. Nor should we expect to buy our freedom — even if we could afford the price we couldn't trust statists to abide by the deal. Statist courts offer us no shortcut to justice; the sovereignty of Free Oceana will not receive their *de jure* recognition until well after we have established our *de facto* independence. And going underground would defeat our educational aims.

But we should not despair if these traditional routes to sovereignty do not work well for Free Oceana — they haven't worked well for anyone else, either. I suggest that we instead try another strategy for establishing Free Oceana: widespread popular support.[11]

If we can cast Free Oceana in a light that renders it attractive to an influential segment of the populace, we can use public opinion as a means to defend ourselves from statist intervention. The recent revolutions in Central and Eastern Europe demonstrate the power of communication and popular support to overthrow statist oppression. We, too, have an attractive and just cause. And our skills in information technology and memetic engineering give us a powerful advantage. *This is a battle we can fight on our own turf—and win.* But to do so we must remain sensitive to how non-Extropians perceive our mission.[12]

We should first of all portray Free Oceana

as a benign research project, a "Sociosphere II" free of statist intervention where we can test the limits of real consent. Because settling in previously uninhabited areas will undoubted raise the hackles of environmentalists, we must also emphasize the ecological benefits of our venture. We should portray ourselves as the ocean's guardians, protecting our domain from those who would pollute it or exploit its resources. We should take care to ensure that Free Oceana encourages the profusion of life often found near the shelter of ocean structures. And we should develop aquaculture—not just for food and trade, but also to demonstrate how our project can reduce pressure on land habitats.

> **We should first of all portray Free Oceana as a benign research project, a "sociosphere II" free of statist intervention where we can test the limits of real consent.**

How can we build Free Oceana? We might use a large ship to start out - a used oil tanker, cleaned and refitted, should serve nicely.[13] As our settlement grows, we can attach several oil tankers together to make a huge floating island. We may eventually want to graduate to huge platforms supported by the ocean floor. A free-floating home has special advantages, however: we could migrate towards opportunities and away from threats as if we were sea-faring Gypsies. Personally, I would like to see our bio-engineers design a species of marine coelenterates that leaves behind a low-density, floating coral reef. Imagine an archipelago of our home-grown isles sprinkled across the South Pacific!

How will Free Oceana support itself? Starting out, we will have to depend on charitable donations and research grants. With time, though, we should develop aquaculture and energy extraction techniques sufficient to allow us to at least break even.[14] Those of us among Free Oceana's first pioneers will face harsh conditions and live in strictly utilitarian quarters. But we will eventually create a more comfortable life-style, thereby allowing us to develop a tourist industry and to attract permanent settlers. As confidence in our permanence strengthens, we might establish free trade zones and an offshore banking industry.[15] And, most importantly to our long term goals, we can take advantage of our isolation and access to equatorial launch sites to prepare ourselves for expansion into space.

What sort of legal system will Free Oceana have? As the foregoing discussion makes clear, one basic principle will provide the framework of Free Oceana's social structure: all who join it must do so only by their explicit consent. More specific features depend on what potential members of Free Oceana agree to accept. Observation of what members of other private communities find attractive, however, suggests that Free Oceana will come to offer a constitutional government where voting rights correlate to ownership of property.[16] Free Oceana will resemble a private corporation in this regard, although voting rights may turn on ownership of "real estate"[17] rather than on shares of stock.[18]

We who build Free Oceana will own it. We will thus have every right to establish its laws and exclude those who refuse to abide by them. But this power need not — and should not — lead us to try and create a micro-managed paradise shut off from the outside world. Rather, we should establish only the barest of legal frameworks. We need only agree on matters that affect all of Free Oceana, e.g., where to set sail and anchor, maintenance of our home's foundation, and a set of basic principles to frame more elaborate social organizations.[19] These basic principles should at a minimum protect the right of each person in Free Oceana to defend him or herself from physical coercion, theft, and fraud.

We should avoid the temptation to universally enforce a set of principles having much greater

complexity than this. Yes, we will need an "Oceanic Code" setting forth more precise statutes, together with mechanisms for amending, interpreting, and enforcing them.[20] And to ensure that no one lives outside of the law, we should set up the Oceanic Code as a default option covering parties who have not made alternative provisions for legal protection. But if we want to ensure that statism does not creep into Free Oceana by way of a legal monopoly we must not demand that all in Free Oceana live under the Oceanic Code.

Each person in Free Oceana should have the right to live under the legal system of his or her own choosing — so long as that system respects the set of basic principles protecting others' essential rights.[21] Although allowing this much freedom may seem to invite chaos, history and theory indicate that a polycentric legal order serves as the best guarantee against statism, the best protector of individual rights, and the best framework for growth, change, and social progress.[22]

The flexibility provided by a polycentric legal system will pay off as Free Oceana grows too large for one single structure and develops satellite communities. If those who establish satellite communities have half of the spunk of we who establish Free Oceana, they will soon be clamoring for their *own* sovereignty. We cannot hope to rule them. Nor should we want to. Instead, we should welcome them into a loosely-organized alliance of independent and sovereign free communities who join in defense of their common interests—an "Oceanic League." Dealing with this alliance of stubbornly independent communities will prepare us to maintain civil ties with the Oceanic League when we leave to settle a frontier even more distant and wild: Space.

C. Extropolis

Most Extropians won't really feel at home until we reach Extropolis:[23] an artificial city floating far above Earth's surface. As the trail-head for exploration of the solar system and beyond, Extropolis will place us on the verge of an infinity worthy of our expansive ambitions. I won't waste time arguing for the desirability and feasibility of

establishing such a space habitat — I trust that Extropians are already sold on the idea. Instead, I'll say a few words about the role Extropolis plays in the broader task at hand.

Note how well our experiences with Free Oceana will have prepared us for founding Extropolis. Having already fought for and won the sovereign status of Free Oceana, we will have established precedents and procedures for developing other such communities in space. Life on the high seas will have taught us how to cope with isolation, how to deal with an unforgiving environment, and how to design and build artificial communities. We will have built up a culture emphasizing the virtues of liberty, self-sufficiency, and mutual respect. And we will carry with us social organizations that have evolved into forms that maximize the benefits of communal life while simultaneously winning our explicit consent.

As with Free Oceana on Earth, we should expect Extropolis to eventually spawn a host of sovereign free communities in space. And as with the Oceanic Alliance, we should expect to witness the development of a loosely organized Extropian Alliance protecting the mutual interests of its constituent bodies. Such an alliance may come to include members of the Oceanic Alliance, too, as well as frontier settlements far away in deep space. We may even someday welcome extraterrestrial communities into the Extropian Alliance. After all, the free communities of transhumans that will come to make up the Extropian Alliance will develop along lines so diverse that many will seem like alien cultures to parochial Terrans.

IV. Extropia

Our quest for Extropia has carried us from here and now on Earth to years and light-years far, far away. We have traced the development of Extropian social organizations from the journal you now hold in your hands to EXI, and onward to Free Oceana, the Oceanic Alliance, Extropolis, and finally the Extropian Alliance. After all this careful buildup you are probably wondering, "Will this last step prepare us to build Extropia? Will we finally

stand at the threshold of our destination?"

Yes and no.

Yes, we will be ready to build Extropia — but we are ready to start building *now* and have already started to do so. Yes, we will stand at the threshold of our destination; but depending on your point of view we either we can never cross that threshold or we already stand within it.

I'm not playing a coy game of words here. Recall that we initially defined Extropia as the social realization of Extropian principles. Because those principles look always forward, upward, and outward, we will never exhaust their limits. Extropia *is not a place*. It is a *process*.

The etymology of "Extropia" makes this distinction clear. Although "Extropia" draws meaning from "utopia" the two words vary in an important respect. "Utopia" comes from *ou,* or not, and *topos,* or place. A utopia is a non-place because it is too perfect to ever exist. Changing the prefix from *ou* to *ex* leads to "Extropia": a place *out of* or *from* where we are now.

Although we can reach yesterday's Extropia, we can never rest in today's. With each step we take towards realizing the principles of Extropianism we attain a condition just beyond our starting point. Yet all of Extropia lies before us, waiting for our future growth. Rather than a place where we would languish in stagnant perfection, Extropia is the path we take in fulfilling our transhuman destiny.

We have now begun to follow that path. Through this journal, the Extropians e-mail discussion list,[24] and bi-coastal celebratory gatherings, we have already started to create an Extropian free community. Bit by bit we will make it more real in the years to come. Our next big step: Sovereignty. We call our community *free* because all who join it explicitly agree to do so. But while that is a necessary component of our growth, it's not enough. We must also make our community *sovereign,* so we can ensure no outsiders coercively interfere with the social arrangements we have chosen. Once we have established a free *and* sovereign Extropian community, one that protects us from both internal and external threats, we will stand ready to fully devote ourselves to pursuing our transhuman destinies.

I began by suggesting that we seek a home for our hopes in order to protect them (and hence ourselves) from apathy and pessimism. Extropia satisfies that request in a surprising manner - not by trapping and taming our hopes, but by leaving them room to run free. Hopes as wild as ours would never survive domestication. They, and we, thrive on the *pursuit* of perfection rather than its attainment. That's the virtue of Extropia: it offers us the means to constantly improve ourselves and our communities. In attempting to build Extropia and house our hopes we will thus create not walls of confinement, but doors to the future.

Notes:

[1] For comments on the ontology of social organizations see Max More, "Deep Anarchy," *Extropy* #5 (Winter 1990): 20-29; and "Forum," *Extropy* #6 (Summer 1990): 33.

[2] Max More, "The Extropian Principles," *Extropy* #6 (Summer 1990): 17-18.

[3] More originally presented these four principles in an order allowing him to create the neat mnemonic "BEST DO IT!" I have here switched around the last two principles for rhetorical purposes.

[4] Max More is currently re-thinking the Extropian Principles and may delete this one, which is implied by its three counterparts, for a Principle conveying the social aspects of Extropianism. Given that my application of the Extropian Principles brings forth the same concepts that Max proposes to recognize, however, his proposed changes would probably have little effect on the picture of Extropia developed here.

[5] The idea for an Extropian non-profit organization, and its proposed name, arose out of conversations with Max More. More thought up the clever acronym and its appropriate pronunciation: "ex-I" as in "out of myself."

[6] The Zetetic Institute described in Marc Stiegler's *David's Sling* (New York: Baen Publishing, 1988) offers a suggestive model for an organization such as EXI.

[7] Such media include public speeches, interviews, ads, and a number of products that an Extropian press (the "ExPress") might publish: pamphlets, books, software, videos, taped lectures and written courses, etc.

[8] This is not the only way to think of it, however. A competing view characterizes the high seas as *res communis*, an area held in common by all of the human race. These different

conceptions can lead to opposing conclusions—the latter is particularly antagonistic to our project. For a discussion of these issues see O'Connell, D. P., *The International Law of the Sea*, vol. II, ed. I. A. Shearer (Oxford: Clarendon Press, 1984).

[9]Anchored floating islands and sea platforms that make contact with continental shelves may encounter opposition from adjoining coastal States, however, for they sometimes claim continental shelves as extensions of their territory.

[10]Consider case histories of such attempts in Erwin S. Strauss's *How to Start Your Own Country* (Port Townsend, WA: Loompanics, Unlimited, 1984).

[11]Note that the only success stories in Strauss's book relate to radio pirates who won popular acclaim by snubbing statist pretensions.

[12]Hence "Free Oceana" - a name that will be widely understood and that conjures up romantic images of pioneers struggling for freedom on the bounding main. Let us save more esoteric titles, such as "Extropolis" for a day when our principles are more widely known and our self-sufficiency more securely established.

[13]Bruce Sterling suggests this strategy in *Islands in the Net* (Ace Books, 1988).

[14]We will be ideally situated to harvest energy from sunlight, waves, and temperature differentials. If magneto-hydrodynamic drive pans out, we may find ourselves well-placed to recharge ships on long hauls between ports.

Another possible growth industry: iceberg shipping. There appear to be at least a couple of unexplored means of moving bergs cheaply. After blasting an iceberg into a streamlined shape, we might melt masts into its surface and (with a computer's help) sail it to our destination. Or we might exploit temperature differences between the ice and surrounding waters to power a Sterling-type engine.

[15]Although we might find ready profits in trades that statists have driven underground (e.g., prostitution, drug use, gambling, animal fights, etc.), we should think twice before basing our economy on them. For one thing, doing so would hurt our image in the eyes of the public and draw the ire of statists world-wide. For another thing, we are unlikely to find the customers and dealers drawn by such trade very good company (yes, things might be different if statists didn't prohibit such activities elsewhere, but we cannot wish away the negative externalities of their policies). Note that I am not saying we, like statists, should outlaw such activities. What the members of Free Oceana do in private is their own concern. I am merely pointing out the arguments against Free Oceana, as a corporate body, actively promoting and supporting such trades.

[16]For an extended discussion of the constitutional features of private communities, see Donald J. Boudreaux and Randall G. Holcombe, "Government by Contract," *Public Finance Quarterly* 17, no. 3 (July 1989): 264-280. For a more general discussion of private communities, see Spencer Heath MacCallum, *The Art of Community* (Menlo Park, CA: Institute for Humane Studies, 1970).

[17]Given that we will build Free Oceana from scratch, we might more accurately call its surface area "artificial estate."

[18]If a secondary market in free transferable titles to Free Oceana's artificial estate were to develop, however, these two alternative sorts of voting franchises would tend towards functional equivalence.

[19]At least as far as Free Oceana is concerned, these are public goods.

[20]With the option to contract out these services.

[21]Things get a bit tricky here. Who decides whether or not an alternative legal system satisfies the basic principles? Because the rule of law is something of a public good, it seems appropriate to let those chosen to interpret the Oceanic Code decide whether to approve the first candidate for an alternative legal system (with the burden of proof in favor of the newcomer). But in order to protect against a legal monopoly, we should thereafter let all approved legal systems join in deciding whether to admit competitors (with the Oceanic Code breaking ties). To prevent "court packing" we would have to set limits on the "cloning" of legal systems— perhaps by giving legal codes voting power proportional to the number of their customers.

An even more lenient approach to this problem would stipulate that a legal systems is "innocent until proven guilty." Only upon proving that it is structured so as to systematically violate the set of essential personal rights could the Oceanic Code invalidate the renegade legal code. Again, we might wish to dilute the Oceanic Code's power by giving alternative legal codes a say in this matter and allocating them voting power in proportion to their customers.

[22]For a more complete explanation and defense of polycentric law, see Tom W. Bell, "Privately Produced Law," *Extropy* 3, no. 1 (Spring 1991): 12-20.

[23]Max More deserves the credit for thinking up this apropos name.

[24]You can join this virtual community by sending your e-mail address and a hook up request to extropians-request@gnu.ai.mit.edu". Our thanks to Perry Metzger, and now David Krieger, for hosting this service.

From Human to Transhuman to Posthuman

by Max More

Now that the term "transhuman" is increasingly entering usage it is time to try to define more precisely and usefully the distinctions between human and transhuman, and between transhuman and posthuman. Until now science has not deeply changed our physical nature, although due to cultural effects it has significantly altered some evolutionary rooted behaviors, from sex roles to cooperation. But now we are at the threshold of making deep changes in human nature. With the sequencing of the 3 billion base pairs of the human genome over the next 6-15 years we will begin to learn how to intervene in the fundamental biological processes that constitute our humanity.

Already there are nootropics and longevity drugs such as Deprenyl, and CoQ10. Neuroscience, AI, genetic engineering, nanotechnology applied to self-modification, neural-computer interfaces, uploading, etc., will all contribute towards deeper and deeper transformations away from the limitations of the merely human condition. Use of "transhuman" will help spread this idea by labelling it neatly.

Drawing sharp distinctions between these three concepts is difficult and possibly futile when the likely stages of the transformations to come blend into one another. Distinguishing one biological species from another is relatively easy, since it can be done in terms of genetic relatedness. Humans alone on Earth are unique in having developed to a level where evolution involving natural selection on varied genes is being replaced by other forms of evolution, and so genetic classification may be inadequate for the future.

With increasing life spans and potential immortality, evolution will no longer proceed by throwing away old organisms in favor of new, sometimes more adaptive, organisms. In place of mindless, purposeless biological evolution has come memetic evolution — the evolution of ideas, practices, institutions, values, purposes, philosophies. Memetic development, especially due to its technological manifestations, is even now making possible the emergence of radical new forms of evolution. The merest beginnings of this new evolution can be seen with the recent gene therapy trials. Humanity is reaching the point where rational consciousness and its offsprings of science and technology are accelerating our development away from blind, unconscious, animalistic nature towards an unknown posthuman stage where old limits, old behaviors and old institutions no longer apply.[1]

Will such memetic and technological evolution transform (some of) us into transhumans? We could use the term "human" to include any organism born of, created by, modified or transformed from human. But that would be to force a potentially endless diversity into a single class. Minor modifications and enhancements may optimize our humanity without leaving it behind.

I have tried to accommodate these considerations in setting out these suggested guidelines for "human", "transhuman", and "posthuman". Persons can remain human even with considerable enhancement. We move into the transhuman phase only when our fundamental abilities are upgraded and when fundamental constraints, such as death

and unsupplemented brains, are overcome.

"Trans" means "through" and so "transhuman" should be taken as referring to a transitional stage. "Posthuman" is not a species term at all; it is a broad class which subsumes many possible posthuman species and individuals (some individuals may be the only example of a particular posthuman species). There might be *Homo supersapiens, Silicus cogitans,* and others. Here is the list of criteria:

HUMAN includes:

- Any degree of cognitive or conceptual change so long as there is no neurological alteration apart from currently standard changes resulting from learning and memory formation.

- Correction of genetic defects by gene therapy.

- Persons resuscitated after biostasis so long as there is repair but not enhancement beyond normal healthy function. (Suspension patients become transhuman when their bodies are altered to prevent aging.)

- Any use of external, non-integrated technology to increase capacities, such as external computers, non-resident nanotech.

TRANSHUMAN includes:

- Neurological or neurochemical or cognitive augmentation beyond normal healthy function, e.g., by nootropics.

- Extension of lifespan beyond the human genetic limit (say 120 years), by drugs, scientifically controlled diet, organ replacement with new biological or synthetic organs.

- Significant genetic modification to enhance function beyond standard human limits (not merely the correction of defects).

- Substantial direct integration with computers and machines to augment capacities.

POSTHUMAN includes:

- Radical genetic transformation and/or integration with computers and machines (transbiomorphosis).

- Uploaded/silicon/optical contelligence. Migration out of biology (deanimalization) or into a completely new biology.

[1]Though some rules will continue to apply, such as the basic principles of physics, as well as the principles of economics. Both these topics, especially the latter, were debated vigorously on the extropians e-mail list in October 1991.

ERRATA FOR EXTROPY #7 (Vol 3, No.1)

The main errors worth noting are as follows:
- In "Neurocomputing Part 4", figures 4 and 5 (p.39 and p.40) were switched around due to a last minute reinsertion. The one labelled "Figure 4" is actually the graphic for Figure 5, and vice versa.
- In "The Transhuman Taste" review of *Surely You're Joking Mr. Feynmann...*" the first two paragraphs on p.47 (from "The shuttle..." to "their working engineers." should be indented: They are quotations from Feynmann's book.
- In "Order Without Orderers", the word "Eupraxosophies" (or eupraxosophy") should be "eupraxophies" (or "eupraxophy"), as in the subtitle on p.30 and in some instances following.
- p.28: First appearance of endnote 17 should be numbered 16.
- p.30: First appearance of endnote 20 should be numbered 19.
- p.34: Hypertext attribution should be TN not TD.
- p.36: Transhumanities attribution should be MP not MPI.

The Transhuman Taste

Reviews of Extropian interest

A vision of Extropia, or what if Ayn Rand had been a cyberpunk?

David's Sling
by Marc Stiegler
New York: Baen Books, 346 pages.

Reviewed by Simon! D. Levy

I remember reading *Atlas Shrugged*, the first Ayn Rand novel I ever looked at, during a snowy December vacation in Michigan. The sharp clarity of the place where I was staying, the frozen lakes and leafless trees, resonated perfectly with Rand's style. It seems almost unnecessary to say, as have so many others, that the book changed something in my way of looking at the world.

A good deal of that formative exposure to radical ideas came back to me in the form of *David's Sling,* a wonderful work of science fiction by Marc Stiegler. In a sense, Stiegler is doing for the Information Age what Ayn Rand did for the Industrial Age: presenting a group of brilliant, strong-willed men and women who accomplish great things.

In this case, the heroes are members of the Zetetic Institute, an organization that I can best describe as what I hope *Extropy* will one day become. Members of the Institute, who call themselves Zetets, include statesmen, scientists, philosophers, engineers, programmers, and, more generally, anyone whose work involves the flow of information. These people are bound together by a common *attitude* toward information, in which I found three basic threads: (1) it is necessary to filter most of what you see, hear, and read, to separate what is useful from what is wrong or deceptive, (2) competition is desirable to the extent that it brings about solution beneficial to everyone, and (3) the answer to a problem will often lie in a third alternative. In other words, *David's Sling* is heavily libertarian, like much of the best science fiction. It also has a great story line, and I'll try to summarize some of it for you....

As the book begins, sometime in the near future ("back in the '90's" is a phrase that crops up now and then), the United States has just finished a big arms-reduction treaty with the Soviet Union. Unfortunately, the Russians secretly intend to do just what we always feared they'd do in such an event: They're going to invade Western Europe. When the invasion comes, the lily-livered U.S. President who created the treaty gets a great Randian I-told-you-so for his efforts. The best justification he, Jim Mayfield, can come up with for his mistake is the slogan that "we have fewer soldiers pointing guns at each other in Europe." The counter-response, from his able-minded Vice President, is brilliant. It should be read by all those ninnies sporting "You can't hug your child with nuclear arms" bumper stickers.

Conveniently, Mayfield dies of shock at the results of his stupidity, and is replaced by the aforementioned Vice President, who has a few friends in the Zetetic Institute. So begins a frenetic rush to combat the Soviet war machine with a new form of technology: Information Age weapons. The head Zetet, Nathan Pilstrom, begins assembling a small team of programmers, engineers, and military people. This group will design weapons with one purpose in mind: to disable the leaders of an attack force, thereby leaving the rest of the attackers without the information they need to complete their mission. Unlike traditional high-tech weapons, these "Hunters" will be cheap, disposable, and produced in great quantities. They will serve as a third alternative to the useless treaties and the bloated military-industrial complex. Like the sling that David used to slay Goliath, their effectiveness will be not in their bulk, but in the way they are employed.

Needless to say, the Zetets encounter all sorts of nasty opposition in their attempt to save the world. There's the evil-genius head of the Wilcox-Morris (Phillip Morris?) tobacco company, who, in a distinctly *non*-Randian turn, wants to stop the Zetetic anti-smoking seminars; the sex-god TV journalist whose career is threatened by the Zetetic anti-bullshit campaign; the labor unions who fear the changes that the Information Age is bringing about; and the revolving-door defense contractors who want to keep selling machine screws for ten thousand dollars apiece.

Helping the plot along are a number of very nice touches that make the already appealing ideas even more exciting. Stiegler's descriptions of the Sling team in action suggest that he has spent some time working on tech projects. (The jacket blurb credits him with being an "information technologist.") We see 48-hour programming sessions, fueled by truckloads of junkfood. We share the discouraging initial failures as the first Hunters crash and burn. We witness "the greatest engine of creative production in human history — the American economy" creating an vast arsenal of Hunters overnight. We watch the cyberpunkish transformation of the head programmer as he sacrifices his sanity to his machine. Finally, we get

a sickening, realistic picture of what killing machines actually do, which you may wish to contrast with the media cheerleading over the employment of "smart weapons" in the Gulf War.

Of course, *David's Sling* is not without its foibles. The Hollywood ending on the last page could have been left out completely. Unless Bush is making the same mistake as Jim Mayfield, recent events in the Eastern Bloc have made the plot of the book instantly obsolete, but who could have foreseen such events?

All in all, though, I found very little to dislike in *David's Sling*. Stiegler is an engaging writer with a distinctly libertarian point of view; he sees government and even the Zetetic Institute itself as fading away in Information Age restructuring. And it bears repeating that Stiegler's creation of a free-thinking, technologically sophisticated, malleable organization is very much what the writers and readers of *Extropy* have in mind. I'm very happy I bought this book.

Unbounding the Future: The Nanotechnology Revolution
by K. Eric Drexler and Chris Peterson with Gayle Pergamit
New York: William Morrow and Company, Inc., 1991. 304 pp.; $23.00 U.S.

Reviewed by David Krieger

"Calculators were once thousand-dollar desktop clunkers, but microelectronics made them fast and efficient, sized to a child's pocket and priced to a child's budget. Now imagine a revolution of similar magnitude, but applied to everything else."
from *Unbounding The Future*

In *Engines of Creation*, Eric Drexler presented the idea of nanotechnology in a clear, forthright, rational and persuasive manner, making the promise and peril of the molecular control of matter clear to a technical audience. In *Unbounding the Future*, Drexler and his co-authors now explain the potential of this technology to the man or

woman in the street. If *Engines* can be described as the R. & D. department's sales pitch to the front office, *Unbounding* can be considered the front office's pitch to the public. This is the nanotech book to buy for your mom.

There were no pictures and few narratives in *Engines*; *Unbounding* has both in abundance. Most of the narratives deal with two scenarios: The first, Desert Rose Industries, is a rural mom-and-pop startup that provides (seemingly) most of the material goods of the Western world. The second is the Museum of Molecular Manufacturing, a virtual-reality Disneyland where simulated fun-seekers explore a nano-world where atoms are the size of marbles.

The museum anecdotes do a good job of making the ideas of nanotechnology *concrete*: in a realm where a protein resembles a bunch of grapes and an assembler is a kinetic sculpture standing like a tree overhead, you don't need a refined physical or mathematical intuition to *get it* — the authors have supplied the imagination; mainstream readers need only to sit back and be entertained (and, surreptitiously, informed). Simply giving the mundanes a sense of the scale at which these events take place is an achievement. (Believe me, I once spent ninety minutes trying to explain to an accountant the rough dimensions of a hydrogen atom. "Now, imagine you're pitching from the mound at Dodger Stadium. If the baseball was a proton...")

Meanwhile, the Desert Rose tales make nanotech cozy and benevolent. The firm's proprietors and sole employees, Carl and Maria Santos, are making a rush order of high-tech tents for the Red Cross to shelter the victims of an earthquake. In a world without future shock, Carl Santos blasts Gershwin on the stereo while he programs the basement assembler plant to start up the day's production.

The *gemutlich* beginning is in keeping with the soothing tone of the entire book. No longer preaching to the converted (or even the particularly open-minded), Drexler and associates are here shunning any suggestion of being wild-eyed visionaries. While *Engines* discussed in detail such far-out applications of nanotechnology as immor-

tality, cryonic biostasis, superhuman machine intelligences, and personal backup copies, *Unbounding* takes a far more conservative tone, as demonstrated by the index entry for "Immortality, unavailability of, 224."

Drexler, Peterson, and Pergamit are also considerably laid-back about the economic upheaval likely to result from a working nanotechnology. They make this candid comparison:

Nanotechnology will have great applications in the field of industry, much as transistors had great applications in the field of vacuum-tube electronics, and democracy had great applications in the field of monarchy. It will not so much advance twentieth-century industry as replace it — not all at once, but during a thin slice of historical time.

but leave it to the reader to figure out what it means when sudden abundance is inflicted on social and political systems founded on assumptions of real and immutable scarcity.

The authors are justified in keeping their authorial voice down; they discuss the misconceptions that afflict even informed audiences contemplating nanotechnology:

...The error is this: The person makes a single new mental pigeonhole for "nanotechnology," throws everything into it, and stirs. After some mental fermentation, the result is the mythical nanomachine that does everything: it's a replicator, it's a supercomputer, it's a Land Rover, it slices, it dices — and on reflection, this imaginary nanomachine sounds uncontrolled and dangerous.

The authors don't attempt to hide much from the readers, however. After painting a rosy picture of peace, plenty, and pluralism for the first ten chapters, they do a thorough job of pointing out some of the possible downsides of nanotech, in a tone and manner even clearer, if possible, than in *Engines*. Parenthetically, the book warns, "Any critic declaring this to be an optimistic book hereby stands charged with having failed to read and understand" the book's warnings about nano-weaponry. They effectively debunk the idea of attempting to suppress research leading to nanotechnology: "[T]he ethical question that must guide human

actions is not 'Would it be better to stop?,' but 'Would attempts to stop make things better?'" (Similarities to current Wars on Drugs, living or dead, are purely in the imagination of the reader.)

Extropians might find the guarded presentation a bit tame (though the matter-of-fact style is far too engaging for the book to be dull), but *Unbounding the Future* is plainly not aimed at the same neophiles as Engines. If you have ever tried to explain Extropianism and SMI²LE to your Aunt Edna or your barber or George F. Will, you have found, like me, that most folks don't want to stride from star to star like gods. Just saving the whales and reversing the greenhouse effect is enough for them. *Unbounding the Future* will calm those fears in just the right way. Thought-provoking, but not provocative, it stands a good chance of catching on with the book-reviewing community: a *Brief History of Time* that the reviewers may actually read all the way through.

The Silicon Man
by Charles Platt
New York: Bantam Spectra Books, 1991, 253pp.

Reviewed by Max More

"Someday," he said, "our minds will make the final transition...from organic entities that evolved to ensure the survival of our physical bodies to electronic entities of pure intellect. The man-machine distinction will break down entirely. There'll be no further need to satisfy the old animal desires for food, shelter, and sex."

Charles Platt is a writer for Extropians to watch. Not only does he construct an enjoyable, well-paced adventure, but he infuses his story with with several highly Extropian values and visions. That the values are truly his, and not mere storyteller's tools, is revealed both by the unfolding of the story and by the Acknowledgments and Author's Note, in which Platt commends the real cryonics organization Alcor, and states his eager anticipation of uploading into superior hardware.

The story revolves around a dedicated team of scientists whose surreptitious LifeScan project, led by aging, arrogant anarchist Leo Gottbaum, aims to scan their own brains and upload them into a vastly more powerful hardware. As they near this goal, the attainment of which is made pressing by Gottbaum's age and the terminal illness of another team member, FBI agent James Bayley gets involved — far more involved than he could have imagined. The intrepid scientists must resort to desperate measures to save their project and their lives.

Clearly the "heroes" are the anti-government, transhumanist scientists, and Bayley, an agent of the state whose actions threaten to destroy their vital work, is the "villain". Yet Platt does not take the easy path of presenting Bayley as despicable, stupid, or destructive, neither does he portray the Promethean researchers as necessarily more benevolent or morally superior. On the contrary, Bayley is seen to be a decent person (and thus a misfit at the FBI), while Gottbaum's brilliance is clouded by his insensitivity and arrogance. Each of the central characters has plausible motivations so that we are able to see the tragic inevitability of their conflict.

The realistic feel of the characterization that draws us into Platt's world is complemented by the convincing technology portrayed in the story: The uploading process is much as Moravec presents it, with the addition of a cryonic suspension procedure being used to put the brain into stasis for scanning and uploading. In general, apart from the central technologies used for uploading and the later delights of life in VR, Platt chooses not to stuff the story with numerous items of future technology — something that Bruce Sterling and a few other cyberpunk writers excel at — preferring instead to leave the story unburdened and free to charge ahead unhampered.

Any Extropian will be delighted by at least some aspects of the conclusion, though some may feel that too much transitional material is left out. Perhaps a new story could fit within the late pre-Singularity days that we pass over. *The Silicon Man* may not completely satisfy everyone, but it will thoroughly entertain and invigorate.

NEWS

Extropianism: As noted in the Editorial, local Extropian gatherings have been taking place or are being organized in Los Angeles, New York, London, and elsewhere. If you want to find out if there are Extropians living near you, write to *Extropy*, or log on to the Extropians e-mail list and post a request for responses by other participants in your area.

Extropians E-mail List: The Extropians e-mail list was formed in the Summer of 1991, and provides a forum for exchanging information and discussing ideas with other bright people with similar outlooks. It's hard to determine the number of participants, since some of the nearly one hundred distribution points are nodes that distribute the output to another list of individuals.

For those who are not familiar with e-mail lists: All you need is a modem and an e-mail account. When you are added to the list any message you send to Extropians is bounced to everyone on the list. To join the list send a request to:

extropians-request@gnu.ai.mit.edu

Life Extension: The Food and Drug Administration (FDA) is currently the government agency most hostile to the interests of Extropians — and anyone who cares about having free access to life-extending and life-enhancing treatments. There is no room here to detail the incredible abuses and constitutional violations perpetrated by the FDA. Their actions are a form of paternalism and epistemological fascism: The agency wants to control and restrict not only drugs but also vitamins, amino acids and other dietary supplements, and it continues coercively to assume and enforce a monopoly on the judgment of information concerning medical drugs and nutrition.

The FDA's authoritarian tactics and lethal policies are being courageously combated by Saul Kent and others of the Life Extension Foundation. Legal costs are draining the Foundation heavily. This means that the money is being diverted from the life extension researchers who used to receive the Foundation's support.

You can help the Life Extension Foundation in their crucial fight. Membership in the Foundation ($50 for a year) entitles you to the excellent monthly newsletter, Life Extension Report, and a 25% discount from a wide range of nutritional supplements. I urge you to help out however you can — if the FDA isn't stopped, significant life extending and enhancing substances such as Co-enzyme Q_{10} will cease to be available and amino acids will require a prescription. Contact the Foundation at: The Life Extension Foundation, P.O. Box 229120, Hollywood, Florida 3022. Or call 1-800-841-LIFE

Smart Drugs: Numerous newspaper and magazine stories have covered smart drugs over the last few months. This surge of interest has been fueled by the success of Dean and Morgenthaler's 1991 book, *Smart Drugs and Nutrients* (reviewed in the last issue of *Extropy*). The rising number of smart drug enthusiasts should boost research into more effective cognition enhancers. (See next page for a new newsletter on the topic.)

Nanotech, Microtech and Computing: Nanotechnology is getting far attention than just a couple of years ago, and research is burgeoning. Eric Drexler's popularly written new nanotechnology book (co-authored by Chris Peterson and Gayle Pergamit), *Unbounding the Future* — reviewed on p.45 — will make the idea accessible to a larger audience. Meanwhile, Drexler has completed a draft of a new far more technical book: *Nanosystems: Molecular Machinery, Manufacturing and Computation*; It'll be reviewed here when in print.

The November 29 1991 issue of *Science* has a special section on microtechnology, nano-

technology, and microfabrication. The ten features contain plenty that is marvellous and encouraging. These technologies, essential to many Extropian goals, are advancing more rapidly than even us optimists might have expected a few years ago.

According to Yoshifumi Katayama, a research director of Optoelectronics Technology Research Laboratory, "If DRAM chips continue to quadruple their density every four years, by 2010 we will probably produce the gigabit chip..." and then we must progress to "atomic memory devices" so that, in theory, "a 1-square-centimeter surface, containing 1 quadrillion atoms, could store all recorded human knowledge." Apart from atomic memory devices, the single-electron tunneling (SET) transistor makes use of quantum effects to overcome the 0.1 micron barrier for conventional transistors.

Materials scientists are gaining success at constructing nanoscale devices such as quantum wells, quantum wires, and quantum dots — devices tiny enough to squeeze electron waves into specific wavelengths and energies, making possible faster and more efficient circuits and optical devices. Quantum dots "might lend themselves to computer chips 10,000 times more powerful than today's best silicon devices and to massively parallel computer architectures, paving the way for computers that think more like people than machines" and for palm-sized supercomputers.

Thinking Machines Corporation, working with IBM, has constructed a massively parallel supercomputer capable of doing one trillion calculations per second. This represents 10% of the capacity required, according to Hans Moravec, to match the power of a human brain.

Perhaps the most thrilling report was "Microfabrication Techniques for Integrated Sensors and Microsystems" which examined the rapid evolution of sensors and actuators and their linking of "very large scale integrated circuits and non-electronic monitoring and control applications from biomedicine to automated manufacturing." A photo is shown of "A multichannel multiplexed intracortical probe produced by micromachining. The overall probe is 4.7mm long and is shown passing through the eye of a needle" "These structures are in-tended both for the study of signal processing in biological neural nets and for application in advanced neural prostheses." These devices allow recording from many spatially distributed neurons, making possible a far more penetrating picture of neural activity. This research, in addition to the report in an earlier issue concerning signals being passed between a field effect transistor and a neuron, suggests that brain-computer integration is within sight.

The September 1991 issue of *Scientific American* was a special issue on Communications, Computers and Networks. This excellent issue covered many cutting edge and near future devices such as Knowbots — "programs designed by their users to travel through a network, inspecting and understanding similar kinds of information, regardless of the language or form in which they are expressed", and ubiquitous computing — the seamless integration of computers into our daily activities.

Entertainment: A $15 million SF movie, directed by Avi Nesher, claims to incorporate a world-view based on fuzzy logic. *Hammerheads* is the story of a race of nano-engineered transhumans at the end of the 21st Century. Nesher says "At some point, we will have to use genetic and nano-engineering techniques to become superhuman, eradicating many physical and mental flaws, or risk extinction."

From the description, *Hammerheads* should be a truly unusual and exciting movie. Expectations may be further raised by the fact that Nesher's technical consultant is Prof. Bart Kosko, of the Electrical Engineering Department at USC; Kosko is a leading figure in fuzzy logic — the study of precisely handling uncertain quantities.

The popular media increasingly features cryonics as a story element. The recent movie *Late For Dinner* used it as plot device to thrust two characters forward a couple of decades in order to develop the theme of the strength of love's endurance despite a temporal gulf. Though the movie did portray cryonics as effective and the dislocation problem as surmountable, I found it too dull to recommend.

Best-selling SF writer Greg Bear recently

came out with a novella called *Heads*. Much of the plot revolves around an attempt to extract information from the frozen brain of a cult leader strongly reminiscent of L. Ron Hubbard.

During 1992 look for a novel called *Chiller*. Central to the story will be a well-informed and sympathetic portrayal of cryonics. *Chiller* is written by a highly successful author writing under an assumed name. More details, perhaps including a review, should be available by next time.

Futique Media

Cryonics: This is the informative and high-quality monthly magazine of the Alcor Life Extension Foundation — the largest of the cryonics organizations. Apart from cryonics, typically found are discussions of uploading, life extension, and nanotechnology.

A subscription costs only $11 for new subscribers (normally $35 in the US, $40 in Canada and Mexico, $45 elsewhere) from: Alcor Foundation, 12327 Doherty Street, Riverside, CA 92503. Tel: 800-367-2228 or 714-736-1703

Smart Drugs News: This newsletter is not yet available (as of December 16 1991) but the first issue is reportedly in production. It will appear nine times a year and will "feature the latest information on smart drugs and nutrients which enhance mental performance." The first year's subscription is a hefty $35 (normally $40). Write to: The Cognitive Enhancement Research Institute, P.O. Box 4029, Menlo Park, CA 94026.

Mondo 2000: The glossy, fashion-conscious magazine of hip technology, Mondo appears at irregular intervals every few months. Mondo provides some coverage of technological advances and has an assortment of frequently entertaining but seldom deep pieces on cyberfolk and their ideas,

but emphases music and fashion. Buy a copy at your local newsstand and sample selectively.

bOING bOING: Claiming to be "The world's greatest neurozine" bOING bOING is interested in similar topics to *Extropy*, with an emphasis on brain change ideas like mind machines, smart (and other) drugs, BB is often funny, is rarely analytical, but can boast entertaining writers and topics fit for transhumans. Recommended. A subscription is $14 ($19 overseas) from PO Box 18432, Boulder, CO 80308.

Life Extension Report: The monthly newsletter of the Life Extension Foundation, LER provides leading edge news of gerontological research and helps life extensionists discover effective anti-aging substances. $27/year from P.O. Box 229120, Hollywood, Florida 33022.

Cryonet: An e-mail list like Extropians, Cryonet has been around for a while, capably run by Kevin Brown, and is home to numerous virtually visiting cryonicists and interested observers. *The* place for gathering information and discussing the challenging questions of cryonics. To join, send a request to Kevin at: kqb@whscad1.att.com

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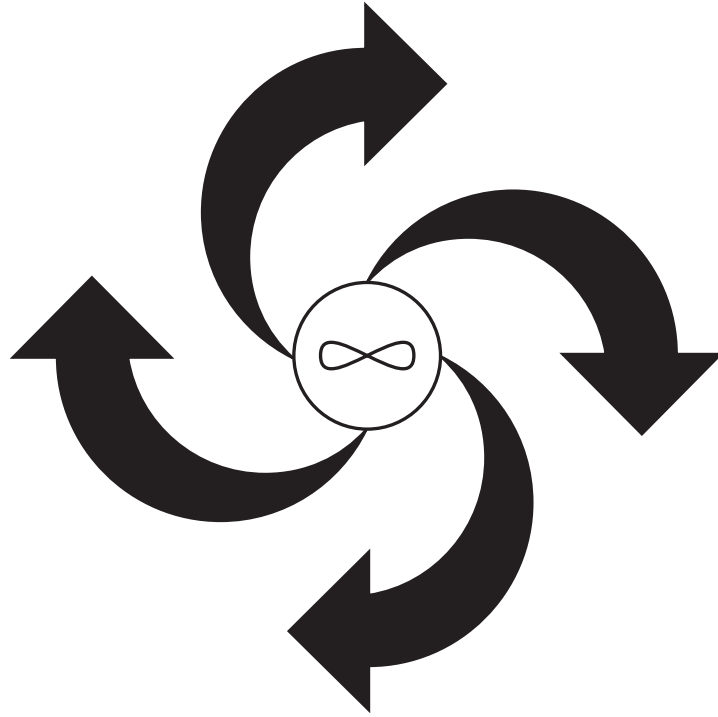
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