

TRANSHUMANITY

The Journal of Transhumanist Thought

SPONTANEOUS ORDERS:

- Privately Produced Law.
- Order Without Orderers.
- Neurocomputation Part 4.

PLUS:

A Memetic Approach to "Selling"

Cryonics.

Futique Neologisms.

Forum on Transhumanism.

Reviews.

Editor: Max More.

EDITORIAL COMMITTEE:

Communications: Russell E. Whitaker.

Computing, Linguistics: Simon D. Levy, Linguistics Dept., University of Connecticut; Haskins Laboratories.

Cryonics, Immortalism: Michael R. Perry, Ph.D; President, Society for Venturism.

Law, Politics: Tom W. Bell, MA; University of Chicago Law School.

Life Extension, Nootropics: Stephen B. Harris, M.D.; U.C.L.A.

Memetics: Keith Henson.

Philosophy, Politics: Max More, MA, Philosophy Dept., University of Southern California.

Transhumanities: Mark Plus, MS.

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#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.

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#3 (Spring 1989): Out of print.

#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".)

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EDITORIAL

Changes

This issue sees a break with the previous trend towards a magazine-style publication. EXTROPY will henceforth be a semi-journal style publication. This means more extensive and penetrating articles on topics of transhumanist interest. I am also forming an editorial committee in order to continue to ensure the high quality and accuracy of the writing. Editorial Committee members are still wanted for Physics, Psychology, and Nanotechnology; if you know someone who you think might be suitable for the position I'd like to hear from you.

A semi-journal style is more fitting both to my own current career path and to the complex material that we publish. Future plans include a companion magazine-format publication that would carry extropian writing in a more popular style. But, for now, the emphasis will be on the development of a comprehensive transhumanist philosophy.

In keeping with the new direction, EXTROPY's sub-title has been changed to "The Journal of Transhumanist Thought." I referred to EXTROPY as a "semi-journal" because it will not be run as a fully academic journal. We will continue to be highly cross-disciplinary; the development of a transhumanist philosophy requires input from many fields (as listed on p.2). Since, unlike religion, transhumanism is not yet recognized as an academic discipline in its own right, a fully academic

format would be inappropriate, and would discourage participation by the broad cross section of persons interested in what we discuss; such persons are often associated with life-extension, immortalist, cryonicist, Venturist, libertarian, computer science, and other advanced-technology intellectual communities.

Unfortunately, another necessary change is a hike in the subscription rate. This is due to an increase in postal rates by the US postal monopoly and because of the increasing page count. I believe this is more than compensated for by the increase in quantity and quality of transhumanist thought cramming these pages. Also to be noted is my new e-mail address; I still have the CompuServe address but check it much less often than my address at more@usc.edu

In This Issue:

A spontaneous orders theme runs through most of this issue: Tom W. Bell's "Privately Produced Law" looks at the historical evidence for the feasibility of abolishing the State's monopoly on law-making and enforcement. In adding to a fine tradition of anti-statist thinking about the fundamental organization of complex societies, Tom draws on the recent scholarship of Bruce Benson in his book *The Enterprise of Law*. As we race into an increasingly complex future, the problem of allowing maximum flexibility and

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) Intelligent Technology.

TRANSHUMANISM - Philosophies of life (such as Extropianism) that seeks 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.

evolutionary potential for our species will press harder. Non-monopolistic legal systems, embodying the spontaneous order principle, appear to be an ideal way to ensure our limitless expansion.

My article, "Order Without Orderers" is an overview of the many fields in which spontaneous orders feature. As transhumanists we want to make some fundamental alterations in the conditions of existence, and to allow maximum diversity in the choice of evolutionary pathways. I suggest a number of ways in which we can continue our transhuman development without violating spontaneous ordering principles.

Simon! D. Levy continues his neurocomputation series, again applying spontaneous ordering principles to computing. This time Simon! explains self-organization in artificial neural networks. This connectionist approach to computing offers a more realistic promise of eventually producing real intelligence. Unlike classical rule-based artificial intelligence, connectionism is demonstrating considerable ability to recognize patterns. Already these systems can learn to understand speech and writing, and to perform other abstract recognitional tasks. As they increase in complexity and become interconnected we are likely to see truly intelligent and flexible artificial cognition emerge.

Apart from the spontaneous order articles, memeticists Keith Henson and Arel Lucas, in "A Memetic Approach to 'selling' Cryonics", apply an evolutionary model of the spread of ideas to the question of why so many people resist immortalism and cryonics. As most readers will know, *memes* are replicating patterns of information, first named by biologist Richard Dawkins.

In the Forum, Bruce Harrah-Conforth comments on my "Transhumanism" article of last issue. The Forum is intended for lengthier commentaries than letters; if you disagree with something in EXTROPY, or want to add to it, this is the place for your thoughts.

Also in this issue is a list of new words for transhumanists: "Futique Neologisms." Inventing new words can be a lot of fun, and this may be reason enough. There is a more serious purpose though, and that is the motivation for publishing

this list (which will be supplemented as the need arises). In developing new transhumanist ideas, many of which are radical and foreign to prevailing philosophies, religions, and cultures, clarity and brevity of expression often require new terms. Just as scientists need new terms to describe newly discovered phenomena without massively circuitous phrasing, transhumanists and extropologists must develop useful and penetrating new terms to refer to their concepts. By using these terms regularly, and explaining them to the neophyte, we can help to introduce transhumanist values, world-views, and conceptual categories to others.

Last issue I suggested the possibility of a new dating system, using as a base date the publication of Bacon's great work, *Novum Organum*, which established the scientific method, making possible the enormous scientific and technical progress essential to the transhumanist philosophy. This idea met with a mixed reception, some of it due to competing ideas for a base date, and some due to the difficulty of introducing a new dating system into our culture. Perhaps we are, for now, too small in number for this to be an idea worth pursuing currently.

Future Issues: Next issue will have a discussion of the Extropian Principle of Dynamic Optimism - a principle that an empowering trait of thought and behavior that maintains rationality while offering something in place of irrational religious faith. Simon! will expand on the idea of agoristic (market-like) computing mentioned in this issue's "Order Without Orderers". Other likely pieces in future include a proposal for a futures' market in ideas to promote accuracy in scientific forecasting and research funding; a look at Lojban - the "logical" language created by linguists, which can be used for everything from computer programming to writing poetry; thoughts on the present and future development of electronic communications, virtual reality, and direct brain-computer interfaces; and a discussion among several transhumanists on the possibility of truly endless existence - are there physical limits to true physical immortality, or can apparent limitations be overcome?

Max More

A Memetic Approach to “Selling” Cryonics

By H. Keith Henson and Arel Lucas

The March '89 *Cryonics* carried Dave Kekich's article "A Practical Memorial." It was about Oz, Dave's friend who did not make it into suspension when he needed it—despite many qualities you would think predisposed him to consider cryonics. Not the least of these predispositions was having a close friend long active in cryonics. In the article, Dave focused on his sense of failure as a cryonics salesman in his effort to understand why Oz did not make suspension arrangements.

The article has prompted us to spend some time on another way to view the problem of "selling cryonics" - in terms of the genetic origin of humans and the memetic origin of culture.

In this discussion, there are deep connections to evolution, which itself is well rooted in our understanding of the physical world around us. Because of the need for background, we will wander a long way from the immediate problem of getting people to make cryonic suspension arrangements, but by the time we get back, you might have a deeper appreciation of the difficulties of "selling" the cryonics concept.

Most readers of *EXTROPY* understand that we arrived at our current physical structure (which includes everything—genes, jawbones and brains) through the process of evolution, that is through random variation and very non-random survival. About 4.5 million years ago our branch of the primate tree split from our nearest relatives the chimpanzees when the climate changed, and the shrinking forest left them "high and dry." (All this is current best guess, but there is a large collection of evidence.) An entire suite of physical and behavioral changes seems to have happened together.

Chimpanzees today have behaviors, such

as sharing meat, that our common ancestors are likely to have had. This tendency seems to have been elaborated by our male ancestors into a steady provisioning of the females and young by bringing food to them from the encroaching, but highly productive, protein-rich plains. (As opposed to the chimps' way of life where the females provide virtually all food for the young and the males guard the territory.) Incidentally, compared to forest, grasslands provide a *lot* of meat per square mile.

It is likely our common ancestor could walk upright for a short distance since chimps can do it. Walking upright for ever further distances had an advantage because the males who could free their hands for carrying food in this changed situation were more successful in the number of children who carried their genes in the next generation. Of course this took place in social groups, so there was continual selection for: genes that made cooperative behavior more likely; genes to exploit others cooperation; and genes to resist being suckered. Computer evolution simulations (see *The Selfish Gene* by Richard Dawkins) of such situations lead to stable mixes of reproductive strategies similar to what are actually observed in human populations.

As genes became more common which (through the process of embryogenesis) constructed males more and more likely to work (mostly in groups) to feed *their* mates and children, other traits became advantageous. Sequestered estrous (as opposed to the flamboyant chimpanzee event), continual sexual receptivity, and a tendency toward monogamy (and jealousy) all tend to genetically reward provisioning males. All of this culminated in the several-million-year old institu-

tion of the human family.¹

The net effect of all these changes was to about double the reproductive rate of proto-humans compared to the chimpanzees. Our ancestors needed the high reproductive rate because the plains were *dangerous* places (no trees to climb). A lot of them seem to have been eaten by leopards and the other large predators of the time.

One class of agents, censors, would be especially useful if they kept someone's mind from spiralling into a blue funk over unanswerable questions.

Some 2.5 million years ago we find the first evidence of worked stone. While even chimpanzees pass cultural knowledge, such as how to catch termites, from generation to generation, worked stone is the first surviving evidence that our ancestors started passing down the generations complex, non-genetic, behavior-influencing information. This information can be said to program high level "agents" in the mind which are invoked to do or make things. About the same time, the brain size of our forebears started to increase substantially over the chimpanzee's. Tool making and larger brains probably influenced each other in a positive feedback cycle.

Those able to learn the more complex tasks from those around them must have had a significant survival advantage, in spite of the increased maternal and infant mortality from getting those larger brains delivered.

As the *information* of how to chip rock and other such discoveries was passed on to larger numbers of the very people whose survival it enhanced, a new evolving entity, the "meme" or replicating information pattern became increasing significant.

Genes are totally dependent on cells; com-

plex memes are no less dependent on large human brains. Memes run the gamut from essential symbionts to dangerous parasites. They evolve, and, in particular, they have *co-evolved* with the human line. In the aggregate, they constitute culture. The memetic information passed down from generation to generation exceeded our genetic data some time ago.

As human brains enlarged they improved in the ability to anticipate changes, making plans to hunt, to move with the seasons, and, later, to plant seeds for a future harvest. These and similar "smart" behaviors have obvious survival advantages, but they may have disadvantages as well. Alas, it seems that it is quite possible to be too smart for "the good of one's genes." A contemporary example is fewer children than the norm. For very different reasons, people of *subnormal* intelligence also have lower-than-average reproductive success.

Many traits of populations that have a bell curve distribution are trimmed by some form of selection on both ends. If they were not, natural selection on individuals on one end of the curve would cause the population norm to drift until a new norm was reached where individuals far out from the norm in either direction suffered reduced reproductive success in about the same amounts.

Being able to anticipate the future may not have been an unmixed blessing for early humans. Besides worrying about what to eat in the morning, and how to get through the night without being eaten, our ancestors could worry about existential

Memes run the gamut from essential symbionts to dangerous parasites.

angst, and ponder questions of the "Where Was I Before I Was Me?" and "What Happens After I Die?" kind. It may sound silly, but such questions, prompted by frequent deaths among those around you may have been a barrier for hundreds of thousands of years to the emergence of smarter

people with enhanced ability to anticipate and plan for the future. It is not good for your genes to be dwelling on such questions while something large, fury, and not in the least concerned about angst, sneaks up and nips off your head!

We know that eventually smarter people did emerge, and came to dominate the world. This started about 200,000 years ago, roughly the same time that DNA studies indicate that one woman was the common ancestor of us all. Like chipped rock and larger brains emerging together, it is possible that some meme mutated out of more primitive ones, or arose from observations to form a "religious belief" that provided "answers" to troubling questions and had the effect of compensating for genes that otherwise would make us too smart for our own (genetic) good. Beliefs that could fit this description are known to go back to the very beginning of written history, and archaeological digs produce physical evidence (flower grave offerings) of such beliefs back at least 70,000 years. (The actual timing is not important to this argument, but objects believed to be "religious" in nature became common by about 35,000 years ago.)

"Religious" memes compensating for too-smart-for-their-own-good brains is rank speculation, but Marvin Minsky argues that more complex brains are inherently less stable. It is true that our more remote relatives (such as cows) seem to have fewer mental problems, perhaps just because they have less "mental." His thought³ is that certain "agents" built with patterns from outside could enhance the stability of a complex mind. He discussed a variety of mental "agents" in *Society of Mind*, reviewed in *Cryonics* some time ago. One class, censors would be especially useful if they kept someone's mind from spiraling down into a blue funk over unanswerable questions. Ideas that when a family member died he had gone to "the happy hunting grounds," and that you would see him again might make a big difference in the survival of grief-stricken relatives. Jane Goodall's report of a case where a chimpanzee seems to have died of grief gives this model some credibility. (The chimp was believed to have had an abnormally strong attachment to his mother.)

This is very speculative, but "religious" memes could have "functions" such as reducing the effects of grief or answering philosophical questions about which it was (genetically) unprofitable to ponder. These memes would be favored in a causal loop if they improve the survival of people carrying genes which tend to destabilize a person's mental state, but otherwise improve their survival.

In an environment saturated with religious memes, there would be little pressure for minds to evolve that could get by without stabilizing memes.

Such genes might (for example) contribute to intelligence, sensitivity, and forming strong emotional attachments. After a few millennia, religious memes and conditionally advantageous genes would become quite dependent on each other. In an environment saturated with religious memes, there would be little pressure for minds to evolve that could get by without stabilizing memes.

In turn, the religious memes that originated long ago have had plenty of time to split into varieties, compete for hosts, and themselves evolve in response to a changing environment. (An occasional variation may kill its hosts, a la Jim Jones.) A lay observer looking for similarities over such a period might not recognize much common ritual. (Joseph Campbell devoted his life to discovering common threads in ritual.) Both modern and ancient religions seem to "fit" into similar places in the mind, and have the similar functions of providing "answers" to the unanswerable, and comfort to the grief stricken.

The environment in those minds (mostly the result of other memes) has greatly changed as people accumulated more observations about the world around them and got better at manipulating it. There are known changes in the history of religion, such as the tendency for monotheistic



religions (in the western cultural tradition) to replace polytheistic ones, and the well known tendency for religions (and similar belief patterns) to mutate into new and competing varieties. We can see some (the written part) of the accumulated variation. For example, the religion of the Old Testament is recognizably the ancestor of the more recent New Testament.

Because humans learn from other adults as well as parents, religious beliefs that are "better suited" to infect human minds could spread, even (if they survived translation) across language boundaries. (Islam simply imposed Arabic on its converts.) In Europe during early historical times, we can see the displacement of older religions with Christianity. Within Christianity we can see in recent historical times competing varieties mutate from earlier versions (a classic example would be the Mormons) and within the US in the last decades we have seen the arrival of both new "religions" such as Scientology, and the repeated importation of eastern religions. (Almost all new and transplanted religions fail - we only see the ones which grow large enough to notice.)

Logically, cryonics should be considered a low tech way to reach high tech medicine.

Because human minds usually hold only one religion at a time, religious memes are in "competition" for a limited number of human minds. This sets up the conditions for a powerful "evolutionary struggle" between religious memes. You should expect the memes which survive this process to resist being displaced, and to induce their hosts to propagate them.

How (at long last!) does this relate to the difficulty of selling cryonics? We submit that the long term mental changes that happen to people who make cryonics arrangements have a lot in common with religious conversions.⁵ Logically, cryonics should be considered a low tech way to

reach high tech medicine, no more exciting than iron lungs, or pacemakers. Alcor, of course, is definitely *not* a religion; it doesn't aspire even to be a cult. However, the mental "agents" the cryonics idea constructs in people's minds have the same "deflect or modify thoughts about death" effect as some of the mental agents most religious memes build. The cryonics memes seem to "fit" into the "mental space" in people that is often occupied by a religion. As a result people class it as one, or something closely related. Unfortunately, this is a hotly contested spot in the mind! Memes of this class usually include a submeme, "this is the only true belief, listen to no others."⁶

Religious memes (including such beliefs as reincarnation) build lasting, often lifelong, agents in human minds. The part of human minds where these agents are located seems to be particularly resistant to change, perhaps because the "function" of these memes is not much related to the way "this world" operates. That is, one belief in this category is about as good for you (and your genes) as the next. If this is the case, switching holds little advantage, and the process of modifying anything close to this area may be dangerous to mental stability. Cryonics (if it works) is very much of an exception to the rule.

On the other hand, the stability of religious beliefs may have little to do with human survival. It simply may be a characteristic of the surviving (and therefore observable) religious memes.

The difficulty of changing from one religion to another, or adding cryonics to your meme set may be compounded by "censor agents" (as Minsky calls them)⁶ that keep deflecting your thoughts away from thinking about anything to do with death. As much as anything censor agents may lie at the root of the remarkable degree of procrastination, that you often see in the cryonics signup process. (The complexity of the paperwork does not help either!)

We wish we could use the memetic model to make specific suggestions which would allow us all to go out and sign up the world, or even to save our parents. We can't. The best we can do is suggest that since most of the mental environment in which the cryonics meme may take root is determined by

other memes, getting the word out about related subjects may be critically important to the "selling" of cryonics. A person who knows about nanotechnology/cell repair/machines is much more likely to be infectable by the cryonics meme. So are the people who hold the computer viewpoint of minds and brains.

Another possibility is that our friends or relatives may eventually become more responsive. They are likely to be among that majority, not the first by whom the new is tried, nor yet the last to lay the old aside.¹ Frequent exposure to an idea lessens the outrageousness of it. Cryonics is, after all, becoming more respectable. Being dismissed by "most scientists" as the newspaper stories state is properly interpreted as being accepted by "some scientists."² On the other hand, part of the fear factor about cryonics is the possibility that it would work, and you would be revived all alone in a future without friends. This may be a large part of the problem of signing up our parents. Though we may respect them, the world has changed so much over a single generation that it is hard to have much in common with them. (And for that matter, it is hard to have much in common with your children either!) Perhaps we should get our oldest signed up members (the ones I have met are *really* nice people) to travel about and talk to our parents.

The memetic model gives some insight into the difficulty the idea of cryonics faces in a world of competing memes, but the picture is far from bleak. While cryonics has grown slowly, the growth rate has increased in the last few years. It would not surprise us for the cryonics "movement" to experience spectacular growth³ over the next decade or two, especially if noticeable progress is made on our *real* goal, life extension, which will eliminate the need for cryonic suspension entirely.

Notes

¹ First defined in *The Selfish Gene* by Richard Dawkins, 1976.

² At least if it does it before you have lots of kids, and have helped raise lots of grandkids. The recognition of this fact is reflected in the Chinese tradition that those who would attempt to understand the I Ching - a contemplative task bound to invoke troubling questions - are traditionally warned off doing so until they have completed the parental phase of life, and secured the future of their grandchildren.)

³ Personal communication through Eric Drexler.

⁴ Douglas Hofstadter and one of us (Arel) prefers to look at a meme as complex as a religion as "a scheme of memes," that is, evolutionarily bound cooperating groups of memes similar to the way mutually advantageous genes are sometimes grouped on chromosomes. Dawkins discussed the mutual propagation of the God/Hellfire memes in *The Selfish Gene*.

⁵ We doubt many realize it at the time. When we made arrangements with Alcor it was just the logical thing to do, given our understanding of nanotechnology. It was only with the threats to Alcor, and its patients, over the Dora Kent affair that made us realize how important cryonics had become to us.

⁶ According to Gazzaniga in *The Social Brain* there actually seems to be a very small chunk of brain tissue that might be called a "religious stabilizing module." In rare cases where this area was destroyed, the victims could change what seemed to be deeply held religious beliefs several times a week!

⁷ 10 years of 100% per year (doubling each year) would put Alcor at 150,000 members. If the ratio of about 1 to ten held, we would have 15,000 in suspension by that time, and a suspension fund in the range of \$700 million. Alcor has been growing at 20-25% per year, the rate has gone up to 30-40 percent recently and a growth of 100% in 1991 seems possible.

Privately Produced Law

by Tom W. Bell

The revolutions which have recently swept through Central and Eastern Europe have dealt a killing blow to socialist ideology. State-ownership has been tried and discarded. Cries of "Privatize!" herald the dawn of a more free and prosperous age. But the light of this new day reveals a vexing question: "Privatize *what*?"

Virtually everyone in these newly freed countries agrees that farms, steel mills, ship yards, and other manufacturing industries ought to be privatized. Some go further and argue for the privatization of industries that are often state-owned even in the West: railways, television, and radio. A very brave few, secretly influenced by long-banished libertarian authors, call for an unprecedented leap to private schools, postal services, and social security insurance.

We should ask ourselves the same question: "Privatize *what*?" If those who have known only totalitarian socialism can imagine a society less statist than our own, we ought to be able to conceive of a society even more free. Why stop at private schools, postal services, and social security? Why not privatize *everything*?

That is what anarcho-capitalists would have us do. Their extreme position puts them even further from conventional political discourse than their libertarian kin who advocate a minimal state. Minimal statist argue that some services *must* be nationalized. Usually anarcho-capitalists and minimal statist debate about whether or not national defense *could* be privatized, and whether or not police protection *should* be privatized. Less frequently, they argue over who should issue currency (discussing this topic requires a good deal of economic expertise).

Useful and interesting though these debates may be, they fail to resolve the fundamental con-

flict between anarcho-capitalism and minimal statism. A state could contract out its national defense, its police forces, and its mint and still remain a state - *so long as it held onto the law*. Soldiers, cops, and minters just follow orders; the law is the real source of the state's power. Strip away its flattering pretenses and you'll find only raw, brutal force.

That's the real issue here: who is going to lay down the law? Statists or consumers? I am going to argue on behalf of the latter.¹

Note that I am not calling for the abolition of all laws. Humans cannot live in complex societies without the guidance of laws. They can, however, live without the coercive imposition of laws. This is an essential distinction, for anarcho-capitalists are often misunderstood as denying the validity of laws *per se*. Nothing could be further from the truth. Anarcho-capitalists see the state as a criminal organization. In their eyes, state law is essentially *lawless*.

What is the alternative to state law? Overlapping jurisdictions of privately produced law in free and open competition - a *polycentric* legal system. In what follows, I will provide a brief introduction to the history and principles and of privately produced law, and argue that it offers a more efficient and just alternative to state law.

Law Prior to the State.

Friedrich A. Hayek finds the origins of law in the natural selection of social orders. Not all types of behavior support social life, he explains. Some -like violence, theft, and deceit - render it impossible. "Society can thus exist only if by a process of selection rules have evolved which lead individuals to behave in a manner which makes social

life possible."² The development of these rules predates courts, written law, and even the concept of law itself: "At least in primitive human society, scarcely less than in animal societies, the structure of social life is determined by rules of conduct which manifest themselves only by being in fact observed."³

Because such customary laws exist prior to state laws, they have attracted the attention of those who research polycentric legal systems. In *The Enterprise of Law*, Bruce Benson concentrates on the legal system of the Kapauku Papuans of West New Guinea.⁴ This "primitive" legal system exhibited some remarkably sophisticated qualities. It emphasized individualism, physical freedom, and private property rights; sorted out fantastically complicated jurisdictional conflicts; and provided mechanisms for "legislating" changes to customary law.⁵ In a separate work, "Enforcement of Property Rights in Primitive Societies: Law Without Government,"⁶ Benson points out similar features in the legal systems of the Yuroks of Northern California⁷ and the Ifugao of Northern Luzon.⁸

David Friedman adopts medieval Iceland as his favorite example of a polycentric legal system. He writes that it ". . . might almost have been invented by a mad economist to test the lengths to which market systems could supplant government in its most fundamental functions."⁹ Murray Rothbard backs up his arguments for privately produced law by pointing to a thousand years of Celtic Irish Law.¹⁰

These and many other examples of customary legal systems demonstrate that we don't need states to have laws. They also tell us what sort of laws arise free of state interference. After an extensive review of customary legal systems, Benson finds that they tend to share six basic features:

- 1) a predominant concern for individual rights and private property;
- 2) laws enforced by victims backed by reciprocal agreements;
- 3) standard adjudicative procedures established to avoid violence;
- 4) offenses treated as torts punishable by economic restitution;

- 5) strong incentives for the guilty to yield to prescribed punishment due to the threat of social ostracism; and
- 6) legal change via an evolutionary process of developing customs and norms.¹¹

Anglo-Saxon Customary Law

The ancient Anglo-Saxon legal system gives us a particularly good example of customary law. Under this system a set of ten to twelve individuals, defined at first by kinship but later by neighborhood, would form a group to pledge surety for the good behavior of its members. The group would back up this pledge by paying the fines of its members if they were found guilty of violating common law. A surety group thus had strong financial incentives to police its members and exclude those who persistently engaged in criminal behavior. Exclusion served as a powerful sanction: "Every person either had sureties and pledge associates or one would not be able to function beyond one's own land, as no one would deal with one who had no bond or who could not get anyone to pledge their surety to them."¹²

Such reciprocal voluntary agreements have a certain timeless appeal. Consider the modern parallels: Like insurance agencies, the surety groups helped members to spread risks by pooling assets; Like credit bureaus, they vouched for the good standing of their own members and denied access to outsiders who had demonstrated their untrustworthiness.¹³

The Anglo-Saxon courts, called *moots*, were public assemblies of common men and neighbors. The moots did not expend their efforts on interpreting the law; they left that to custom. The outcome of a dispute turned entirely on the facts of the case, which were usually established through ritual oath-giving. The disputants first swore to their accusations and denials. Each party then called on oath helpers (including members of their surety groups) to back up these claims with oaths of their own. For the court to accept any one of these oaths, it would have to be given flawlessly - though the poetic form of the oaths made it easier to meet this requirement. Deadlocks were often settled by ordeals of

fire or water.

Anglo-Saxon law had no category for crimes against the state or against society - it recognized only crimes against *individuals*. As in other customary legal systems, the moots typically demanded that criminals pay restitution to their victims--or else face the hazards of outlawry and blood-feud. Murderers owed *wergeld* (literally, "man-gold") to their victims' kin, while lesser criminals owed their victims lesser fines, elaborately graded according to the victim's status and the importance of the limb, hand, digit, fingertip, etc., that had been lost. In recognition of the importance of private property, heavier penalties were also imposed for crimes occurring in or about the home.

Like the surety groups, these courts depended on voluntary cooperation. Berman writes that

"... jurisdiction in most types of cases depended on the consent of the parties. Even if they consented to appear, they might not remain throughout, and even if they remained, the moot generally could not compel them to submit to its decision. Thus the procedure of the moot had to assume, and to help create, a sufficient degree of trust between the parties to permit the system to operate. . ."¹⁴

This Anglo-Saxon customary legal system protected the liberties of the English long and well, but eventually it was consumed by royal law. The story of this downfall tells us much about the contrasting natures of private and state law.

The Rise of State Law

In many societies, state law has advanced rapidly on the heels of military conquest. It entered England, however, with almost imperceptible subtlety. Two factors prepared the stage. Firstly, the constant threat of foreign invaders, particularly the Danes, had concentrated power in the hands of England's defenders. Secondly, the influence of Christianity imbued the throne with a divine quality, enshrining the king as vicar of Christ. Onto this stage strode Alfred, king of England during the last quarter of the ninth century.

Prior to Alfred, men served their kings voluntarily. A king had to offer battle gear, food, and plunder to get others to follow him into battle. More importantly, he volunteered to champion the cause of the weak - for a fee. Weak victims sometimes found it difficult to convince their much stronger offenders to appear before the court. Kings balanced the scales by backing the claims of such plaintiffs. This forced brazen defendants to face

Privately produced law continues to thrive in the U.S. and gives every indication of growing stronger.

the court, where they faced the usual fines *plus* a surcharge that went to the king as payment for his services.

This surcharge, called *wite*, made enforcing the law a profitable business. King Alfred, strengthened by threat of invasion and emboldened by his holy title, assumed the duty of preventing all fighting within in his kingdom. He declared that anyone found guilty of assault owed him *wite* for violating the king's peace. Alfred lacked the ability to back up this claim, however, and it went largely ignored. But he had set a trend in motion. Over the next few centuries royal law would grow stronger--especially after the Norman invasion of 1066. Eventually it consumed virtually all of England's legal order, as did the royal law of countries throughout Europe. But first royal law would have to contend with some stiff competition.

From Polycentric Law to State Law

A legal revolution swept through Europe in the years between 1050 and 1200. While the power of the Church rose to rival that of kings, the law of the church, inspired by the newly rediscovered Justinian codification of Roman law, rose to new levels of sophistication. But the Church's

new-found independence helped to develop the state, as kings reformed royal law to give it the order and strength of ecclesiastical law.

Other legal systems entered the fray. Thousands of new cities and towns sprang up, leading to new centers of power and the development of urban law. The support of the church and a labor shortage introduced an element of reciprocity to the relations between peasants and lords, triggering the emergence of manorial law. Vassals likewise won standing in the separate jurisdiction of feudal law. And the rise of a populous, mobile merchant class promoted the evolution of the law merchant.¹⁵

Berman provides the single best source of information about this legal tangle in his magisterial *Law and Revolution*. He there explains how competition between jurisdictions helped to protect individual liberty: "A serf might run to the town court for protection against his master. A vassal might run to the king's court for protection against his lord. A cleric might run to the ecclesiastical court for protection against the king."¹⁶

For the most part, royal law won this competition among jurisdictions. It had two important advantages over its rivals. The power to tax allowed it to subsidize its legal services. Royal courts absorbed the local functions of the law merchant, for instance, by adopting its precedents and offering to enforce them at bargain rates. Royal law also wielded far greater coercive power than competing legal systems, which depended on reciprocity and trust for their operation. Consider Henry II's effective resolution of his bitter struggle with Archbishop Thomas Becket over the proper boundary between royal and church jurisdictions: He had Becket killed.

Through this and other measures Henry II rapidly expanded England's royal law. He established a permanent court of professional judges, the use of inquisitional juries, and regular circuits for itinerant judges. The latter measure, in particular, reveals Henry's motivations: his itinerant justices also served as tax collectors.

The legal conquests of King Henry II and kings throughout late-medieval Europe established a reign of state law that has lasted to this day.

Although grafted to the good stock of customary law, state law grew in strange, twisted ways. It classified murder, rape, theft, and so on as crimes as against the *state*, rather than as crimes against individuals. Fines went to the king. Victims got only the satisfaction of seeing criminals suffer corporal punishment. Dissatisfied individuals continued to seek restitution out of court, so state officials forbade them to take justice into their own hands. This sharply reduced victims' incentives to pursue criminals, and statutes demanding the victims' cooperation had little effect. The state therefore developed the police powers necessary to enforce its laws on criminals and victims alike.¹⁷

The Persistence of Polycentric Law

Although state legal systems have amassed immense monopolistic powers, they have never entirely quashed competition among legal systems. States themselves compete to attract human and financial capital. And the law merchant has continued to survive in that realm safely beyond the reach of any one state's laws: international trade. But even within state boundaries polycentricity has survived.

The United States in particular has enjoyed a rich variety of competing jurisdictions. Each federal, state, county, municipal, and military court system has its own substantive and procedural rules - rules that often come into conflict. But these "official" jurisdictions barely scratch the surface. In *Justice Without Law?* Jerold S. Auerbach records several groups that produced systems of private law: the early Puritan, Quaker, and Dutch settlers; the many various nineteenth century utopian communes; the newly-freed slaves; the Mormons; the Chinese, Jewish, and other immigrant communities; merchants; and uneasy labor/management couplings.¹⁸

Pioneers moving beyond the reach of state law also created their own private legal systems. Terry L. Anderson and P.J. Hill provide an excellent summary of the laws of the land clubs, cattlemen's associations, mining camps, and wagon trains.¹⁹ See Benson for a fascinating account of vigilante justice on the western frontier.²⁰

Privately produced law continues to thrive in the U.S. and gives every indication of growing stronger. Americans have a special knack for forming private organizations, each of which produces a set of rules we can justifiably call "law." Leon Fuller explains:

If the law is considered as 'the enterprise of subjecting human conduct to the governance of rules,' [Fuller's own definition] then this enterprise is being conducted, not on two or three fronts, but on thousands. Engaged in this enterprise are those who draft and administer rules governing the internal affairs of clubs, churches, schools, labor unions, trade associations, agricultural fairs, and a hundred and one other forms of human association. . . there are in this country alone "systems of law" numbering in the hundreds of thousands.²¹

Many of the organizations that Fuller lists provide law in areas that the state has overlooked or willfully ignored. In recent years, however, privately produced law has grown most rapidly in an area where it competes directly with state law: commercial arbitration.

Private arbitration has removed entire classes of disputes from state courts. The insurance, construction, stock exchange, and textile industries (among others) all make heavy use of arbitration.²² There are currently about 600 arbitration associations in the U.S. The largest of them, the American Arbitration Association, reported 52,520 case filings in 1989 - up more than 36% from 1980's figures. Overall, some 90,000 cases were filed with arbitrators in 1989.²³ Why are state courts losing so much business? Because private courts offer greater speed and efficiency than state courts.

Theories of Privately Produced Law

Economists since Adam Smith have argued that competition in production serves consumers' interests, while monopolies tend toward sloth and waste. Gustave de Molinari was probably the first legal theorist who dared to ask why this should not be as true of the law as it is of apples, cotton, and

iron. He argued that under the state's monopoly of law "Justice becomes slow and costly, the police vexatious, individual liberty is no longer respected. [and] the price of security is abusively inflated and inequitably apportioned, . . ."²⁴ He therefore advocated a non-monopolistic legal system and projected that once "all artificial obstacles to the free action of the natural laws that govern the economic world have disappeared, the situation of the various members of society will become *the best possible*."²⁵

Since de Molinari, other scholars have developed sophisticated theories of polycentric law. In addition to the work drawing on customary law referred to above, the work of Randy E. Barnett and Morris and Linda Tannehill merits special attention. Barnett criticizes the state's monopoly in law from first-hand experience and promotes a forward-looking polycentric alternative.²⁶ Although Ayn Rand supported state law, the Tannehills employ her objectivist ethics to derive the moral superiority and basic features of a system of privately produced law.

The polycentric legal systems advocated by these theorists share several features: the protection of individual rights and private property; voluntary agreements for the provision of security; non-violent dispute resolution; restitution (backed up by insurance against crime losses); compliance enforced primarily through the threat of ostracism; and the evolution of legal norms through entrepreneurial activity. Note that these are essentially modernized versions of the six features that Benson discovered common to all customary legal systems (above).

Advocates of polycentric legal systems disagree about how to justify these common features, however. Rothbard, for instance, argues that private courts would have to obey a precise legal code "established on the basis of acknowledged libertarian principle, of nonaggression against the person or property of others; in short, on the basis of reason rather than on mere tradition, . . ."²⁷ Friedman, on the other hand, argues that the market in law will tend to protect individual rights because people "are willing to pay a much higher price to be left alone than anyone is willing to pay

to push them around."²⁸

These two forms of justification represent extreme versions of two approaches to the study of polycentric law: the philosophical/normative approach and the economic/descriptive approach. Although many legal theorists mix these two methods, they provide useful means of classifying research in polycentric law.

In *Anarchy, State, and Utopia* Robert Nozick employs the philosophical/normative approach to impugn the desirability of a polycentric legal system.²⁹ His work has triggered a number of defenses of privately produced law couched in terms of moral rights.³⁰

Fuller's *Morality and the Law* introduced polycentric law to mainstream legal philosophy.³¹ Fuller defines "law" in terms broad enough to encompass privately produced law (as we saw in the quote above), and criticizes legal positivism's authoritarian tendencies. Barnett argues that Fuller's assumptions should lead him to repudiate monopolistic legal systems altogether and outlines a program means of bridging the gap between the two contrasting approaches that I have described.³²

Researchers of polycentric law employ the economic/descriptive approach more often than the philosophical/normative one. Barnett and Benson apply public choice arguments to analyze the actions of state agents and critique the perverse incentives created by state legal institutions.³³ Gerald J. Postema³⁴ and Robert Sugden³⁵ support Hayek's theory of the spontaneous development of law with game theoretic proofs of the important role social conventions play in coordinating behavior.

Economic analysis cuts both ways, however. The most sophisticated critique of polycentric law comes from William M. Landes and Richard A. Posner, who argue on economic grounds that private adjudication depends on state courts to back up its decisions; that it under-produces precedents; and that it creates a confusing hodge-podge of conflicting jurisdictions.³⁶ Benson offers convincing counter-arguments to these claims, calling in part on examples of successful private legal systems like the law merchant mentioned above.³⁷

Advocates of polycentric legal systems have yet to employ the economic/descriptive approach to their fullest advantage. The analogy between the private production of law and the private production of money deserves further attention.³⁸ Note, for example, that courts in a polycentric system do not simply sell judgements. Anyone can name one party of a dispute "the winner." By demonstrating wisdom and impartiality, private courts sell judgments that people will respect. Consider the parallel with privately produced money: anyone can call a piece of paper "money," but people will only respect the currency of banks that demonstrate adequate reserves and good management.

The analogy goes still deeper. Banknotes represent claims to commodities. In a free banking system, only those banks that successfully back up their claims will be able to keep currency in circulation. Bruno Leoni explains the law in similar terms: "Individuals make the law insofar as they make successful claims."³⁹ By this he means that legal norms arise out of the sorts of claims that have a good probability of being satisfied in a given society. This takes polycentricity to its logical extreme; there are as many potential sources of law as there are individually successful claims.

As we have seen, polycentric legal systems tend to generate successful claims to restitution. Just as the claim to a commodity can be transferred from one party to another (via the exchange of banknotes), so too the right to restitution can be transferred from one party to another (via the exchange of "courtnotes," we might say). For example, individuals in a polycentric legal system would probably buy insurance to protect themselves against losses due to others' illegal activity (in addition to buying insurance to cover their own liability). When insurance companies had to cover their clients' losses they would assume the right to demand restitution from the responsible parties. The claim to restitution would thus transfer from the original victim to the insurance company. Insurance companies would probably transfer claims to restitution among themselves to settle their accounts, giving rise to features analogous to those that arose among private banks: transferable courtnotes, clearinghouses, and client infor-

mation bureaus.

The Future of Privately Produced Law

Having learned something of the history of privately produced law and the theories that explain its operation, we can now look into the future to see what sort of legal system might arise in a free society. This is highly speculative, of course, for we cannot tell exactly what legal entrepreneurs will come up with. But we can paint a plausible picture of the future development of privately produced law by borrowing from Barnett, Friedman, Rothbard, and the Tannehills.

Disputes arising out of contractual relations usually won't present too much of a problem, since contracts can simply stipulate that all disputes be settled before a named arbitrator. As mentioned above, this is a practice which is already common to many areas of trade and rapidly spreading to others.

But what if you signed a contract without such a stipulation and a dispute arises? You and the other party to the dispute can always agree to take your dispute to a private court after the dispute arises. There should be no shortage of objective courts to choose from--biased courts would go out of business rather quickly.

But what if the opposing party knows he will probably lose and thus refuses to go to court? This is where the insurance companies alluded to above come into play.⁴⁰ Like most people in a society where law is produced privately, you will have brought legal insurance for just such occasions. You tell your insurance agent of the other party's recalcitrance, file a claim under your policy, collect compensation for your losses, and leave the matter in your agent's hands.

The right to take the other party to court now transfers to your insurance company, which contacts his insurance company (or whatever organization through which he purchases legal representation) and arranges a hearing. Upon losing, your opponent can expect his legal insurance premiums to skyrocket - if he does not lose his policy altogether. In either case, if he tries to get a policy from another insurance company he will find that it

has heard of his guileless behavior through a legal credit bureau set up and run by the insurance industry. Such consequences will prevent most people from refusing to go to court voluntarily.

But what if your opponent doesn't have any legal insurance to lose? In that case, you probably wouldn't have done business with in the first place, having discovered that upon your request he couldn't give proof of legal coverage. What if you forgot to check? Firstly, you can expect your own insurance premiums to increase for having engaged in such high risk behavior. Secondly, your insurance company will assume the right to demand restitution once again - but this time they'll go after the scoff-law himself, rather than his insurance company. Or, if they don't handle such dirty work, they might sell the right to restitution to a private police agency or a free-lance bounty-hunter.

The analogy between the private production of law and the private production of money deserves further attention.

Whoever catches the outlaw will not want to punish him; there's no profit in pointless suffering. Rather, they will want monetary restitution. If there are no assets to seize, they will reserve the right to garnish the outlaw's paycheck. In the worst-case scenario, they will place him in a workhouse until he work off his debts. Such unpleasant consequences should convince most people to take out legal insurance or otherwise obtain legal representation.

Disputes arising out of criminal activity will unfold in much the same way, though criminals' uncooperative disposition will probably put such cases in the hands of insurance companies, private police agencies, or bounty-hunters rather quickly.

Where do the laws come from in this system? From the desires of consumers. You'll get to choose

the court of law, and hence the legal system, under which your cases are heard - subject, of course, to the agreement of the party opposing you. This unanimity requirement, combined with the economic benefits of following general standards, will probably result in a basic legal code accepted by almost all courts (Some courts will still of course offer specialized laws for particular sorts of cases.) What will this basic code look like? Rothbard probably has it right when he claims that it will follow the principle of nonaggression against the person or property of others - but Friedman is probably right to point out that it will look this way for reasons of economics, not ideology.

What happens when legal systems conflict?

Most people fear that war would erupt in a system of purely private law, but such fears are ill-founded. First of all, note that war is expensive. Those who produce laws in a private system can't depend on taxes for their income; they have to find willing purchasers of their product. But warlike law-merchants are at a competitive disadvantage, for they must subsidize their aggression by offering less or lower quality legal services per unit of purchasing power. Military dictators would quickly go bankrupt in a polycentric legal system. But what if one who aspires to military dictatorship tries to alleviate his cash-flow problem by introducing taxation, thereby turning his customers into slaves? In that case he will have reestablished a state--and its warts can hardly be taken to impugn a system of privately produced law.

We would still be concerned, however, if a system of privately produced law made it easy for military dictators to succeed in reestablishing states. But this does not seem likely. In a polycentric legal system, power is widely dispersed. There are no borders to violate, no capitals to seize, no leaders to assassinate. And yet the would-be tyrant faces countless obstacles, for each coercive step he takes in a free society incurs the wrath a private protection agency. Together or apart, these agencies would hold the tyrant and his servants⁴¹ responsible for correcting every wrong they commit.

Of course, no one can guarantee that privately produced law would work. The success of any social organization depends on the attitudes

and beliefs of those who take part in it. If most people feel that they need and want coercively imposed laws, they shall have them. But if a certain critical mass people--not necessarily a majority of the population - believe that they should be free to chose their own legal standards, then privately produced law has a good chance at taking off. And taken off it has. A polycentric legal system has already taken root in the cracks of the state's legal monolith. The greater efficiency, justice, and resilience of purely private law gives it a good chance of shooting skyward. Its continued growth will split the state's power asunder, and leave us free to enjoy the sweet fruits of a legal system based on real consent.

NOTES

¹ I do not consider myself to be an anarcho-capitalist. Until I hear a convincing justification of statism, however, I will continue to advocate the ideal of real consent in all human relations - including the law.

² Friedrich A. Hayek, *Law, Legislation, and Liberty*, vol.I (Chicago: University of Chicago Press, 1973), p.44.

³ Hayek, *Law, Legislation, and Liberty*, vol.I, p.43.

⁴ Bruce L. Benson, *The Enterprise of Law* (San Francisco: Pacific Research Institute, 1990): 15-21.

⁵ For detailed information about the Kapauku legal system turn to Benson's main source: Leopold Popisil, *Anthropology of Law: A Comparative Theory* (New York: Harper and Row, 1971).

⁶ Bruce L. Benson, "Enforcement of Property Rights in Primitive Societies: Law Without Government," *Journal of Libertarian Studies* 9 (Winter 1989): 1-26

⁷ Benson's main source: Walter Goldsmidt, "Ethics and the Structure of Society: An Ethnological Contribution to the Sociology of Knowledge," *American Anthropologist* 53 (October-December 1951): 506-524.

⁸ Benson's main sources: E. Adamson Hoebel, *The Law of Primitive Man* (Cambridge, MA: Harvard University Press, 1954); and R.F. Barton, "Procedure Among the Ifugao," in Paul Buchanon, ed., *Law and Warfare* (Garden City, NY: The National History Press, 1967). Benson also repeats many of the observations about the Ifugao that he makes in "Enforcement of Property Rights in Primitive Societies: Law Without Government" in his article "The Lost Victim and Other Failures of the Public Law Experiment." *Harvard Journal of Law and Public Policy* 9 (Spring 1986): 399-427.

⁹ David D. Friedman, "Private Creation and Enforcement of Law: A Historical Case," *Journal of Legal Studies* 8 (March 1979), p.400. Friedman summarizes and interprets research on Icelandic law more briefly in his book *The Machinery of Freedom*, 2nd ed. (La Salle, Illinois: Open Court, 1989).

¹⁰ Murray Rothbard, *For a New Liberty*. Rev. ed. (New York:

- Collier Books, 1978), 231-234.
- ¹¹ Benson, *The Enterprise of Law*, p.21. Benson's analysis draws heavily from his earlier article, "Enforcement of Property Rights in Primitive Societies: Law Without Governments."
- ¹² Leonard P. Liggio, "The Transportation of Criminals: A Brief Political-Economic History," in Barnett and Hagel, eds. *Assessing the Criminal: Restitution, Retribution and the Legal Process* (Cambridge, Mass: Ballinger Publishing Co., 1977), p.273.
- ¹³ For in-depth treatment of the frankpledge system, see William A. Morris, *The Frankpledge System* (New York: Longmans, Green, and Co., 1910) and J.E.A. Joliffe, *The Constitutional History of Medieval England* (W.W. Norton & Co. Inc.: New York, 1961).
- ¹⁴ Berman, *Law and Revolution*, p.56.
- ¹⁵ For an excellent source of information about the law merchant see Leon E. Trakman, *The Law Merchant: The Evolution of Commercial Law* (Littleton, COlo.: Fred B. Rothman & Co., 1983).
- ¹⁶ Berman, *Law and Revolution*, p.10.
- ¹⁷ For a particularly shocking account of the treatment of victims in the U.S. legal system, see William F. McDonald, "The Role of the Victim in America," in Barnett and Hagel, eds. *Assessing the Criminal: Restitution, Retribution, and the Legal Process*.
- ¹⁸ Jerold S. Auerbach, *Justice Without Law?* (New York: Oxford University Press, 1983).
- ¹⁹ Terry L. Anderson and P.J. Hill, "An American Experiment in Anarcho-Capitalism: The Not So Wild WildWest," *Journal of Libertarian Studies* 3 (1979): 9-29.
- ²⁰ Benson, *The Enterprise of Law*, pp.312-321.
- ²¹ Fuller, pp.124-125.
- ²² Benson, *The Enterprise of Law*, p.219.
- ²³ Andrew Patner, "Arbitration Settles A Lot, Unsettles a Few," *The Wall Street Journal*, April 13, 1990, p.B1.
- ²⁴ Gustave de Molinari, *The Production of Security*, translated by J.H. McCulloch (New York: The Center for Libertarian Studies, 1977), p.14.
- ²⁵ Ibid., p.15 (de Molinari's emphasis).
- ²⁶ Randy E. Barnett, "Pursuing Justice in a Free Society: Part One - Power vs. Liberty," *Criminal Justice Ethics* (Summer/Fall 1985): 50-72; "Pursuing Justice in a Free Society: Part Two - Crime Prevention and the Legal Order," *ibid.* (Winter/Spring 1986): 30-53.
- ²⁷ Rothbard, *For A New Liberty*, p.230.
- ²⁸ Friedman, *The Machinery of Freedom*, p.127-128.
- ²⁹ Robert Nozick, *Anarchy, State, and Utopia* (New York: Basic Books, 1974).
- ³⁰ You will find several of these critiques conveniently gathered in one place; see Randy E. Barnett, "Whither Anarchy? Has Robert Nozick Justified the State? *Journal of Libertarian Studies* 1 (Winter 1977): 15-21; Roy A. Childs, Jr., "The Invisible Hand Strikes Back," *ibid.*: 23-33; John T. Sanders, "The Free Market Model Versus Government: A Reply to Nozick," *ibid.*: 35-44; and Murray N. Rothbard, "Robert Nozick and the Immaculate Conception of the State," *ibid.*: 45-57. For another series of articles triggered by Nozick's work, see George H. Smith's excellent mix of rights-theory and economics, "Justice Entrepreneurship in a Free Market," *Journal of Libertarian Studies* Vol. 3, No.4 (1979): 405-426, and its accompanying commentaries.
- ³¹ Fuller, *The Morality of Law*.
- ³² Randy E. Barnett, "Towards a Theory of Legal Naturalism," *Journal of Libertarian Studies* Vol.2, No.2 (1978): 97-107.
- ³³ Barnett, "Pursuing Justice in a Free Society: Part One - Power vs. Liberty;" Barnett, "Pursuing Justice in a Free Society: Part Two - Crime and the Legal Order;" and Benson, *The Enterprise of Law*.
- ³⁴ Gerald J. Postema, "Coordination and Convention at the Foundations of Law," *Journal of Legal Studies* 11 (January 1982): 165-203.
- ³⁵ Robert Sugden, *The Economics of Rights, Cooperation and Welfare*, (Oxford: Basil Blackwell Ltd, 1986).
- ³⁶ William M. Landes and Richard A. Posner, "Adjudication as a Public Good," *Journal of Legal Studies* 8 (March 1979): 235-284.
- ³⁷ Benson, *The Enterprise of Law*, p.221,277-281,299-300.
- ³⁸ The private production of money is often called "free banking." For excellent works in free banking see Lawrence H. White, *Free Banking in Britain: Theory, Experience, and Debate, 1800-1845*(Cambridge: Cambridge University Press, 1984); George A. Selgin, *The Theory of Free Banking: Money Supply Under Competitive Note Issue* (Totowa, NJ: Rowman and Littlefield, 1988); and, as a general overview, Kurt Schuler, "Free Banking," *Humane Studies Review* 6 (Fall, 1988), p.11.
- ³⁹ Bruno Leoni, "The Law as the Claim of the Individual," *Archives for Philosophy of Law and Social Philosophy* 40 (1964), p.58.
- ⁴⁰ Of course you might have taken your dispute to the insurance company as soon as the dispute arose if your policy so allowed. Policies calling for such attention would of course cost more than those requiring you to make good faith efforts to settle the dispute on your own.
- ⁴¹ Holding the tyrant's servants fully responsible is perhaps even more important, from a public choice point of view, than holding the tyrant responsible. The servants would realize that they cannot escape liability by hiding behind their uniforms, and would thus hesitate to take the tyrant's orders.

Order Without Orderers

by
Max More

The Importance of Spontaneous Orders

Transhumanists of all kinds - Extropians, Venturists, Immortalists - look forward to making some radical alterations in the human condition. We want to remake ourselves into something more than mindless nature has generated. This will require some powerful technologies and will produce enormous social changes. We are therefore obligated to think about appropriate constraints on the pursuit of our goals. The purpose of this paper is to argue for the recognition of spontaneous ordering as just such a constraint.

To understand the importance of spontaneous orders (*SOs*) and spontaneous ordering principles (*SOPs*) we first need to distinguish them from another kind of order. I will usually refer to this other type of order as a *constructed order* or as an *organization*. The two types of order have been called by many names.¹ Here are a few:

Spontaneous	Organization
Self-generating	Construction
Grown (organic)	Artificial
Endogenous	Exogenous
Kosmos	Taxis
Abstract	Concrete

Spontaneous orders are orders designed by no one, though someone may have prepared the ground for their development. I will provide a number of illustrations of the prevalence of spontaneous ordering; for now some examples are: the complex biological forms resulting from genetic variation and selection without any conscious direction; crystals which form into a pattern without

that pattern being specified by the initial atomic forces; the free market economic system; and the development of language.

Examples of *constructed orders* are ubiquitous: Automobiles; the legal structure of a corporation; a painting; a computer program. Clearly, many orders are mixed to various degrees. For instance the pattern of activities you engage in over a month is partly the result of your planning (a constructed order), and partly the result of unpredictable interactions with other people and events, and unforeseen opportunities. Large organizations are typically a mixture of the two types of order; a corporation's basic legal structure and its goals will be the result of planning by one or a few people, but many details of operation will emerge over time depending on multifarious, protean factors.

Since I will be explaining why spontaneous orders are so valuable and important in shaping our futurist goals, I should stress here that I am *not* arguing that *SOs* are, in a general sense, better than constructed orders. Both types of order have their place. In writing a paper, we cannot expect our thoughts to spontaneously self-organize. For the task of paper-writing, planning and deliberate organization is clearly more appropriate. On the other hand, social systems are best allowed to spontaneously order, containing within them many smaller constructed orders.

The Hidden Order

The pervasiveness and importance of spontaneous orders is poorly appreciated by most people. There are three reasons for this: First, concrete constructed orders are easily perceived

because of their relative simplicity. Since constructed orders are designed and organized by one person or one integrated group of persons, they are necessarily limited to the degree of complexity comprehensible and controllable by those minds. This is not true of spontaneous orders.

Spontaneous orders can achieve any degree of complexity. SOs that are extremely complex may be difficult to recognize as orders. For example, we sometimes hear of "the chaos of the market", a phrase signifying the speaker's failure to understand the enormously complex spontaneous ordering at work in a decentralized, free market economic system. As this person sees it, there is no order in economic affairs unless they can see some person or group of persons designing the order, setting a pattern for the outcome.

Recognizing SOs is further complicated by the abstractness of almost all such orders. SOs consist of a system of abstract relations between elements which are themselves defined only by abstract properties. The abstractness of an order means that the same order can persist even though the particular elements that comprise it change over time. So long as elements of a certain kind continue to be related to each other in a certain manner, the order will persist. A language, for instance, can remain the same language when spoken by different speakers. The double abstractness of a spontaneous order can be illustrated by the free market: The order of the market is constituted by the abstract relations between persons, and the persons themselves, in this context, must be understood abstractly as agents constituted by sets of desires, purposes, beliefs and actions.

The abstractness of SOs makes them particularly difficult for the untutored mind to recognize. You can't simply look at an SO and spot it. You need to apply a theory. Your theory allows you to examine the objects and events and to cognitively reconstruct the order by applying explanatory principles. Application of a theory to the phenomena amounts to filtering data in search of a pattern.

Apart from complexity and abstractness there is a third, surprising, feature of spontaneous orders that renders them less obvious than con-

structed orders. This is their purposelessness. Concrete orders are designed for a particular purpose or group of purposes and so we can recognize them easily due to their specificity and goal-directedness. The essence of spontaneous orders is their purposelessness. This feature does not detract from their usefulness in the least. While an SO is not designed and so has no purpose, it may be capable of sustaining within itself an enormous variety of purposes. An order that is itself without specifiable purpose may serve as the framework for purposive action. Again, a clear example is the market. The market system is not there for any particular reason, yet allows a limitless number of persons to pursue their goals.

Some spontaneous orders might have a meta-purpose, though perhaps such orders would be partially organizations and partially spontaneous. An example might be an artificial ecosystem set up to evolve new lifeforms, but where the creators have no idea what the particular results will be, expecting only that some useful results will be generated in the ecology. In this case, the ecology has a meta-purpose which is to generate interesting new lifeforms, but it does not itself have a purpose or function in a purposive, directed manner.

If no one designs a spontaneous order how can it turn out to be ordered? This is a question that has arisen in economics, biology and cosmology. In each of these and other fields the details of the answer are different, but they all share something in common. The common answer lies in recognizing the self-organizing possibilities of systems that run according to certain well-defined rules or principles. So long as the elements of the system do or must follow the rules, and the rules have the necessary structure, then self-organization will occur and complex orders will be generated. Perhaps the best way to clarify this is to introduce several cases of SOs. This will also support my earlier assertion that spontaneous orders are tremendously pervasive and extremely important for futurists and Extropian transhumanists.

Examples

Economic Markets: Having already mentioned free markets several times, and because they are such a clear and generally familiar case, I will begin here. Whereas a corporatist, fascist, or national socialist economy (and, to a lesser degree, a mixed economy) will be deliberately structured, regulated, and controlled to pursue certain goals - such as world domination, maximizing the power of the leadership, enforcing certain moral views, etc. - a market economy has no goal. Of course it may produce certain *results* such as maximizing output, enhancing freedom and diversity, and stimulating technological advance. However, these emergent results are not goals of the system as such.

A fully free market economy requires certain principles regulating the behavior of the agents within it if the order is to be preserved. In a market system the regulating principles are *private property rights*. Fundamentally there is a right of self-ownership - the right to live, to think as you choose, to choose your way of life consistent with respecting others' same right. As extensions of that fundamental right are all the other property rights. Maintaining a market order simply requires people to respect each others rights to life, liberty and property. Where violations of these rights occur such as theft, assault and fraud, the system primarily requires *restitution*, in order to restore legitimate claims and to repair the harm done to the rational expectations of the persons involved in voluntary market activities.

A fully free market system is often described, in a political context, as "libertarian" because of the minimal coercion of some persons by others. I also refer to the system as "spontaneous voluntarism". This term has the advantage of emphasizing the voluntaristic and spontaneously ordering characteristics of the system. Tom W. Bell has offered the term "consent rich", and we could also refer to this system as "maximally consensual". Whether the maintenance of a system of property rights requires any role for a monopolistic agency of coercion ("the State") is a question I will not touch on here.² *Bell (ed.) + Friedman, 1979*

The careful definition and maintenance of the structure of private property rights is essential to the ordering processes of the market. If there is constant coercive intervention in the economy, widespread legal and/or cultural disregard for the rights of self-ownership and property, then disorder will ensue. An enormously complex order such as the market is able to withstand much disregard for its underlying principles, but if disruption becomes excessive or invades crucial areas such as the monetary system, chaos begins to dominate.

The effectiveness of spontaneous orders in facilitating interactions and communication of information in extremely complex systems is well illustrated by the present example. In a market order efficient use is made of the particular and special knowledge possessed by individuals. Effective production and the efficient satisfaction of consumer wants requires the coordination of billions of persons and their plans, expectations and knowledge.

No central planner could hope to acquire all the information necessary to coordinate all these actions into an efficient plan. There are many reasons why authoritarian central control cannot work. The individuals to whom the planner is to give orders and from whom to gather information may be unwilling to be controlled and directed from above. Even if they are willing to give the planner all the information requested they may be *unable* to express the situation-specific information they possess. Much of the success of producers is based on *tacit knowledge* - knowledge that cannot be verbalized. It is frequently procedural, not declarative in nature. Entrepreneurs may have ways of working, of interacting with customers and fellow workers that they may be consciously unaware of: even if they are aware of all their procedures they may be unable to express what they do to a bureaucrat.

Even if these problems were not insuperable, the central planners would face an impossible task in coordinating all the information flooding in, no matter how powerful their data processing capacities. We can see the problems inherent in central planning by looking at our own economy. Government officials compile economic statistics

such as figures for the money supply, gross national product (GNP), employment, income, growth rates, and so on. These figures are always revised after initial publication, often revealing a large error margin. Making central plans based on such faulty data, data that is continually changing in a dynamic economy, is inherently problematic. By the time the data, inaccurate as it is, becomes available, the economy has moved on and the information is immediately incorrect.

The decentralized market economy deals with this problem by making it unnecessary for anyone to know everything about the entire system. Price signals - generated by voluntary decisions based on private property rights - transmit the relevant information to those who need to know it. Incommunicable tacit knowledge is reflected in the market prices of the producer with no need for her to explain to anyone how she does her job.

The market system has the further advantage of requiring minimal coercion. Coercion (the threat or use of physical force) is required only to prevent persons from violating others' rights to life, liberty and property. By decentralizing decision-making and rational planning to individuals and voluntary groupings of individuals, the market harnesses productive capacities for everyone's benefit. As Adam Smith wrote two centuries ago, the market works as if there were an "invisible hand" ensuring that the actions of individuals produce benefits for all. The better someone is at supplying others with what they want the more she is rewarded.

Of course this requires that the proper principles necessary to the functioning of the spontaneous order are maintained; this means that self-ownership and private property rights must be respected both by the legal system and the culture. External costs (such as polluting activities) should be internalized by the consistent application of private property rights. The spontaneous ordering processes embodied in the market then, economize on the use of information and optimize production from the point of view of the voluntary agents within the system.

Evolution: Another enlightening paradigm of a

spontaneous ordering process is genetic evolution. Although yet far from completed, scientists have gone a long way in explaining how organisms and genetic material could have spontaneously evolved from molecules in the environment.³ The rules of the system that allow spontaneous generation of organisms are the principles of physics and the genetic system in environments falling within certain parameters (temperature, pressure, availability of elements).

We can now see a revealing parallel between theists and socialists.

We can now see a revealing parallel between theists and socialists. Those who believe in a god who creates the universe, life and consciousness, and those who reject the market because of its purported chaos, both fail to appreciate the power of spontaneous ordering principles. Theists don't understand how vastly complex phenomena such as the structure of galaxies, life on Earth, and conscious intelligence could possibly have come about other than as the deliberate design of some ineffable being. (of course they further violate the principle of explanatory parsimony in introducing a being whose complexity must be greater than the original phenomena to be explained.)

Likewise, socialists and other statists can't understand how human purposes can be efficiently pursued without some wise persons designing and controlling a social system. Put into reverse this confluence of intellectual deficiencies may explain why such a high proportion of Extropians and transhumanists are both atheists and free marketeers.

Evolutionary Models: Evolutionary principles have recently been fruitfully applied in constructing computer models of self-ordering systems. Examples are strategies such as Tit-For-Tat, cellular automata such as Conway's Game of Life, and

The *Tit-for-Tat* strategy that was submitted to a computer strategy tournament organized by Robert Axelrod⁴. It consistently outperformed other strategies in terms of scoring points in its interactions with them, as a result the cooperative Tit-For-Tat strategy gradually grew and swamped the others.

It did this by adhering to simple rules embodying the principles of *niceness* - not attacking first, *retaliation* - hitting back when another strategy "defects", *forgiving* - not holding grudges, and *clarity* - being simple enough for other strategies to understand. By allowing this simulation to run through many rounds, an overall pattern of Tit-For-Tat behavior came to dominate the environment even though this result had not been programmed into the computer. Similar processes have been evoked to explain cooperative behavior among animals.

"Artificial life" (A-Life) is an attempt to create many small "agents" in connectionist computers and to allow them to evolve useful behavior. It also involves using these small agents to make tiny robots that can perform functions like walking, exploring, and cleaning buildings. So far many of the examples of A-Life are both intriguing and amusing: Rod Brooks, at MIT's robot lab, built "the Collection Machine" which travels around the building recognizing and collecting soda cans. One of his students built a device that tracks your movement around a room and calibrates the stereo so that you always enjoy the best sound.

A-Life researchers often work with cellular automata (CA) - grids of cells in computational space. Each cell is determined to be dead or alive (off or on) by a set of rules that refer to the neighboring cells. The Game of Life is an example of CA; it applies a few simple rules and generates complex patterns that were in no way specified in the original rules. Watching the screen you would first see a few dots appearing, disappearing and apparently moving around. Over time you would observe a multiplication of patterns which start to assume characteristic forms - such as blocks, waves, bee-hives, blinkers, glider guns and puffer trains. Again, nothing in the original rules of the program specifies these patterns.⁵

Physics: (Brevity means that this section may be obscure to most non-physicists. For those interested, see Polkinghorne, 1984.) In quantum mechanics there are two methods for calculating probabilities. The traditional method involves solving the Schrodinger equation to find two wavefunctions (with one slit open, the other closed in the two-slit experiment). The square of the moduli of these wavefunctions, or probability amplitudes, yields actual probabilities for the state of motion. The alternative method, invented by Richard Feynmann and known as the path integral or sum over histories approach directly calculates probability amplitudes without using the Schrodinger equation.

Feynmann's approach involves assigning a complex probability amplitude to each of the vastly many trajectories an electron might take. While in conventional quantum theory an electron has no trajectory, in the sum over histories approach it has every trajectory. Feynmann's perspective enables us to see how quantum mechanics can correspond with the neat, regular trajectories of classical, Newtonian physics. In other words, we can understand how the apparently chaotic behavior at the quantum level generates macro-level regularity. In the sum over histories approach, there is an enormous amount of interference between the different paths of the electron, and these tend to cancel each other out. Essentially, "For really large systems this will have the consequence that the only paths that contribute significantly to the final result will be those in a region where the action changes as slowly as possible, since here the cancellations are minimized." (Polkinghorne, p.43) This region follows the path of stationary action which is just the classical trajectory.

Memetics: Memes are patterns of replicating information, whether in brains or computers. They include ideas, beliefs, tunes, habits, traditions, morals, designs, jokes, and fashions.⁶ In memetic evolution variation is driven by imagination, invention and confusion, and the rules of the game are the principles of psychology. New and often interesting memes can be generated without conscious design, in a similar way to the generation of Dawkins' ⁷ also this issue

new somatic types in biological evolution. In the memetic case, however, it is memes which perish if unsuccessful, not their carriers (with some ugly exceptions such as kamikaze and Jim Jones memes). The burgeoning field of evolutionary epistemology attempts to understand scientific progress in terms of evolutionary and spontaneously ordering processes. Since memetics is frequently discussed in these pages I will say no more.

Agoric Open Systems: The stunning rate of the computerization of modern societies is wonderful to be a part of; but as the complexity and interconnectedness of these systems grows we are increasingly faced with the problem of how to allocate computational resources: "As programs and distributed systems grow larger, they are outrunning the capacity of rational central planning. Coping with complexity seems to depend on decentralization and on giving computational "objects" property rights in their data and algorithms. Perhaps it will even come to depend on the use of price information about resource need and availability that can emerge from competitive bidding among these objects."⁸

The computer analogy for property rights is "object-oriented programming" (OOPS).

 The computer analogy for property rights is "object-oriented programming systems" (OOPS). This kind of programming involves assignment of tasks to computational objects; these objects are autonomous sections of code whose functions cannot be modified by other objects. This allows programmers to build a program containing many objects whose internal workings she need not know.

Decentralized, spontaneously ordering mechanisms for handling computation are known as *agoric open systems*. An agoric system "is

defined as a software system using market mechanisms, based on foundations that provide for the *encapsulation* and *communication* of *information, access, and resources among objects*.⁹ In this system programs would bid for memory and disk space, paying more for coveted memory than disk space and paying more at times of peak demand.

Setting up networks and programs along these spontaneously ordering lines would allow the limitless growth of computational complexity and interconnectivity. Another advantage would be the promotion of innovation and discovery. With encapsulation assuring computational property rights and agoric systems conveying price information, entrepreneurial activity would be stimulated just as in a market economy. Programmers could take existing objects and add their own algorithms to produce new software. They would not need to reinvent the original code now in the objects and would not even need to understand it.¹⁰ EXTR^{OP}Y 8

Neurocomputation and Connectionist AI: The last several issues of this journal have had much to say about artificial neural networks, connectionism, or parallel distributed processing (PDP). This approach to computing contrasts with "Classical Artificial Intelligence (AI)" in its vastly greater ability to recognize patterns. Connectionist models, like agoric systems, are spontaneously ordering processes. Learning takes place by the adjustment of weightings of those components that have moved the system towards more successful recognition. Essentially, by setting up the network and giving it feedback according to the appropriateness and successfulness of its output, the network self-organizes its internal states (its activation vector spaces).

As artificial networks become ever more complex and brain-like, the problem of coordinating the components grows. Miller and Drexler suggest that by combining connectionism and agoric systems networks could learn how to better assign credit to the components that contribute to success. This is often done with current connectionist models by using the "back-propagation" algorithm.¹¹ "As the system develops, mar-

ket competition will reward objects which employ more sophisticated negotiating strategies that better reflect both the value derived from the various contributors, and what their competitors are offering." (Miller & Drexler, 1988b, p.172.)

Contelligence and Society of Mind: This leads us into how spontaneous order can help us to understand consciousness and intelligence, and how to build our own contelligences.¹² Our brains are now understood as extremely complex and massively interconnected neural networks. The elements are the neurons and the connections are the axons, dendrites and neurotransmitter releases from the synapses. The brain is a spontaneous order; it has no central processing unit. Classical, rule-based AI has failed to make progress in developing real intelligence because it has followed a formal processing model reminiscent of neoclassical economics. Connectionist AI, although yet only moderately biologically realistic, promises much more potential for flexible intelligent cognitive behavior.¹³ *Churchland 15:39*

The brain has been described as a "society of mind"¹⁴ and bears remarkable parallels to an economy. Cognition of all kinds - reasoning, believing, emoting - is increasingly being understood in terms of interactions between more specialized sub-systems, or "agents". In order to build real artificial contelligence we can expect to have duplicate certain features of neural networks, though we can also expect to surpass nature by eventually creating faster and more powerful thinkers, perhaps using optical or nano-computers. In constructing self-organizing artificial thinkers agoric principles will be tremendously helpful as a means of coordinating the cognitive contributions of the many agents constituting a network.

SOs and Transhumanist Goals

Now that we have seen the pervasive role of spontaneous orders in both limiting and enabling the extropic processes of creation, organization, and information generation and distribution, we are ready to look at the means available to us in the

pursuit of Extropian transhumanist goals while respecting the SO principle.

Freedom vs Technocracy: Laws regulating experimentation with self-transformative technologies should be abolished. In North America dismantling the Food and Drug Administration (FDA) would be an excellent way to start the process of freeing individuals in their personal experimentation.¹⁵ Laws regulating research, genetic self-modification, and neurochemical self-enhancement should also be rejected. Given the rapidly growing technological opportunities for self-enhancement, now would be a good time for legally-minded Extropians to think about action to establish constitutional guarantees of our freedom of self-modification.

Similarly, given the increasingly vital role of electronic communications and soon hypertext in the spread of diverse information, we require strong legal protection of our freedoms in these areas. Currently electronic mail does not receive the same protection as old-style paper mail, and computers and BBSs are taken without regard for the privacy of those using them. If the State can pry into our discussions when its agents choose, and can stifle our free discussions, the results can only be antithetical to progress.

H.G. Wells dreamed of a scientifically, centrally planned world in which our glorious future would be assured by efficient control of the scientific experts from the center. In 1991, after decades of failure with central planning Wells' plans for our future seem foolish. Just as government is hopeless at centrally planning industrial policy and investment, so it would be worthless, stifling and destructive if we were to allow it to control our transhuman development.

In place of technocracy Extropians propose individual self-experimentation limited by nothing other than the purely negative injunction: Don't interfere with other people's pursuit of their path of development. The only people who can complain about this *minimal limitation* are the parasites and the controllers, for only they conceive of personal gain essentially in terms of restraining and taking from others. So long as we maintain non-initiation

of aggression guided by private property principles we will benefit each other no matter how we choose to develop. By taking a variety of paths we will make discoveries that would otherwise go unnoticed. A spontaneous free social order provides incentives and means to share those discoveries as my earlier examples illustrated.

States, Countries and Planetary Exodus.

So long as people on this planet are divided into nations, freedom should be maximized by minimizing control of one country by another. Governments are as dreadful at "reforming" other countries' governments as they are at controlling their own country and for the same reasons.

While the best paths of political evolution would include the dissolution of the massive power blocs called nation states, political society on Earth may remain statist. To the extent that states and countries remain, the goal of any international institutions (such as the U.N. or the EEC) should be to restrain international coercion and to promote free trade and free movement.¹⁷ This doesn't require that *individuals* cannot try to influence the behavior of foreign governments. Individuals should be free to do this just as they are now free to aid a person being mugged. What they may not do is force individuals with differing ideas to pay for and join in a collective assault.

Space habitats will offer an opportunity for unprecedented social experimentation. Interplanetary and, later, interstellar civilization seem to provide a far superior "framework for utopia"¹⁷ than exists at the bottom of our gravity well. The limited environment and immovability of the Earth-based societies will be shed. Some space habitats will attract persons with similar political views, some with shared eupraxosophies or religions. Others will be communities of persons with certain preferences in bodily vehicle. And we can expect many combinations of these possibilities. There will be the equivalent of both rural villages and Los Angeles.¹⁸

Humans are gradually emerging from their tribal roots, questioning racism, sexism and other forms of irrational behavior. We should encourage this trend and prepare the way for new species

branching off from *homo sapiens*. We don't want to replace old prejudices with new fears of persons different from ourselves.

The process of intercommunication and commerce will maintain a large confluence in the basic bodily form most people choose to take for the next couple of centuries or so. Few will want to diverge from an essentially humanoid form if it will alienate them from more conservative persons, though there will always be trend-setters and what we might call somatic rebels. Those of us who add enormous computational power to our brains will most likely want the enhancements to fit within our humanoid forms. Skulls will be reinforced with nanotech-built ultra-strong materials, our brains will be supplemented with tiny databases and add-on processing power, internal organs will be replaced with durable and more powerful synthetic organs, muscles will be strengthened, and immune systems will be supercharged with nanite defense systems, but all these upgrades can be accommodated within our present bodily form.

The first major modifications to our natural bodies will probably consist of synthetic organs, gene therapy and genetic enhancement, neurochemical fine-tuning and turbocharging, and direct physical interfacing with computers. Assuming it will be possible, many people will eventually swap their brains for superior carriers of consciousness (or will *incrementally* move their cognitive processes into the new hardware). Again, hardware allowing, most of these people will - at least initially - choose exterior forms resembling *homo sapiens*. Only in the more distant future, and first in more distant space habitats, can we expect to see entirely exotic somatic forms. The mere availability of radically new forms won't immediately lead to a rush into them; it will be a gradual process requiring new cultural forms to develop.

These future developments are an inevitable continuation of our evolving practices of self-definition. The nature of primitive unconscious life on Earth was wholly determined by genetic and environmental factors. When evolution produced humans with a degree of consciousness and basic culture, self-definition was born. As their history has progressed, humans have shown an inex-

able desire to choose their appearance, beliefs, lifestyle, and behavior. In the 20th Century we have even started to modify our personalities and unchosen behavioral patterns through applied psychology and neurochemical modification (using everything from alcohol and marijuana to MDMA and lithium).

This practice of self-definition and self-construction will continue. The possibilities for self-construction expand as we become ever more conceptually sophisticated (and so become increasingly aware of the factors forming us) and as our technological sophistication grows (and so we can act on our improved self-understanding). The threat of determinism will continually recede as we gain control over our own bodies, cognition, emotion, appearance and environment. Not everyone will want to continue in an endless extropic process of individualization and self-transformation, but this new freedom will be available for those not willing to stagnate with familiar but limited forms.

New Children and Few Children.

While we are remaking ourselves we will be remaking the ways we have offspring. In the nearer future individuals, couples or groups will decide on the genetic constitution of their child, no doubt eliminating deficiencies and maximizing the offspring's mental health, physical capacities, and emotional stability. Applying spontaneous order principles, we must ensure that the design of a new transhuman child and the family form itself are left up to the individuals involved. There should be no authoritarian government control over such choices.

Continuing the trend in the more developed countries, we can expect the rate of new children born (or built) to slow. More attention to each child may be the result, and a slowing of population growth, which will partly compensate for increasing longevity. Though this planet is capable of supporting many times as many people as we have now, most may prefer a more spacious environment. Space migration may not solve this problem - unless birth rates fall dramatically or until and unless leaving Earth becomes *very much* cheaper. Coercive solutions will be proposed: For

instance governments might offer the choice between a right to have a child and a right to (legal) longevity treatment (or between longevity and Earth habitation). SO considerations suggest we should devise property right so as to make child-creators bear the full social cost of their activity. This could begin by removing tax-subsidies to education and welfare subsidies that encourage large families.

Handling the Blast of Information.

The emerging technology of hypertext promises to enable rapid and efficient access to rapidly expanding information and to improve memetic evolution (see Nelson 1974, 1981, and Drexler 1986, ch.14). Hypertext allows extremely flexible cross-referencing of information: you can not only follow references backward in time as now, but forward to find who has commented on a piece of writing.

Some of the advantages of hypertext include much shorter lag times for refutations and rebuttals to appear, thus guiding discussions and research in more productive directions earlier on, and the ability to search for information across all disciplines - thereby reducing the current tendency towards academic compartmentalization.

Hypertext embodies spontaneous ordering principles: There is no central organization; anyone can post comments and add information, though frivolous postings will be limited (on the Xanadu system now in testing) by charges and filtering systems which will be programmable to individual taste. For instance, in gathering information on a controversial issue, you might have your computer filter out people with bad reputations, or accept only peer-reviewed material, or material which has generated supportive comments, and so on. The Xanadu hypertext system proposes to pay every writer for each time their writing is accessed; this will encourage a productive market in information dispersal.

Another epistemological process for handling information inspired by SO theory is the "Futures Market in Ideas" proposed by Robin Hanson (see Hanson 1990, 1990b). The idea is to evolve a better fact-finding process capable of generating a well-grounded consensus on sci-

tific and technical questions. Anyone would be able to bet on controversial scientific and technical issues and the market odds would be used as a consensus for policy questions. This would be enormously valuable where policies and funding depend on projections of technology, such as estimating when nanotech assemblers or cheaper space launches will be available.

An advantage of Hanson's suggestion is that, as in other markets in contingent assets such as markets in stocks and securities, irresponsible and ignorant betting will be costly. Financial incentives will promote careful betting, and will serve as a source of funding for those in the lead of particular research projects. "Arbitragers would keep the betting markets self-consistent across a wide range of issues, and hedgers would correct for various common human biases, like overconfidence." (Hanson, 1990b, p.3) Idea futures markets integrated with hypertext will allow vastly more accurate and rapid fact-finding procedures - an essential function in a future characterized by ever-expanding information.

Longevity, Cooperation and Eupraxosophies.

In Axelrod's work, cited earlier, far more cooperation emerged over time in iterated Prisoners' Dilemmas than in a single interaction. Agents capable of benefitting or harming one another will become increasingly likely - if only from self-interested considerations - to cooperate with one another the longer they expect to deal with each other. Thus one recommendation made by Axelrod to promote cooperation is to "enlarge the shadow of the future". This involves "increasing the expected number of interactions between agents. The shadow of the future will stretch further in the future.

Computerized information sources and tracking will make it hard for an uncooperative agent to avoid detection and damaging publicity. Moving to another community will not serve to avoid retaliation or compensation for theft, coercion, or fraud when computer networks and easy communications see to it that anyone can check on someone's past history. Perhaps boycotting as a means of retaliation will come back into favor.

The prospect of indefinite future interactions between persons will be further strengthened by increasing longevity, and eventually virtual elimination of unchosen death. When we become used to planning over centuries and longer, we will think less of how we can defraud others and get away with it. We will be especially wary of getting involved in violent conflicts whether personal or inter-governmental. Violating others' rights for short-term gains will be seen to be ever more foolish as we expect to live with the consequences of our actions. Similarly, extended lifespans will reinforce the growing concern for the long-term future of our environments.

Longevity will encourage open-ended and liberal philosophies. Religions will continue to slowly decline, being replaced with a wide range of eupraxosophies.¹⁹ Extropianism is a good example of a transhumanist eupraxophy: Its central values are flexible and open to personal interpretation while still making certain commitments clear. The Extropian principle of Self-Transformation expresses the intention to always grow and improve, to expand one's capacities and possibilities. It doesn't specify exactly what means are to be taken to fulfil that goal. Unlike a religion which lays down particular beliefs and practices as dogma, Extropianism provides a forum for free discussion of means to promote the basic values we affirm.

Several transhumanistic philosophies, many compatible with Extropianism, are developing already.²⁰ Venturism is an athanophic eupraxophy dedicated to the abolition of involuntary death through scientific means, and many persons involved or interested in life extension, cryonics, nanotechnology, advanced computing, and so on, hold many of the ideas and values embodied in Extropianism and other eupraxosophies. Rather than the sad history of religious conflict, the future is likely to become an arena of a co-existing and evolving variety of transhumanist philosophies.

This paper has been a survey of spontaneous ordering and some of the numerous ways in which it can be applied. I have shown some ways in which we can expect the shape of the future to depend on spontaneous orders and the advan-

tages of such an approach. SO processes are vital to the actualization of the Extropian principle of Boundless Expansion. If our knowledge, intelligence, constructive powers, and experiences are to be able to grow without limit we must ensure that the essential supporting frameworks are place. Spontaneous ordering is the key to the creation and maintenance of these frameworks.

NOTES

1 See Hayek, 1973.

2 See Bell, 1991 (this issue), and David Friedman (1989) for the view that no monopolistic agency is necessary.

3 See Dawkins, 1989, 1986.

4 Axelrod, 1987.

5 Moravec, 1988, presents a mind-expanding discussion of advanced A-Life, computer viruses, and cellular automata.

6 For the original coinage of "memes" see Dawkins, 1976. Also see Henson & Lucas's articles in this journal: "A Memetic Approach to 'Selling' Cryonics," in EXTROPY #7, and "Darwin's Difficulty," in EXTROPY #2, Winter 1989. Also Milner and Drexler 1988, "Comparative Ecology: A Computational Perspective."

7 This will remind philosophers of the distinction between teleological and deontological moral theories. As in the case of moral theories, the spontaneous vs constructed order distinction is an idealization.

8 Lavoie, Baetjer and William Tulloh, "High Tech Hayekians."

9 Miller and Drexler, 1988b.

10 Simon! D. Levy will cover agoric systems in detail in EXTROPY #8 (vol.3, no.2), Fall 1991.

11 See "Neurocomputing Part 3," by Simon! D. Levy, in EXTROPY #6 (Summer 1990).

12 I use the term "contelligence" to indicate that intelligence (in the sense of "the ability to perform a range of tasks") and consciousness (awareness, especially self-awareness) may not always go together. As an example, we might say that a society is intelligent (it can solve problems that no individual can solve) but it is not conscious. This is a point of controversy in the uploading argument. If posthumans want to upload the contents of their brains into computers, they will want to be sure that they will be conscious as well as ultra-intelligent. (See Moravec, 1988, on uploading.)

13 For an excellent overview of the connectionist view of mind, see Churchland, 1989, and my review of his book in EXTROPY #6 (Summer 1990).

14 Marvin Minsky, 1988. *The Society of Mind.*

15 The FDA's highly restrictive policies result in many thousands of premature deaths every year. This agency has no compunction about raiding organizations like Life Extension International, on the basis that the company is selling "unapproved drugs" (i.e., selling vitamins and offering good information on their beneficial effects, without the permission

of this authoritarian agency. For an economic analysis of the baneful effects of the FDA see M. Friedman, 1980.

16 James Bennett has made similar recommendations in his talk, "After the Nation-State, What?" at the Albert Jay Nock Forum, Long Beach, California April 2 1991.

17 See Nozick, 1974, ch.10, "A Framework for Utopia." A science fictional portrayal of humanity diverging in only two directions is found in Bruce Sterling's fascinating *Schizmatrix* 1985). 28A

18 A worthwhile long-term project for Extropians intent on enormous longevity might be the design, organization, finance and construction of the political constitution and physical creation of a space-based society conducive to Extropian values and maximal progress. The building of such an "Extropolis" could occupy us for the next few centuries. 28A

19 See "Futique Neologisms" in this issue for definitions of "eupraxophy", athanophy, etc.

20 Extropianism will continue to evolve in this journal and in an eventual book.

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FUTIQUE NEOLOGISMS

Compiled by Max More.

FUTURE SHOCK - "a sense of bewilderment felt by those who were not paying attention." - Michael Flynn, ANALOG Jan 1990.

ARCH-ANARCHY - the view that we should seek to void all limits on our freedom, including those imposed by the laws of nature. [TWB, 1990]

ATHANASIA - the act of preventing death. [WTQ, 1988]

ATHANOPHY - a philosophical system that offers a possible means of overcoming death scientifically. [RMP, 1991]

ANTIFUTURE - resisting the future. Pessimistic. Reactionary. [FM]

BIOLOGICAL FUNDAMENTALISM - a new conservatism that resists asexual reproduction, genetic engineering, altering the human anatomy, overcoming death. A resistance to the evolution from the human to the posthuman. [FM]

BIOSTASIS - suspension of all biological activity, usually by infusing the patient with cryoprotective chemicals and freezing or vitrifying (cryonics), or by chemically bonding cellular components in place. [KED, 1986]

CHIMP (or **NEUROCHIMP**) - an integrated chip implant into the brain. May be a chip/brain interface device, or additional mindware which passes through a chip/brain interface. [MM, 1990]

CHRONONAUTS - those who travel through time, either by biostasis or other means.

CONTELLIGENCE - [Consciousness + Intelligence]. The combination of awareness and computational power required in an Artificially Intelligent network before we could, without loss of anything essential, upload our selves into them. [TL]

CYBERNATE/CYBERNIZE - to automate a process using computers and robots.

CYBERSPACE/CYBERMATRIX - the informational and computational space existing in and between computers.

DEANIMALIZE - replace our animals organs and body parts with durable painfree non-flesh prostheses. [FM]

DEATHISM - the set of beliefs and attitudes which glorifies or accepts death and rejects and despises immortalism.

DEEP ANARCHY - The view that "the State" has no real existence; "states" can be "abolished" only by changing beliefs and behavior. [MM, 1989]

DEFLESH - replace flesh with nonflesh. [FM]

DEMORTALIZATION - rejuvenation. [BS, 1985]

ECTOGENESIS - in vitro reproduction; non-flesh wombs.

EPHEMERALISTS - mortals who reject immortalist technology and philosophy (the result of deathist thinking). [MM, 1990, from "Ephemeral", RAH, 1958]

ETERNALS - Immortal beings.

EUPRAXOPHY - (Good practice, active wisdom): A philosophy of life. [PK, 1988]

EXTROPY - 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. [TWB, 1988]

EXTROPIAN - one who affirms the extropy philosophy; anything which consciously promotes extropy.

EXTROPIANISM - The philosophy which aims at extropy.

EXTRO-LIBERTARIANISM - libertarianism conditioned by the extopian perspective. [MM]

EXTROPOLOGIST - One who studies and develops the extopian vision. [MM]

EVOLUTIONARIES - The extopian alternative to revolutionaries. (cf. Timothy Leary's "Intelligence Agents") - those who try to accelerate the move from humanity, through transhumanity, to posthumanity. [MM, 1990]

EYEOPHONES - a video headset, consisting of two high-definition screens or retinal projectors, worn over the eyes. Some have inertial sensors for tracking head movements. Used for entering *virtual* reality. (Also: Cybervisor)

FUTANT - "Future-oriented mutation"; one whose ideas, interests, and personal qualities are attuned to the technologically mature times ahead. [TL?]

FUTATION - Any mutation, genetic or memetic, that makes a person or society more effective in

the future. [MM]

FUTIQUE - Stylishly futuristic.

FUTOPIA - the possible coming technological global "post-scarcity society", specifically one which includes space colonies, robot labor, nanotechnology, AI, personality uploading, intelligence increase, life extension, and so on. (*Future + utopia.*) [RHE, 1990]

GENGINEERING - genetic engineering.

HEADWARE - Programming for your brain [TL].

HYPertext - massively interconnected database; references can be traced backwards and forwards. [TD]

IMMORTALISM - the commitment to achieving and maintaining an unlimited life and self-development; the belief in the desirability of abolishing death.

IMP - electronic implant, usually in the brain. [RHE]

INACTIVATE - non-living but not dead. A person in biostasis, or one subsisting in data storage awaiting downloading. [MM, 1989]

INFOTOPIA - a possible computer-generated reality which provides (through personality uploading) immortality of consciousness, and infinite user-defined virtual realities. [GMG, 1990]

MEME - self-reproducing idea or other information pattern which behaves like a gene. [RD, 1976]

MEMETICS - the study of memes. [DRH]

MEMOID (or **MEMEOID**) - True Believer in a meme and willing to die for it. [KH, 1985]

METABOLICALLY DISADVANTAGED - [Humorous] Biostasis/cryonics patients. [SBH, 1990]

MINDFOOD - Substances which increase cogni-

tive efficiency.

MINDWARE - Programming for your brain. [TL]

NANITE - a self-reproducing nanotechnological machine. [From the *Star Trek* TNG episode "Evolution", 1990.]

NANOID - a naive and ill-informed pro-nanotech propagandist; like Lyndon LaRouche, supports military nanotech and fastest possible implementation. Even more dangerous than a nanophobe. (Fr. *nano + memoid*) [GMG, 1990]

NANOMEME - any idea regarding *nanotech*; *The Nanomeme*: the nanotech meme-complex, considered as a whole. [GMG, 1990]

NANOPHILE - a well informed *nanotech* propagandist; supports non-military research and careful and considered implementation; against misinformation, false *nanomemes*. [GMG, 1990]

NANOPHOBE - a person against nanotech research and implementation; a *Rif*. [GMG, 1990]

NANOPUTER - a molecular-scale computing device. [MM, 1990]

NANOTECHNOLOGY (NANOTECH) - the technology of molecular-scale machines; from nanometer: a billionth of a meter. [ED, 1985?]

NANOTEK - Fictional portrayals of nanotechnology which may or may not be workable future devices.

NE - (pronounced "nee") the singular form of a genderless third-person pronoun which refers to a person who is of neither sex, as in: "Ne is an artificial intelligence." Objective *nem*, possessive *nes* (pronounced "nez"). (See *se*.) [GMG, 1990]

NEOPHILE - One who welcomes the future and who enjoys change and evolution.

NEOPHOBE - One who fears change and wants to

kill the future; one who is antifuture.

NEURONAUT - One who explores his/her own neural functioning by various means, including deep introspection and meditation, psychoactive drugs, mind machines and neuroscientific understanding.

NEURONUTRIENT - same as "mindfood". [MM]

NEUROPROSTHESIS - Implanted cybernetic brain augmentation.

NOBOT - member of an anti-robot lobbyist group; also, by extension, any persons against robots. [RHE, 1990]

NOOTROPICS - Mindfood substances. [CG, 1972]

ONEIROGEN - oneirogenic (dream or REMstate producing) drug. [RHE, 1990]

POSTHUMAN - Someone who has made such radical biological, genetic and neurological changes that they are no longer human. [FM]

POSTIQUE - Stylishly futuristic (like *Futique*). (Antonym of *antique*.) [RHE, 1990]

RIF - a Rifkinite, or supporter of Jeremy Rifkin and his anti-nanotech, anti-genetic engineering crusade; against any and all research or implementation in these areas. A *nobot*, or *nanophobe*. [GMG, 1990]

SE - (pronounced "see") the subjective form of a third-person singular pronoun of non-specific gender, to be used in place of "he" or "she" when referring to an individual of unspecified sex, as in "An author should be careful that se isn't making a fool of semself by allowing sexist default concepts to appear in ses work." Objective *sem*, possessive *ses* (pronounced "sez"), reflexive *semself*. Also denotes a person who is of multiple sexes, as in "Se is an hermaphrodite." (See *ne*, *ser*.) [GMG, 1990]

SER - (pronounced "sair") a non-gender-specific title of courtesy. [GMG, 1990]

SINGULARITY - the point or period in our future when our self-guided evolutionary development accelerates enormously (powered by nanotech, neuroscience and AI) so that nothing beyond that time can be reliably conceived. [VV, 1986]

SPONTANEOUS VOLUNTARISM - a fully free society, with a totally free market and no institutionalized coercion. [MM, 1989]

TELEGENESIS - producing babies from the stored sex cells of men and women who may never have met or who may not even have been contemporaries. [FM]

TRANSHUMAN - Someone in the transition stage to posthumanity. One who orients his/her thinking towards the future to prepare for coming changes and who seeks out and takes advantage of opportunities for self-enhancement. [JH]

TRANSHUMANITIES - art, literature, and other aesthetic media for transhumans. [MPI, 1990]

TRANSHUMANISM - a philosophy of life focusing on self-transformation into a condition beyond that of the human. [MM, 1990]

UNIVERSAL IMMORTALISM - the view that the problem of death in its entirety (including bringing back those who were not suspended) can be solved in its entirety through a rational, scientific approach. [RMP, 1990]

UP (UP-WING) - the commitment to the next stage in evolution. A philosophy of optimism, abundance, universalism, immortality. Similar to *Extropian*. [FM, 1970]

UTOPIANTS - Drugs which balance pleasureable effects with minimal or no toxic consequences, have fixed durations of action, and contain built-in chemical antagonists to prevent addiction or overdose. [RS, 1989]

VENTURISM - an immortalist transhumanism founded on the principles (1) to do what is right, understood as implying the benefitting of sentient life and the reduction or elimination of abuses to the same, and (2) the advocacy and promotion of the worldwide conquest of death through technological means. [DP, 1986]

VIRTUAL REALITY - a computer interface that allows the user to move through and interact with a computer-generated world in three dimensions.

YOGATRONICS - Yoga aided by technology, such as biofeedback.

Neologizers:

BS - Bruce Sterling.

CG - C. Giurgea.

DP - David Pizer.

DRH - Douglas R. Hofstadter.

FM - FM-2030 (previously F.M. Esfandiary).

GMG - Glenn Grant.

JH - Julian Huxley.

KED - K. Eric Drexler.

KH - Keith Henson.

MM - Max More.

MP - Mark Plus.

PK - Paul Kurtz.

RD - Richard Dawkins.

RAH - Robert A. Heinlein.

RS - Ronald Siegal.

RHE - Ron Hale Evans.

RMP - R. Michael Perry.

SBH - Steven B. Harris.

TWB - Tom W. Bell.

TL - Timothy Leary.

TD - Ted Nelson.

VV - Vernor Vinge

WTQ - W.T. Quick.

The source of unattributed neologisms is unknown to the compiler. For future editions please inform me of any errors in attribution and year. Thanks to Ron H. Evans (of *Singularity*) and Glenn Green (of *Edge Detector*) for their neologisms. Submissions for future editions are encouraged.

Neurocomputing Part 4: Self-Organization in Artificial Neural Networks

by Simon! D. Levy

Since this issue of Extropy focuses on spontaneous order, I thought it would be appropriate to conclude my neurocomputing series with a discussion of how spontaneous orders can be modeled with neural networks. The ideas in this article were advanced primarily by Carpenter and Grossberg (1986). Lippmann (1987) provides a good summary of the Carpenter/Grossberg algorithm, along with an excellent technical outline of other neurocomputing paradigms.

One domain in which self-organization seems to play a major role is the behavior known as clustering. Clustering refers to the grouping of different objects into a single category or set of categories, based on some similarity among the objects. To take an example that we will explore here, you are able to recognize several different varieties of the letter T in print, and in handwriting, despite large differences in the appearance of the letter. Clustering represents a way of ignoring small variations in order to focus on differences that we consider significant. For this reason, neural networks that perform clustering are commonly called classifier networks.

The type of classifier network we will consider, the Carpenter/Grossberg classifier, is especially interesting from a spontaneous-orders perspective, because it learns to make classifications without supervision. All we tell it are the values of the input; the network itself determines what the outputs are. This way of learning stands in contrast to the perceptron learning algorithm and the back-propagation algorithm that I described in this series, because those two algorithms required us to tell the network what the output was supposed

to be for a given input.

Like most neural nets, the Carpenter/Grossberg classifier consists of a set of input units, a set of output units, and weighted connections among the units. Inputs are binary; that is, they are allowed to have the values 0 or 1, and nothing else. Each input unit is connected to each output unit in two directions. One direction, called the bottom-up connection, sends activation from the input to the output; the other direction, called the top-down connection, sends activation from the output to the input. In addition, there are "inhibitory connections" between each output unit and the other output units, because only one output unit is allowed to be active for a given input pattern. The output unit that is active will correspond to the classification given to the current input pattern. For this reason, the maximum number of clusters that a Carpenter/Grossberg classifier can create is equal to the number of output units.

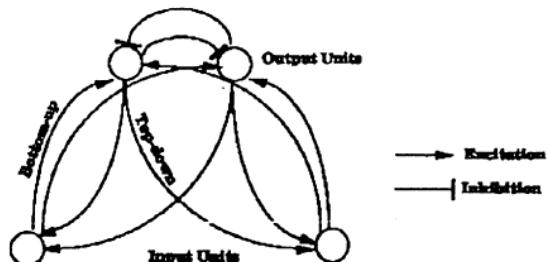


Figure 1: A typical Carpenter/Grossberg classifier

Figure 1 shows a classifier with two input units and two output units. Lines indicate connections: If

a line ends in an arrow, the connection is excitatory (activation on the source node triggers activation on the destination node); if a line ends in a bar, the connection is inhibitory (activation on the source node kills off activation on the destination node). The way that the classifier does its thing is pretty straightforward. At the start of a learning session, all top-down connection weights are set to 1, and all bottom-up connection weights are set to the inverse of one more than the number of inputs. For example, if there are 2 inputs, then each bottom-up weight is set to $1/3$; if there are 3 inputs, each bottom-up weight is set to $1/4$, etc. In this manner, top-down and bottom-up weights are distributed evenly over the network; the network is a tabula rasa, waiting to learn something. This configuration is shown in Figure 2. I've also given a sample input pattern in this figure.

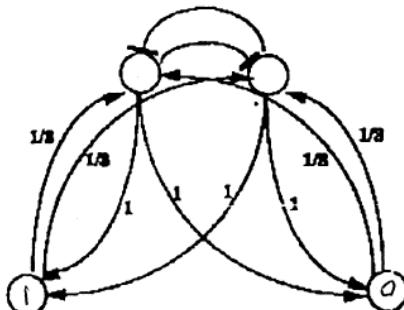


Figure 2: The classifier before learning

Actual learning proceeds as follows:

(1) For each output unit o , we calculate its value by summing up the products of the input to o and the bottom-up weight b that connects o to this input. (This summation of inputs times weights is the fundamental operation in all neural networks, so you may remember it from my last two articles.) Figure 3 shows the values of the outputs for the initial configuration from Figure 2.

(2) After we've calculated all the outputs, we simply pick the largest one. At the first presentation of input, all outputs will be equal, since every input unit connects to every output unit. Therefore, we arbitrarily pick one output unit as the largest. We then take all the t connections from this largest output, multiply each t by the input to which it

connects, and add up the results. We divide this sum by the number of 1 bits in the input. (Dividing by the number of 1 bits ensures that inputs with lots of 1's will not be favored over inputs with lots of 0's.) For example, the result for the network in Figure 3 will be $(1 \times 1 + 1 \times 0) / (1 + 0) = 1 / 1 = 1$.

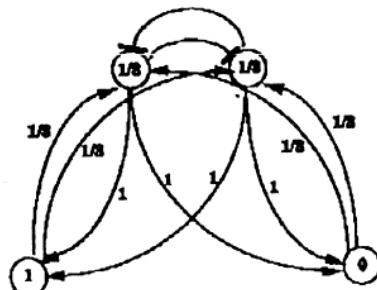


Figure 3: Calculation of outputs based on input (1 0)

(3) If the result from (2) is greater than some pre-determined threshold (the so-called "vigilance threshold"), we adapt the top-down and bottom-up connections of the largest output, and return to step (1) with a new input pattern. If the result is smaller than the threshold, we "disable" the largest output, and return to step (2), looking for the second largest output. Adapting the connections to only one output implies that we are "inhibiting" the other outputs: They are not allowed to be influenced by the current input pattern.

We repeat stages (1) through (3) until we are satisfied with the clusters obtained. The more cycles (repetitions) we go through, the more clusters we get.

Note that parts of this algorithm correspond to our common-sense understanding of classification. For example, step (3) is essentially a comparison of a new input pattern with previous patterns that the network has classified as members of a given cluster. If this new pattern is considered similar enough to the other patterns to belong to the same cluster (i.e., if the vigilance threshold is exceeded), we activate the output pattern corresponding to that cluster. If the new pattern is different enough from earlier patterns (i.e., if the vigilance threshold is not exceeded), we look for

another cluster (output) to activate.

To make all this a little clearer, I've written a program to do Carpenter/Grossberg classification of bit map patterns. (I will mail a copy of the program to interested Extropy readers.) A bit map pattern is the way that a dot-matrix printer prints out characters: There is a matrix of bits (dots), say 8 bits wide by 12 bits high, and each bit is either on (1) or off (0). For example, the patterns I used for the program were 8-by-8 bit maps of letters of the alphabet, as shown in Figure 4. (To help prevent eye strain, I've represented a 1 with an asterisk and a 0 with a period in the Figures.)



Figure 4: Bit map patterns used in the program (* = 1; . = 0)

Representing the letters this way gives us a network with 64 (= 8 X 8) inputs. Note that the two-dimensional nature of the patterns is not explicitly encoded. For example, the bit in the third row and fifth column will be input number 21 (2 X 8 + 5 = 21); that number and the bit's state (0 or 1) are all the network knows about the bit. As we shall see, the network is nevertheless able to make classifications that can be related to our two-dimensional perceptions of the bit maps.

The two basic choices we have in setting up the rest of the network are the maximum number of output units, and the vigilance threshold. Table 1 shows what happens when we vary these two parameters.

How are we to interpret the results in Table 1? Consider the first line in this table. Here, the vigilance threshold is 0.1, which is on the low end of the scale. (Its minimum allowed value is 0.0, and its maximum 1.0). This means that the network will exercise very little "vigilance" in distinguishing a new pattern from one it has learned. Furthermore, the number of outputs is also low - we've given the network 4 patterns that we perceive as different, but we've only allowed it to form two clusters. The result is that every pattern is interpreted as being a member of the same cluster — in other words, all patterns are classified as variations of the same basic thing.

Now look at the second line in Table 1. Here, we've kept the vigilance threshold low, but raised the allowed number of outputs. The result is that the network still classifies two patterns (I and T) together, but also forms two other clusters, each made of only one pattern. Things have started to get interesting. The network has, in a sense, "seen" the similarity in appearance between the letters I and T, and has therefore classified them as one thing; it has also detected some differences among the letters.

The third line in the table shows what can happen when the vigilance threshold is high and the maximum number of outputs low. The high vigilance forces the network to consider each pattern as a different cluster. The network therefore tries to form four clusters. But we've only

Vigilance Threshold	Number of Outputs	Clusters Formed
0.1	2	(T, I, L, H)
0.1	10	(T, I) (L) (H)
0.9	2	***FAILURE***
0.9	10	(T) (I) (L) (H)

Table 1: Behavior of a Carpenter/Grossberg Model on the Inputs in Figure 4.

Each pair of parentheses indicates a single cluster. Results are reported after two cycles through the whole set of four patterns.

allowed for two outputs; hence, the network fails.

Finally, we see that with a high vigilance threshold and a large number of outputs, the network correctly "figures out" that it is looking at four different patterns. I should mention that this four-cluster result was obtained after the network had cycled twice through the set of patterns. After the first cycle, the network had classified I and T together, as it did when the vigilance threshold was low. (I have not indicated this fact in the table.) So, in a sense, we have spontaneous order forming before our very eyes.

So much for learning. What does the network do when it encounters a pattern it hasn't seen yet? To find out, I created the pattern in Figure 5. This new pattern is a jazzed-up variation on the letter T used for learning.

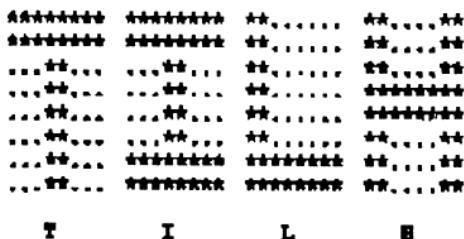


Figure 5: A New Pattern

When I ran the new pattern on the most successful network (threshold = 0.9; 10 outputs), the network put the new pattern in the same cluster as the plain old T from the learning stage. It seems that the network has learned what is essential about the letter T (a horizontal bar over a vertical bar) and used that information to recognize a variant on the letter. In other words, the network has begun to make generalizations from a limited set of data. *Not nec. May be max overlap.*

The dual ability of the Carpenter/Grossberg classifier — the ability to form categories without supervision, and the ability to generalize - make this variety of neural network particularly appealing as a model of the way that people learn. For example, consider the problem of learning to talk. Until you get to school no one ever tells you

explicitly what sounds you should make, or how many vowels there are, or anything like that. Nevertheless, you come to know these things implicitly; you end up producing a limited set of sounds, and you can recognize if someone has a foreign accent. So it seems likely that neural networks, or some other self-organizing devices, will play a substantial role in producing machines that behave like people.

As far as current applications go, most of the recent work with self-organizing networks seems to have been done in the area of vision. For example, Fukushima's (1980) cognitron model was able to do the sort of character recognition described above, but with the added ability to ignore shifts in position of the characters. Fukushima's work was with 16 X 16 bit letters. Other researchers have used Fukushima's model for more sophisticated types of recognition. Menon and Heinemann (1988) report success in recognizing images of vehicles represented in a 128 X 128 bit map.

Well, that's about all I have to say about neural networks. In future issues of this 'zine I will discuss other Extropian topics in my two favorite fields, computer science and linguistics. Stay tuned for agoristic (market) computing, self-organization in human languages, and other applications of free-market guerilla metaphysics.

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FORUM:

Transhumanism and Religion

A Response to the Persistence of Religion.

Bruce Harrah-Conforth, Ph.D.

In Max More's thought-provoking article, "Transhumanism: Towards a Futurist philosophy," he spends a considerable amount of time discussing the causes of the persistence of religion. The four primary conditions for this state are, according to More: "(a) a pre-scientific system of explanation and technology; (b) a source of meaning, direction, and emotional expression in life; (c) a means of social control; (d) a result of the structure of the brain in pre-conscious humans."¹ While More's enumeration may be correct in structure, additional points need to be addressed. In all fairness, since his stated purpose was to "focus on (a) and (b),"² he was forced to omit a larger discussion of the entire range of his list. Therefore it is no great error on his part that he addresses the technological efficacy of religious practice with the single line "the overall result has been entropic and anti-progressive since religious technology is ineffective (with the occasional exception of psychosomatic effects)."³

While there is absolutely no mistake that More is correct in his statement that "...the apparent strength and resurgence of religion is, I believe, an illusion generated from a limited perspective"⁴, it is important to make extremely clear the distinction between "Religion" and religious practice. The mythic band-aid that "Religion" offers to a people who have been so removed from any source of linkage with either internal or external power is compelling, and at the same time truly entropic.

The sympathetic magic associated with organized "Religion" is merely a means by which individuals feel that they are participating in the control of their lives, while in reality they are relinquishing that control. "Religion," as a hierarchy of dogma, fits More's argument well. But religious practice has a technological efficacy and history that is anything but entropic. Indeed, it has all the earmarks of an extropic movement built around contemporary technological means.

More's mention of Julian Jaynes' idea that "religion may have had its source in the structure of the brain"⁵ is worthy of great attention because it addresses not just the entropic drive I will discuss, but also attempts to answer the chicken or egg question of which came first: religious practice or "Religion." Based on Jaynes' argument, my own research, and that of others, I would posit that the former was indeed responsible for the latter, but precisely because it was an effective extropic tool.

Defining religious practice here becomes necessary, and for these purposes I believe a reasonable definition may be stated thus: A religious practice is any experiential undertaking that allows the practitioner to feel, in some way, either spiritually or physically, closer to the ineffable than they felt prior to the experience. Religious practice, by this definition, necessitates an alteration of current consciousness to one in which the ineffable is more readily apparent. Therein lies both the extropic drive and the cause of "Religion".

The most recent work of Ronald K. Siegel, a research pharmacologist at the UCLA School of Medicine, contends that humans may have a built-in drive to alter their consciousness that is as basic as hunger or thirst.⁶ This hardly seems unreason-

able since anthropological and archeological evidence points to the fact that psychobotanicals were used as early as the paleolithic era. Since Jaynes' argument places the origins of modern consciousness at only about 3000 years ago, the use of psychedelics would therefore predate any mindset that would create a "Religion" by at least 7000 years.

Even today, there is little question that the psychedelic experience lends itself to the belief that the user has come into direct contact with the ineffable, ultimate truth/unity. Under such circumstances the user is prone to assume that he/she has had a spiritual experience.

Scientists have, for some time, forwarded the notion that psychedelics duplicate the religious experience. Experimental comparisons between what is accepted as the religious experience and the psychedelic experience have shown that they can be one and the same. Psychiatrist Walter Pahnke administered psilocybin to ten theology students with the result that nine of the ten believed they had had a genuine religious experience.⁷ Comparisons between the great texts on religious experience, such as William James *Varieties of Religious Experience* and Masters and Houston's *Varieties of the Psychedelic Experience* likewise demonstrate overwhelming similarity. Contemporary psychological consensus agrees that there is an overwhelming link between psychedelics and religion, this view being succinctly stated by Walter Clark in his text *Chemical Ecstasy: Psychedelic Drugs and Religion*:

*But title
in chapter
book was
written for
that purpose*

On the basis of the evidence the conclusion would seem inescapable that an important property of the psychedelic chemicals is their agency as a release of profound experience of an ecstatic and mystical nature.⁸

Given the extremely early use by man of hallucinogenic drugs - when Jaynes and others would say that some thoughts were interpreted as the voices of gods - it is not unreasonable to hypothesize that early man's contact with psychedelic plants caused "the mighty springboard" which put the idea of God into our brains."

In an effort to enhance, recreate, or dis-

cover alternative means by which the state can be accessed, myriad practices that proved efficacious were developed. I find it impossible to assume, on the basis of what we currently know about the chemistry of the brain, that many of the experiential practices now associated with "Religion" were developed because of organizational dogma. Rather, I think it more likely that they developed because they were proven to be effective methods for inducing this link with the "gods". And it is precisely because they were links that the dogma developed.

Fasting, for example, is well known to produce hallucinations due to the creation of an imbalance of nicotinic acid in the brain, a similar effect to LSD, which is precisely why niacinamide is used to help bring down trippers who are out of control. Meditation, isolation, chanting, the flickering of lights (as in the candlelight of a church service), even the very postures of prayer have been shown to have a similar effect on brain chemistry. An in-depth look at how this works is to examine the use of music as a brain tool.

Music, aside from psychedelics, is one of the oldest procedures by which people have been able to alter their consciousness. Since the earliest times and for virtually every culture known to man, sound/music was related in some way to the mystic realm. Examples of this can be found in the Indian ragas, the musics of Africa, and the Macumba and Candomble cults of South America. In Polynesia the Gods who created the world are all associated with sound/music. Likewise Tibetan bells and horns have long been used by priests as part of their spiritual induction techniques.

From Gregorian chants, to those of shamans, East or West, a spiritual quality of sound was appreciated and utilized in religious practices. Virtually every religion has incorporated music as part of its ceremonies. It is quite clear that this employment of sound was not merely an aesthetic or dogmatic decision. Our knowledge of psychoacoustics has allowed us to understand how effective sound is in the alteration of consciousness. To speculate that the rhythmic products of these practices induce trance states because of their manipulation and stimulation of a higher order of unity, either neurobiological or

mystic, not only seems to be validated by the neurosciences and religion, but acts as a link between the scientific realm and the mystic. It is a unity of science and spiritualism.

This unitary field may be the product of the very vibrational qualities of the universe. Everything in existence is vibrating, or creating sound. Joachim-Ernst Bernedt has explained how harmonics lie at the very root of the microcosm. For instance, he states how atomic structures are in reality a part of the sonic vibration of the universe:

So what?
...the electron shell of the carbon atom [for instance], saturated according to the rules of nuclear physics and in the steps of the basic theorem, produces the tone scale C-D-E-F-G-A.⁹

So what? "bullshit"
The structure of DNA corresponds exactly to the Pythagorean Tetractys, a subdivision of an octave into octave, fifth, fourth, and major second. According to the work of Rudolf Haase of the Vienna Academy for Interpretive Acts, the periodic system itself "is based upon the notes C', C", D'', and C''''", that is, primarily on higher octaves of the basic tone C."

There can be little doubt that all existence corresponds to a similar vibrational theorem, but what is even more important is the idea that all vibrational items synchronize, or entrain, themselves with one another. Everything in the universe vibrates in relation to everything else. Vibrational entrainment has been found in architecture, electronics, acoustics, physics, the biological sciences, and all realms of human investigation.

This drive toward harmonic relationships from out of chaos is the focus of the universe, and is certainly extropic in nature. And this, this synchronicity of sound, may be one of the most salient demonstrations of the extropic idea. As we uncover harmonic relationships which appear hidden in chaos with all the other vibrational components of the universe, we entrain one another, a collective consciousness of synchronous experience.

A further aid in understanding the nature of this link with the ineffable can be found in the recent

neuro-psychological research done by Eugene d'Aquili. D'Aquili had demonstrated that the structuring and transformation of myth and the ineffable may be a function of a number of brain operators. This research states that such a process is "a behavior arising from the evolution and integration of certain parts of the brain,"¹⁰ most importantly those identified as cognitive operators: the holistic operator, the causal operator, the abstractive operator, the binary operator, and the value operator.

D'Aquili describes how these operators underlie abstract dyadic opposition and conceptualization, the seat of the ineffable/myth construction. He has also verified my above point that humans have discovered various means, among them exposure to rhythmic auditory, visual, or tactile stimuli, by which they may tap into this neurological function in the service of mythic needs.¹¹ These repetitive or rhythmic signals generate a high degree of arousal in the brain's limbic region resulting in "the kinds of mystical feeling accompanying religious rituals."¹²

If, as d'Aquili claims, "gods, powers, spirits, personified forces, or any other causative ingredients are automatically generated [by the brain]"¹³, then we are dealing with a powerful, and indeed extropic endeavor: the use and manipulation of one's own body chemistry via specific physical practices, to alter one's consciousness, to transcend this corporeal realm and exist on another level.

The greatness of this power, and the easy access which early man had to it, could not have been lost on early shamans and priests, and the stifling, entropic dogma that is associated with "Religion" was born. Lost in the ritualistic past which is celebrated more than inspected, is the power once gained by religious practice. "Religion," therefore, was created and has persisted not only for the reasons stated by Max More but also for the earlier perceived need of "Religious" hierarchs to remove this power from the common person. Irrationality, blind faith, false drama have all replaced the original intent of the practices we associate with the religious experience. Prayer, chanting, prayer postures, and fasting have all been impotized: stripped of their usefulness by

"Religion". Man's power to control his own consciousness has, therefore, been replaced with the earlier mentioned band-aid, a crutch for the relinquishment of power.

NOTES

- ¹ Max More, "Transhumanism: Towards a Futurist Philosophy," EXTROPHY #6, Summer 1990, p.6.
- ² ibid.
- ³ More, p.7.
- ⁴ More, p.8.
- ⁵ More, p.7.
- ⁶ Ronald K. Siegel, *Intoxication: Life in Pursuit of Artificial Paradise* (New York: Dutton, 1989).
- ⁷ William Braden, *The Private Sea: LSD and the Search for God* (Chicago: Quadrangle Books, 1967, pp.38-39).
- ⁸ Walter Clark, *Chemical Ecstasy: Psychedelic Drugs and Religion* (New York: Sheed and Ward, 1969), p.90.
- ⁹ Joachim-Ernst Berendt, *Nada Brahma: The World is Sound* (Rochester, Vt: Destiny Books, 1987), p.178.
- ¹⁰ Eugene d'Aquili, "The Myth-Ritual Complex: A biogenetic Structural Analysis," in *Zygon*, Vol.18, No.3, September 1983, p.247.
- ¹¹ D'Aquili, 1983, pp.262-263.
- ¹² Richard Schechner, "Magnitudes of Performance," in *The Anthropology of Experience*, eds. Victor W. Turner and Edward M. Bruner. (Urbana and Chicago: University of Illinois Press, 1986), p.358.
- ¹³ D'Aquili, 1983. p.203.

Religion, Altered States of Consciousness, and Transhumanism.

Max More.

Bruce Harrah-Conforth seems to me to be making two main points: That there is an important difference between "Religion" and religious practice; and that the altered states of consciousness (ASCs) sought through religious practices are the same as (some of) those produced by ingesting psychedelic drugs. I will address these points and the further question of what role these "religious practices" could have in a transhumanist philosophy such as Extropianism.

I agree that a distinction should be made between religion-as-dogma and religious practice. But the distinction cannot be sharp. Part of the problem is that these practices are of several kinds. Many ceremonial practices (such the Catholic eating of "the blood and body") rather than being

separable from a religion are part of its dogmatic creed. Harrah-Conforth focuses on practices aimed at bringing about ASCs. Certainly the methods of attaining such states are not necessarily religious. However, the particular form in which those states are experienced will be strongly influenced by the religious dogma of the person affected and so may then reinforce the dogmatic religion. Practices that induce ASCs such as fasting, dancing, chanting, and organized praying can be powerful methods of bonding a person to a religious system.

Another way in which ASC-inducing religious practices can bolster religious dogma is by bestowing upon the experiencer a special status. While outside of a religious context the pronouncements of people in ASCs tend to be disregarded, within a religion such persons may be revered, exalted, and obeyed as representatives of divine authority.

Yet ASCs need not have anything to do with religion. Millions of people have used psychedelic drugs to have unprecedented experiences without thinking of them according to any religious formula. Such non-religious ASCs can be the "same" as the "religious experience" in that both may be characterized by awe, wonder, delight, ecstasy, and a feeling of being connected to a deeper and broader reality than normal.

Harrah-Conforth defines religious practice as "any experiential undertaking that allows the practitioner to feel, in some way, either spiritually or physically, closer to the ineffable than they felt prior to the experience." Unfortunately this definition, applying just as much to non-religious ASCs as to "religious experiences" would force us to describe any ASC-inducing practice as "religious". Because of the connotations of irrational faith and dogma, theism, and anti-physicalism, I would prefer to describe "religious experiences" as religious interpretations of altered states of consciousness, rather than calling ASCs "religious".

So I agree that altered states of consciousness are one contributory source of religion, but I hold that they are distinct from religion. (Just as official clothing worn by religious functionaries can add authority, but official clothing can be worn for non-religious purposes.)

I am also unhappy with describing ASC experiences as bringing one closer to the *ineffable*. This description does bias our view towards a faith-based, dogmatic view of the experience: "Ineffable" means "too overwhelming to be expressed or described in words; inexpressible" (Webster's Unabridged). Interpreted one way this seems unobjectionable - it may well be hard to express such experiences. However, to say that it is *inexpressible* implies not just "difficult to express" but "*cannot be expressed*". By thus placing the experience, by definition, outside the realm of intelligibility and communication, the door is left open to dogmatic, unverifiable and unfalsifiable claims - such as "this experience is of my personal contact with God."

Eupraxophies (philosophies of life) such as humanism and transhumanism reject faith and dogma, stressing instead reason and empiricism. If ASCs are to find a place in these philosophies we need to inquire into the value of these experiences. Instead of being used to bolster the dogma of religions, can ASCs be used to promote transhumanist values?

The transhumanist philosophy of Extropianism is (for now) defined by its Principles of Boundless Expansion, Self-Transformation, Dynamic Optimism, and Intelligent Technology.¹ In what ways might the ASCs induced by, say psychedelics, contribute towards these values?

Psychedelics can have a wide range of effects, from enhancing sexual or aesthetic response to increasing the generation of ideas and insights. Perhaps the most valuable potential of these drugs from the Extropian view is that they bring about radical alterations in your perspective on yourself, your life, and others around you, and they allow a powerful though transient window on new modes of living.

MDMA and LSD have enabled many to see themselves more objectively and perceptively. However, after the drug has worn off, the task of making enduring changes based on the insights remains hard work. By facilitating breakthroughs in insight psychedelics may serve as useful catalysts for Self-Transformation and Dynamic Optimism. To make effective use of them requires, of course

much care in preparing mental set and external setting.

Another, related, valuable role psychedelics-induced ASCs may play in eupraxophies is enabling us to feel more *connected*. This is the aspect of the experience most susceptible to mysticism, but it need not be an excuse to abandon comprehensibility. We can understand it as a powerful simultaneous comprehension of our many relations and connections to other persons and to the wider universe. This may well help in establishing a satisfying and meaningful perspective on life, since "meaningfulness" is largely a matter of our connectedness to other entities and processes.²

ASCs, carefully engineered then, can contribute towards personal growth and transformation. But, since some cognitive functions are disrupted by psychedelics, they should be used carefully, and with the understanding that the temporary insightfulness will have to be followed up with hard work on oneself. Eventually psychedelics will be replaced by other substances and implants capable of *permanently* enhancing intelligence, insights, cognitive energy, creativity and emotional health without any corresponding suppression of other functions. The nootropics such as the pyrrolidones are a first step in this direction. In the future, more powerful substances, still without toxicity, may be expected. In the meantime some transhumanists will continue cautious investigation of the beneficial effects of psychedelics.³

Finally, I wish to note that, as a physicalist, I cannot accept Harrah-Conforth's description of ASCs as "transcend[ing] this corporeal realm and exist[ing] on another level". Also, in referring to the universe as made of *sound*, I would stress this to be just a *metaphor* for the quantum mechanical nature of the universe. These reservations aside, I thank Bruce Harrah-Conforth for his insightful comments and welcome further exchanges.

1 See EXTROPY #6 (Summer 1990).

2 See my "Transhumanism: Towards a Futurist Philosophy" in EXTROPY #6. Also see Robert Nozick, *Philosophical Explanations*, section 6.

3 This does not amount to a recommendation to experiment for any individual. Before using such drugs it is vital to do your own research and to be confident that you are reasonably mentally stable.

The Transhuman Taste

Reviews of Extropian interest

He wasn't joking.

by Simon! D. Levy

Surely You're Joking Mr. Feynman: Adventures of a Curious Character by Richard P. Feynman (as told to Ralph Leighton). New York: Bantam Books, 350 pages.

What Do You Care What Other People Think?: Further Adventures of a Curious Character by Richard P. Feynman (as told to Ralph Leighton). New York: Bantam Books., 255 pages.

Richard P. Feynman was born in 1918 and died in 1988. Between those years, he helped build the first atomic bomb, won a Nobel prize in physics, and solved the mystery of the Challenger space shuttle disaster. Strangely enough, he was also an accomplished safecracker and samba musician. Tales of these achievements, and many others, are told in a refreshingly direct, engaging style in Feynman's two autobiographies.

You will probably find these books in the science section of your local bookstore, but there is absolutely nothing technical about either one. Feynman explains his profession in the same way he explains everything else: in simple language. What really drew me into these books was the feeling that that is the right way to talk about things, because Feynman is so successful at it. Consider, for example his description of a character in Flaubert's *Madame Bovary* as "a simple country doctor who had some idea of how to fix club feet, but all he did was screw people up." Feynman uses the same shoot-from-the-hip prose to describe everything, and it works.

Surely You're Joking... and *What Do You Care...* are also great reading for libertarians, because of the wonderful irreverence that Feynman showed for any authority or bureaucracy that crossed his path. Faced with frightening security holes at the Manhattan project — the top-secret information was stored in "wooden filing cabinets that had little, ordinary, common padlocks on them"—Feynman didn't complain or fill out a form. Instead, he picked the locks to show how easy it would be for anyone to get the information. Asked to speak at a local city college, he agreed on the condition that he would only be asked to sign his name on government paperwork a maximum of thirteen times. (He pulled the number thirteen out of a hat.) He had already signed twelve times and was then asked to sign once more, to receive his honorarium check. He refused, because signing the form and check would make a total of fourteen signatures. The government was so embarrassed that they let him have the money.

Feynman's distaste for bureaucracy gets more serious justification in his analysis of the Challenger explosion:

The shuttle... flies in a relatively unsafe condition, with a chance of failure on the order of a percent.

Official management, on the other hand, claims to believe the probability of failure is a thousand times less. One reason for this may be an attempt to assure the government of NASA's perfection and success in order to ensure the supply of funds. The other may be that they sincerely believe it to be true, demonstrating an almost incredible lack of communication between managers and their working engineers.

This is scary stuff. I take this passage to mean that the Challenger astronauts died because of lying, or lack of communication, or both, on the part of the National Air and Space Administration. In his typical fashion, Feynman doesn't mince words in stating his conclusions.

I was especially taken by Feynman's views on social responsibility. In an age where we are told that we are to blame for every possible ill, from the plight of the homeless to the destruction of the rain forests, it is a delight to hear Feynman say that - "... you don't have to be responsible for the world that you're in. So I have developed a very powerful sense of social irresponsibility...."

What impressed me the most about these two books, though, was the simple sense of optimism in Feynman's writing. It is clear that he believed in his own power to solve difficult problems, and in the ability of science to comprehend the world. If you don't feel better about the future after reading these books, you are beyond help. In short, I recommend both *Surely You're Joking Mr. Feynman* and *What Do You Care What Other People Think?* without reservation.

And the chickens shall lead them.

Reviewed by Simon! D. Levy.

Great Mambo Chicken and the Transhuman Condition by Ed Regis. Reading, MA: Addison-Wesley, 350 pages.

Well, it's finally here: the book that is going to put the word transhuman into the dictionary.

Great Mambo Chicken covers just about every late-twentieth-century event that could be of interest to readers of Extropy, along with several that probably aren't. (Evel Knievel's antics fall into the latter category.) In fact, there's so much going on here that it's hard for me to decide where I should start.

The book itself begins with a discussion of the Dora Kent affair, which is already legendary to many readers of this magazine. For those who haven't heard the story, I suggest you read Regis' account of it, which is nothing if not amusing. As a caveat, though, I should tell you that that Regis left Max's name out of the suspension team list. I suspect that this sort of slip is not unique in Mambo Chicken, because the aim seems primarily to entertain, and not to inform. With that in mind, let's see what else Regis has to offer.

There's the story of Bob Truax, a real-life American rocket scientist who also happens to be an immortalist. According to Regis,

Truax wanted to do for rockets what Jobs and Wozniak did for computers: he wanted to make them into everyday items, machines that people could own, operate, and run by themselves, personally.

Truax once placed an ad in the paper, asking for \$100,000 in investment capital. In return, he would make you -the world's first private astronaut.' He hasn't succeeded (no one could come up with the cash), but the idea of free-market space exploration strikes me as a great one.

There's also the story of the Hensons, Keith and Carolyn, who lived in the Arizona desert and built a system of tunnels under their house, apparently for the purpose of entertaining their friends. The tunneling was fairly tame, though, compared to the Henson's main activity, which was blowing things up with dynamite. Like almost everyone else in this book, they are, to put it mildly, interested in space exploration. You haven't seen optimism until you've read Regis' account of Keith Henson's intergalactic party plans.

Mostly, though, this book is concerned with ideas : the cryonicists' idea that each of us can live forever by freezing-and-waiting; Hans Moravec's

idea that we can achieve the same goals more easily by downloading our consciousness into robots; Chris Langton's idea that the computational critters in artificial life programs will be just like real organisms. All these ideas eventually coalesce into a very, very big idea: that "postbiological man" will, as Barrow and Tipler put it in *The Anthropic Cosmological Principle*, be in "control of all matter and forces not only in a single universe, but in all universes whose existence is logically possible."

Ultimate intelligence and control sounds appealing from an Extropian point of view, but *Great Mambo Chicken* left me with the impression that many of the ideas that Regis relates hadn't been very well thought out. There is, for instance, Moravec's notion of "backup copies": Since you are a transhuman and want to experience everything, it would be best to download a copy of your mental software onto a machine, in case your adventurous body is destroyed by one of its experiences. Of course, this idea is based on the belief that minds are programs and that bodies are simply the hardware that stores and runs the programs.

To put it plainly, I think that this is pure nonsense. First, the only similarity between computers and brains is analogical. If you work very, very hard, you can get a computer to do a poor imitation of some tiny corner of human behavior. Don't get me wrong: I don't believe that things will be this bad forever. But I do think that the "downloading" idea is based on the same mind/body (software/hardware) dualism that has screwed up Western thought for so many millennia. It's clear to me that what we are — and who we are — is tied inextricably with how we're put together. I don't believe that carbon-based mush is necessarily the only way to make an intelligent organism, but I won't agree that it's irrelevant whether you put my mind in a brain or a VAX.

Nevertheless, *Great Mambo Chicken* is quite entertaining, and admirable in its cheerful attitude toward the future. Most of the ideas it describes — space exploration, cryonics, artificial life — are exciting and worth pursuing, and Regis does a nice job of making them seem so. I often got the feeling

that he was trying to be Tom Wolfe writing *The Right Stuff* about scientists instead of astronauts — there are loads of italics and exclamation points — but I enjoyed the book anyway. If you're wondering about the title, I'm going to set a precedent for *Great Mambo Chicken* reviews by not explaining what it means. Regis does that better than I ever could.

Despite the wacky name and Regis' uncritical attitude toward his material, this book should be useful in getting your non-transhumanist friends introduced to some of the ideas that you probably care about, so it makes a great present. It's certainly something that should be on the bookshelf of every Extropian worthy of the name.

Just Say Know.

Smart Drugs and Nutrients: How to Improve Your Memory and Increase Your Intelligence Using the Latest Discoveries in Neuroscience, by Ward Dean, M.D. and John Morgenthaler.

From B&J Publications, PO Box 483, Santa Cruz, CA 95061-0483. \$9.95 + \$2 (\$3 overseas) postage (+\$0.62 tax for addresses in California).

Reviewed by Max More.

This book, appearing shortly after Ross Pelton's *Mind Food and Smart Pills*, indicates a growing interest in the possibilities for improving cognitive capacities by means of drugs and nutrients. As the neurosciences have increased our understanding of the chemical basis of thinking, scientists have come up with better and better means of enhancing cognition.

In the short time between the appearance of Pelton's book and this new one by Dean and Morgenthaler, quite a few new substances have entered the limelight. As neurochemistry reveals even more about the still largely mysterious workings of the brain we can expect ever more effective cognition enhancing substances. Apart from improving memory formation and recall, concentration and attention, alertness, ideation (production of ideas), and slowing the rate of brain aging (sometimes reversing it), we can expect more drugs capable of allowing us to fine-tune our

emotional self-control.

Smart Drugs and Nutrients (SDN) is a valuable aid for Extropians. It provides information on a wide variety of vitamins, herbs, and drugs known to have cognition enhancing effects. The authors helpfully supply information about the studies done, the neurochemical pathways involved (to the extent these are known), and sources for the substances. This information is tremendously valuable in helping us to act on the Extropian principle of Self-Transformation, which affirms personal responsibility in the pursuit of personal improvement. The authors adopt a helpful, non-authoritarian approach in presenting information and allowing us to use our own judgement in deciding on which substances to use at what dosages.

Especially worthy of attention in regard to dosage is that cognition-enhancing substances frequently have a U-shaped response curve, so that more is not necessarily better. Many of the substances are synergistic; if you taking a combination then you may need only a fraction of the amount required if you were to take them separately. This is true of the nootropic drugs if not the vitamins. "Nootropic" is a term coined by Giurgea in 1972 "to describe substances that improve learning, memory consolidation, and memory retrieval without other central nervous system effects and with low toxicity, even at extremely high doses."

The pyrrolidone derivatives piracetam, pramiracetam, aniracetam and oxiracetam exhibit this response curve. I found that I was able to save money by adding more nootropics to my daily intake. By adding hydergine to piracetam, DMAE and choline, I was able to greatly reduce the dosages of each. For example, you can cut your piracetam down to a fifth of the previous intake if you are also taking DMAE or centrophenoxine and hydergine.

The pyrrolidone derivatives, such as piracetam, have a number of appealing effects. They protect against brain damage under hypoxic conditions, and enhance memory and some kinds of learning in both normal persons and those with cognitive deficits. Piracetam may also improve creativity since it facilitates the flow of information

between the brain's hemispheres.

Hydergine has many beneficial effects and is probably worth taking *before* your brain starts to seriously age, since it will help to slow down age-related deterioration. This drug, among other effects, increases blood supply and oxygen to the brain, enhances neural metabolism, protects the brain against free radical damage resulting from hypoxia and hyperoxia, accelerates elimination of brain-clogging lipofuscin, increases intelligence, memory, learning and recall, and normalizes systolic blood pressure. In America it is usually prescribed at 3mg/day, but in Europe 9mg is typical. New users should start at lower doses to avoid headache, gastric disturbance or nausea.

In addition to piracetam and hydergine, a good brain program might include regular use of DMAE (apparently similar to centrophenoxine but cheaper) and choline for memory. Occasioal use Of vasopressin nasal spray could be added for times when recall or optimal learning of new information is vital, though vasopressin should not be used continually.

A note for users of maijuana, LSD or stimulants such as amphetamine: Marijuana inhibits release of vasopressin - this is what causes short-term memory problems; vasopressin may help alleviate this effect. LSD, and especially the stimulants, cause large amounts of vasopressin to be released - this is one reason for the vivid nature of the effects of these drugs; a few squirts of vasopressin will help restore levels toward normal and relieve the negative after-effects. Reportedly, people in a depression after continually over-using strong stimulants show an impressive improvement in manner within a minute of vasopressin administration.

The authors cite a few studies on the effects of caffeine, noting that though it has been promoted for its cognition enhancing effects, there is evidence that it has some negative effects on cognition. They also cite a study showing, contrary to popular practice, caffeine taken with alcohol will make you more drunk than the alcohol alone (the same is true of aspirin). However, on the basis of the work cited by Dean and Morgenthaler, the message about caffeine seems more mixed than

they seem to suggest. The evidence shows that it will reduce certain types of memory (the studies involve recalling lists of words), and reduces efficiency at processing confusing or ambiguous data. However, it might improve reaction time, and clearly improves alertness (unless overused) and so may be valuable for cognitive tasks not significantly involving verbal recall or ambiguity.

It is the fault of many books on nutrition, health matters, and life extension that the design of supporting studies is rarely or never cited, leaving the reader unable to know if the claims are merely hype. Happily Dean and Morgenthaler are much more responsible: They regularly mention the design of the studies, which are almost all well-designed double-blind, controlled, cross-over studies.

Smart Drugs supplies information on FDA regulations (which now allow Americans to import drugs approved abroad but not here for personal use) and lists suppliers. I can recommend Interlab whose service has been good and who carry a variety of nootropics and other useful drugs such as Propanolol and Deprenyl: Write for a price list to: Interlab, BCM, Box 5890, London WC1N 3XX, England. Fortunately the ability to import drugs allows us to reduce the difficulties imposed by the authoritarian and entropic FDA. The Life Extension Foundation has recently produced a new list of "life extension doctors" who are likely to prescribe you nootropic and life-extending drugs. Free to members, the list costs non-members \$10 from The Life Extension Foundation, PO Box 229120, Hollywood, Florida 33022.

I highly recommend this book, and hope the authors go ahead with a regular newsletter on the subject. *EXTROPY* will continue to report on advances in cognition enhancement.

FUTIQUE MAGAZINES

MONDO 2000: A colorful, slick, large-circulation magazine covering virtual reality, computer hacking and cracking, life extension and intelligence drugs, various other high-tech topics, plus fashion and music with a techno tinge. Frequently entertaining, sometimes informative, but not analytical. Recommended. \$24 for 5 issues (\$5.95 at newsstands). Officially quarterly, they have yet to come close. MONDO 2000, PO Box 10171, Berkeley, CA 94709.

Boing Boing: Editor Mark Frauenfelder always puts together an entertaining read for neophiles. Light-hearted short writings on high-tech and future-tech topics. BB will bounce you into a fun-filled future. \$10 (\$15 overseas) subscription; single issue: \$3 (\$5 overseas): Boing Boing, PO Box 12311, Boulder, CO 80303.

Singularity: Number 3 discusses the institutional treatment of the mentally ill, has a memetics piece by Keith Henson, a list of neologisms complementing the list in *EXTROPY*, a helpful overview of virtual reality, and a hilarious futique advice column. Wild, funny, serious, and addictive, Singularity belongs on the shelves of Extropians. \$3/issue, 4-issue sub for \$10 from Singularity, 89 Massachusetts Ave., Suite 199, Boston, MA 02115.

Cryonics: The high-quality magazine of the largest cryonics organization. Apart from plenty of cryonics science, philosophy, and movement news, there health and life extension news, uploading debates, and plenty more. Excellent value. 12 issue sub: \$25 (\$35 in Canada and Mexico, \$40 others), from ALCOR, 12327 Doherty St., Riverside, CA 92503.

Life Extension Report: Monthly very current reports on life extension research. Provides excellent summaries with references. Comes from a pro-individual liberty, pro-immortalist direction. The best source of information on life extension. \$27 (\$33 outside USA) for a year; included with %50 membership of the The Life Extension Foundation, PO Box, 229120, Hollywood, Florida 33022.

The Immortalist: Published by the Immortalist Society. A healthy chunk of cryonics, immortalism, and longevity information every month, with plenty of debate and discussion. \$25/yr (\$30 Mexico and Canada, \$40/52 to Europe surface/air).

Cryonet: A forum for discussing cryonics news, technology, philosophy, strategy, and related technical subjects. If you have a computer and modem and want to join in the fun contact Kevin Brown at kqb@whscad1.att.com

Contributors

Tom W. Bell, MA: Bell is now studying Law at the University of Chicago Law School, having received a Masters in philosophy from the University of Southern California.

Keith Henson and Arel Lucas: Henson and Lucas have written on memetics and cryonics; Henson was a founder of the L5 Society, and his activities appear throughout *Great Mambo Chicken* reviewed in this issue.

Simon! D. Levy: Levy is studying for a Ph.D in Linguistics at the University of Connecticut while also working at Haskins Laboratories, and also works at Los Alamos National Laboratories

Max More, MA: Editor of *Extropy*, and Vice President of the Society for Venturism, More is writing his Ph.D dissertation on the continuity of the Self at the University of Southern California.



Lance LaMere

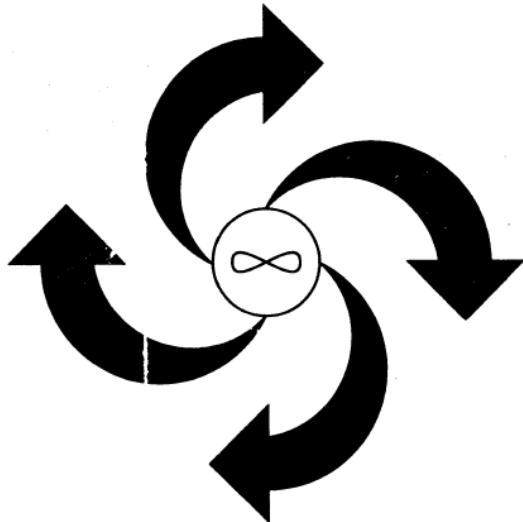
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