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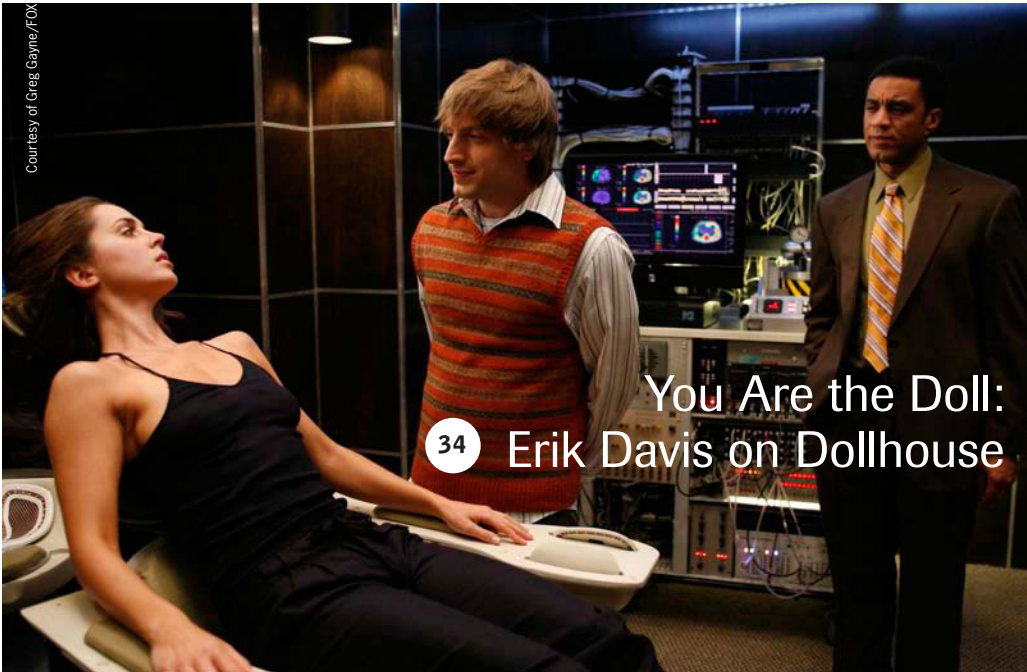
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*Studying Extreme Genomes, Technology Review, May 11, 2009

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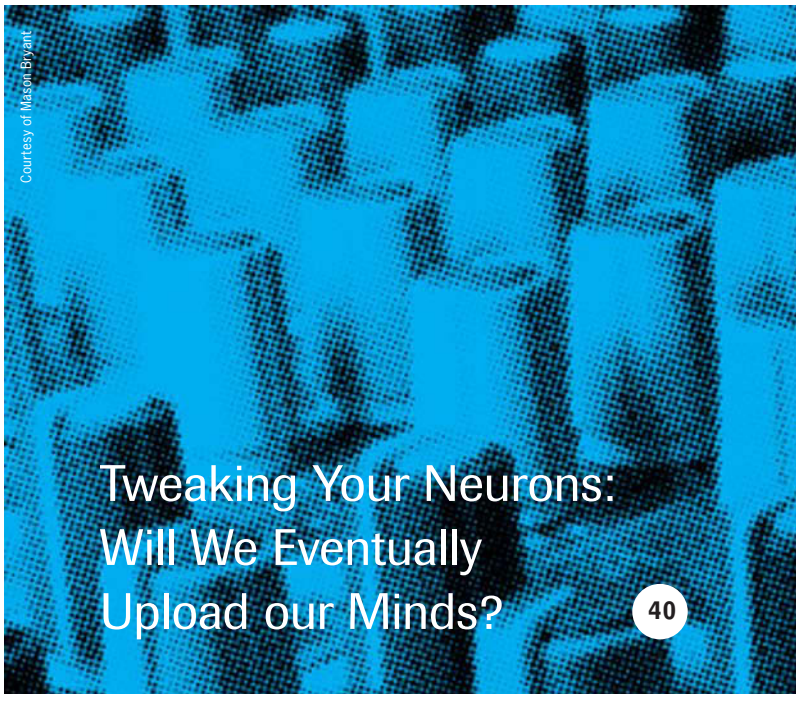
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Courtesy of Mason Bryant

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BRINGING ABOUT HET

Human Enhancement Technologies (“HET”) is the term given to any non-therapeutic attempt to temporarily or permanently overcome the current limitations of the human body through natural or artificial means.

While many of the HET have somewhat fantasy-like qualities (changing one’s skin, hair or eye color or texture), two stand out as extraordinarily important to the human race: radical healthy life extension and cognitive enhancement.

The most interesting and potentially important of the HET is radical human life extension. Aging is the single greatest problem, which if solved, relieves society of the enormous economic and intellectual losses caused by the decline of an individual’s health and mental abilities as they age beyond early adulthood and eventually die. We currently have major efforts to conquer cancer, Parkinson’s, Alzheimer’s and other diseases, but not a similar effort to conquer Aging. However, these diseases are mostly a result of Aging — teenagers (in the absence of a faulty gene) do not suffer from cardiovascular disease, cancer, dementia, Parkinson’s or Alzheimer’s. This deserves repeating — these are diseases of old age. Think of the suffering such diseases cause. Billions are spent every year treating the effects of these diseases, when we should be cutting them off at the root — by intervening in the Aging process itself. Think how many resources are spent educating an individual — hundreds of thousands of dollars these days — only to have their wealth of accumulated knowledge and experience vanish from the Earth upon their death.

We are on the brink of technologies that will unravel the mysteries of Aging once and for all and allow us to reach the so-called Escape Velocity for radical human life extension, which is the point whereby our healthy lives are extended more than one year for every year we continue living. Ultimately, we will be brought to a nearly immortal state of perpetual youthfulness.

Cognitive enhancement is the other HET we must pursue now. As we live radically longer, productive lives, we will need to increase our ability to store and retrieve memories, share information or experiences, and tap into the seemingly limitless resources of the web. We might also offload some of our mental processing to an Exocortex, which might be designed to follow more logical rules than we are prone to observe unaided. Reverse engineering the brain will allow us to understand and cure psychological problems and help us build better artificial intelligences. Biological tweaks (genetic or nootropic) will some day end illnesses like schizophrenia, depression, obsessive-compulsive disorders, addictions, etc. And finally, uploading or backing up our Minds will provide an ultimate safe-haven for our continued existence.

Let’s be clear about one thing, we do not condone the idea that HET should be forced on anyone. Take cosmetic surgery — it’s a personal choice whether one has liposuction, botox injections, a nip & tuck, hair implants (or removal), dental veneers or implants put in to increase the size or firmness of various regions of your body. Some of the HET will be equivalent to taking medications to halt a disease (Aging can be thought of as a disease), and thus we can envision that most people would elect to take advantage of such. Other HET will be purely an expression of one’s self-image, and will allow people to try on or adopt a new race or invent one of their own, in the same way we explore different religions, philosophies or political ideologies.

Researchers Unite! We need a lot more researchers working in the two fields of life-extension and cognitive enhancement. We need researchers talking to each other, sharing ideas and creating roadmaps as to how to tackle these daunting problems. *h+* Magazine will continue to cover all of the advances in the NBIC fields which are making HET possible, but we also want to encourage students to gravitate to these fields, and those who are in these fields to renew their efforts to work together for the benefit of all Humankind for longer, healthier lifespans and greater cognitive powers! Others can contribute their time and discretionary funds toward helping promote these fields, as well as putting political pressure for governments to promote and facilitate these crucial HET.

Best wishes,
James Clement and Dan Stoicescu



James Clement
Co-Founder



Dan Stoicescu
Co-Founder

SELF ENHANCEMENT,

Fun ... and Who Put the TRANS in the TRANSition to Post-Humanity?

RU SIRIUS



RU Sirius
Editor in Chief

All Aboard for Fun Time!

After publishing our initial edition of *h+* — an issue filled with strategies for living a long life, manipulating human evolution and developing the first device for uploading memories — I worried that readers would think we were from another planet.

After all, the 'zine posted just as people were contemplating the potential failure of the entire economic system and wondering if there would be a run on the banks. So in our second issue, we came down to earth, so to speak, and took on the theme of social responsibility from the radical technological viewpoint. We covered various points of view on economic crisis and transition, and resolving problems related to clean energy and water. Mighty noble of us, hmmm?

Anyway, this time out, we're headed down a different track. No, not *irresponsibility*, but good, wholesome (well, *mostly* wholesome) fun, pleasure, happiness, play and self-enhancement. We asked many of our favorite contributors to come up with ideas related to those things that make us feel good and help us to enjoy a long and enhanced life. The response has brought *me* joy, and I hope it does the same for you.

It perhaps behooves me to emphasize that this *is* a theme issue, lest people think we have become giddy. The next issue will surely be solid and sober, back to the serious work of making a long-lived and livable, enhanced future. Meanwhile, we leave you to contemplate the importance of play, sex, self-enhancement and mind expansion in our now and near-future worlds.

Who Put the TRANS in the TRANSition to Post-Humanity?

As transhumanism continues to be a buzzword for radical technological alteration, it awes me to recall that transgender people began getting hormone treatments right after World War II (1949). And in 1952 (the year that I was born) Christine Jorgensen's male-to-female gender reassignment surgery was all over the newspapers. Touted as the "first sex change surgery" (in truth such surgeries were performed in Germany in the late 1920s, but by the early '50s, surgery was being combined with hormone therapy), Jorgensen's media coverage opened up a new world of gender change.

While it would be quite an exaggeration to claim that the West has accepted full rights for transgendered people (there is still bigotry and a lack of legal protections in the U.S. and elsewhere), the fact is that the basic right of a human being to make an extraordinary transformation in the nature of his or her or hir gender was established many years ago. Sex reassignment was not stopped or shut down. Now, a woman-to-man gives birth to a baby and most of us barely bat an eye.

As we move into an age of shifting identities, where we can be whatever or whoever we choose to be in our second lives; where biotechnology might soon offer changes in skin melanin bringing about the age of the trans-racial, as people start to evolve novel body ornamentations and eventually parts, as we learn how to control our hormones to amp up our estrogen or testosterone to suit the needs of the day, we should always remember to thank the transgendered. They have walked point for our basic right to self-alter.

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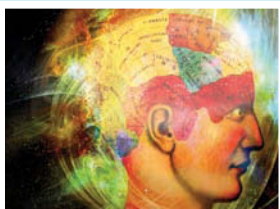
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The Neuro Revolution

A Book Review

Written By: Surfdaddy Orca



Sims of the Flesh

Review of *The Surrogates*:

Flesh and Bone

Written By: Chris Hudak



From the Robot App Store

to the Global Robot Brain

Written By: Ben Goertzel

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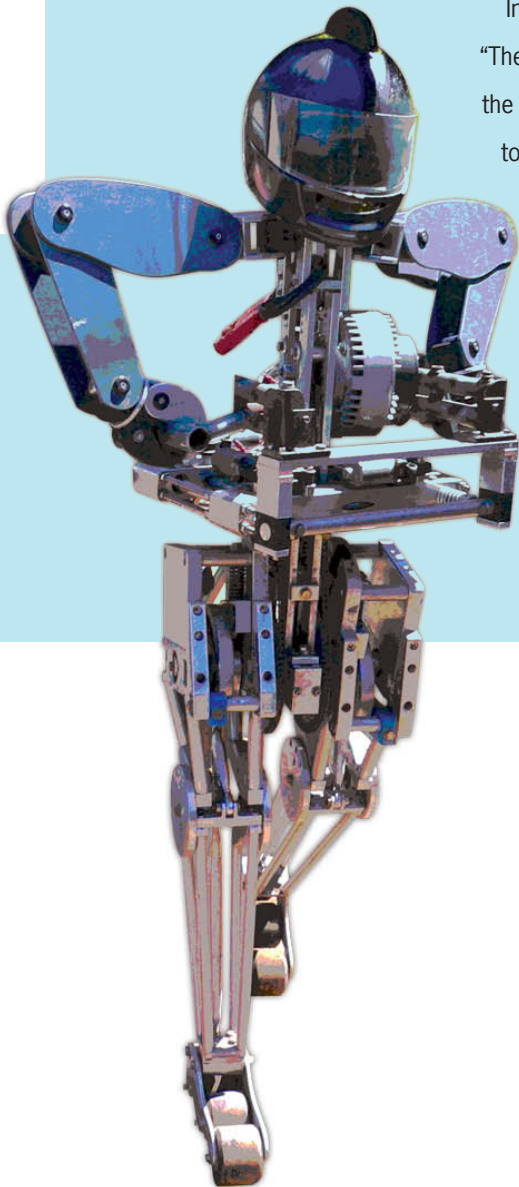
STEPHEN HAWKING: “Humans Have Entered a New Stage of Evolution”

MICHAEL ANISSIMOV

At a recent talk, eminent scientist Stephen Hawking said that humans are entering, “a new phase, of what might be called self designed evolution, in which we will be able to change and improve our DNA.” Showing impatience with biological evolution, he said, “There is no time to wait for Darwinian evolution to make us more intelligent, and better natured.” Dr. Hawking previously expressed transhumanist views in his book *The Universe in a Nutshell* (2001).

In his talk, Hawking contrasted the speed of evolutionary and memetic progress, saying, “There has been no detectable change in human DNA, brought about by biological evolution, in the 10,000 years of recorded history. But the amount of knowledge handed on from generation to generation has grown enormously.” Considering that it has taken us “several million years to evolve from the apes,” and that “the useful information in our DNA, has probably changed by only a few million bits,” Hawking estimates that the rate of change of biological evolution in humanity has been only about a bit per year. But the amount of knowledge passed down through written language exceeds this by many orders of magnitude. Hawking said, “The rate at which useful information can be added is millions, if not billions, higher than with DNA.”

At the end of his talk, Hawking said that DNA-based organisms will eventually evolve into machines, which could “eventually replace DNA-based life, just as DNA may have replaced an earlier form of life.”



The Eversmarter Home: Powered by Negawatts

ALEX LIGHTMAN

Surge suppressors are about to get upgraded. Via wireless, networks and virtual reality, they are about to become — in a way — the newest type of renewable energy: *negawattage*.

Coined by Amory Lovins of Rocky Mountain Institute, “negawatt power” refers to something that isn’t there or that is being reduced. If you are using 100 watts an hour, and suddenly get by on 50 watts, you can be said to produce 50 negawatts. A startup called Greenwave Reality claims that it can combine three technologies to save 30% of the average home’s \$1,800 annual electricity bill. Deployed broadly, enough negawatts can be produced to take the place of hundreds of power plants that don’t have to be built.

Greenwave combines three technologies:

1. Home-based consumer electronics, including unique surge suppressors, a wireless gateway that recognizes the “digital fingerprint” of any plugged-in device and a display about the size of a mousepad.
2. A data center that can handle the information from up to 100,000 homes, matching power usage characteristics with the devices plugged in, to create estimates and forecasts of power use and expenses.
3. A rapid, patented 3-D home design program that allows a consumer to click around and come up with a sort of dollhouse version of her home, with little symbols for every device that uses electricity, and to input preferences for times that various devices and rooms can be shut off, in order to utilize all “what if” calculations towards the goal of saving 30% of electricity consumption.

Greenwave Reality is not an ordinary startup. The founding team includes a former CEO of Walmart, and other corporate megastars. What really distinguishes Greenwave, though, is that it has an agreement with the “Electricity Savings Bank” of Denmark to install its negawatt creating systems in 500,000 Danish homes. This unprecedented roll out is timed to be the major inspirational announcement at COP-15, the United Nations Copenhagen conference that takes place Dec. 7–18, 2009.

Many hope that this conference will create a new and improved replacement for the Kyoto Treaty. The Danish government hopes that the leaders of over 180 countries will see Denmark’s example as worthy of emulation. Given that buildings are the number one user of electricity, and consume 48% of all energy, Greenwave (and competitors) could save as much as 14.4% of all energy. Let’s hope Greenwave succeeds in spreading the negawatt way.

RESOURCES

Negawatt power
http://en.wikipedia.org/wiki/Negawatt_power

Greenwave Reality
<http://www.greenwavereality.com>

Buildings are leading energy consumers
http://www.architecture2030.org/current_situation/building_sector.html

Classy Optical Company Takes Pictures of Your Brain

KRISTI SCOTT

Carl Zeiss is known for creating desirable lenses, but did you know their creations aren’t limited to just enabling you to get a crisp clean snapshot of your night out on the town? Their division, Carl Zeiss SMT, makes specialized lenses for scientific use, including lenses for the delicate work of “brain mapping and soft tissue imaging.” They have several lenses for brain mapping: the SIGMA™ FE-SEM, the ZEISS CrossBeam® workstations, the ORION® Helium-ion microscope and the LIBRA® 120 PLUS.

With the LIBRA®120 PLUS, you don’t just get an image. It reveals “structural and 3-D information of beam sensitive or frozen hydrated specimens at the nano scale.”

Brain-mapping is a daunting undertaking, even with the technology we have today. For scientists and researchers to be able to accomplish and see what they need to propel the research forward, they need the right tools. The people at Carl Zeiss SMT saw that need and the demand for a lens that could get deeper and take images of the brain that were clear, small (think below nanometer level), and easy on the samples that were being imaged. They were able to meet these needs by coming up with lenses that will help make the formidable task of seeing and understanding how the brain operates a little less daunting.

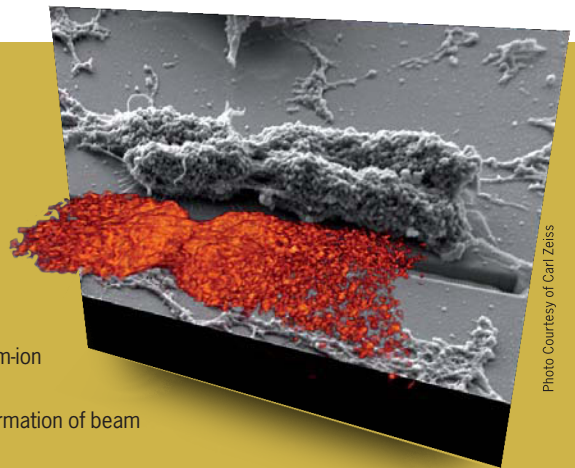


Photo Courtesy of Carl Zeiss

RESOURCES

<http://www.smt.zeiss.com/nts>

ANDY DROID: YOUR SEX DOLL HAS ARRIVED

KRISTI SCOTT

Real Doll just doesn't cut it anymore. You look to the future: innovation, the next stage of evolution and you shouldn't leave your sex life behind you on the path to posthumanity. Let me introduce you to a new friend, who you can play with in your own personal fantasy playground. Her name is Andy, created by First Androids in Germany. Andy can hold multiple sex positions, be ordered to simulate breathing, perform oral sex acts, have a pulse, be equipped with a g-spot that responds to orgasm, and much, much more. The list of possibilities is impressive. Linny, one of the other dolls, has the most realistic fake areolas I have ever seen, and I've seen my fair share. What First Androids has created is not just a sex doll, but an innovative sexual experience straight from the pages of science fiction which you can order and play with alone or with a friend.

RESOURCES

First Androids
<http://first-androids.de/>

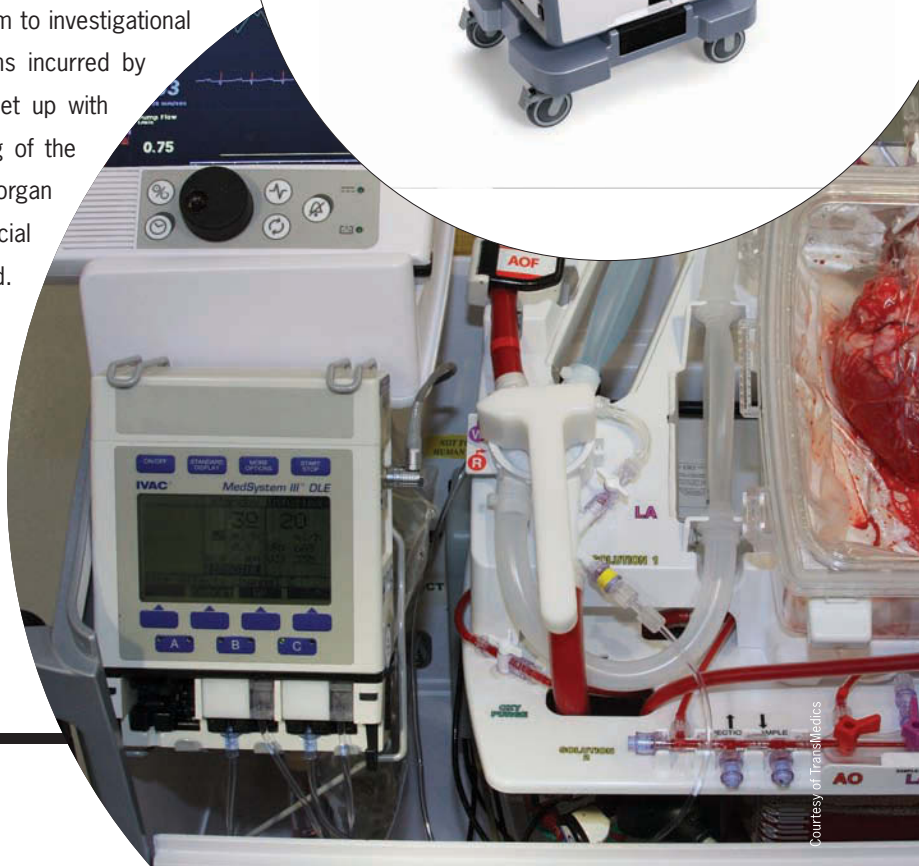
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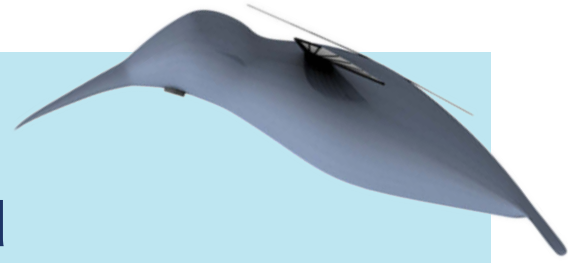
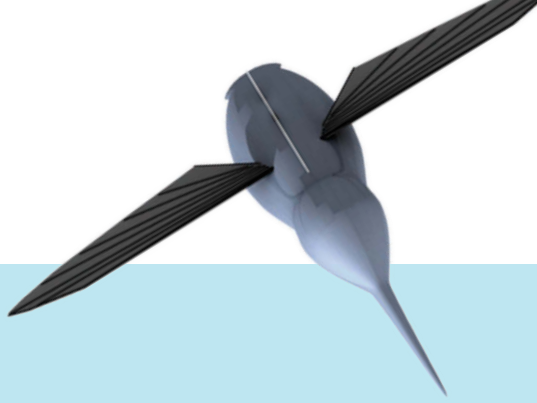
KRISTI SCOTT

TransMedics, Inc. in Andover, Mass. has come up with the Organ Care System, an ingenious solution to the specter of medical staffers looking like they're going to a frat party while carrying vital organs in a hospital cooler. It's a portable machine that keeps the organs in a viable state longer than any cooler. While federal law currently limits the TransMedics system to investigational uses, the technology is a solution to serious problems incurred by medical staff in transporting organs. The system is set up with a wireless and portable monitor that allows monitoring of the organ's vitals inside the device, including viewing the organ through a sterile plastic window. The machine has special bags for the fluids needed to keep the organ preserved. The various valves and monitors are hooked up to the organ within the sterile container, with multiple options for connections depending on the organ. According to their website, this allows for "healthier organs, better matching, less urgency, and more organs." With this technology, the medical community will be able to get more organs to the people who need them and not let good donations go to waste because of outdated transportation methods.



RESOURCES

Transmedics
<http://www.transmedics.com/wt/home/index>



DARPA Funds Nano-UAV Hummingbird

MICHAEL ANISSIMOV

For years, engineers have been working on making smaller and smaller UAVs (unmanned aerial vehicles). DARPA (Defense Research Advanced Projects Agency) has been taking the lead for years, and is now pushing the envelope by providing a second round of funding for the development of nano-UAVs, unmanned flyers with a mass of just 10 grams, approximately equivalent to two nickels. The company designing the flyer, AeroVironment, recently announced reaching a never-before-achieved technical milestone: a 10-gram nano-UAV that can engage in controlled hovering flight by flapping its two wings, using only an on-board power source and its wings for propulsion and control. Previous nano-UAVs of similar size used a tether system for power and/or control.

What makes the nano-UAV even more attention-grabbing than prior UAVs is biomimicry — it looks like a hummingbird, and the company's press release comes with a concept image of a nano-UAV that is painted just like a hummingbird. AeroVironment tested 90 different wing designs before settling on the hummingbird design. Like a pencil

RESOURCES

AeroVironment Flapping-Wing Nano-UAV Video
<http://www.youtube.com/watch?v=Cov7-XWUa18>

DARPA Nano Air Vehicle
<http://www.darpa.mil/DSO/thrusts/materials/multfunmat/nav/index.htm>

balanced on its tip (or a human walking), the design is inherently unstable. It constantly wants to tumble out of control, and is only corrected by an automatic control system. The aircraft has a wingspan of about five inches, about five times larger than the smallest UAV ever built, but the extra size is essential for the UAV to withstand wind gusts of 2.5 m (8.2 ft) per second, one of the requirements of DARPA's Nano Air Vehicle program.



Courtesy AeroVironment, Inc / avinc.com



Can Bots Feel Joy?

BEN GOERTZEL

Will machines ever really *feel*, in the same sense that humans do?

This is a separate question from whether machines can be intelligent, or whether they can *act like* they feel. The question is whether machines — if suitably constructed and programmed — can have awareness, passion, subjective experience ... consciousness?

I certainly think so, but generally speaking there is no consensus among experts. It's fair to say that — even without introducing machines into the picture — consciousness is without doubt one of the most confused notions in the lexicon of modern science and philosophy.

Given the thorny and contentious nature of the subject, I'm not quite sure why I took it upon myself to organize a workshop on Machine Consciousness... but earlier this year, that's exactly what I did. The Machine Consciousness Workshop was held on June 14, in Hong Kong, as part of the larger Toward a Science of Consciousness conference and Asia Consciousness Festival. The TSC conference as a whole attracted hundreds of participants, but only a couple dozen deigned to venture into the riskier domain of machine consciousness. Among these brave souls, I reckon there were *more* than a couple dozen views on the matter at hand!

First we have the materialists. Joscha Bach — a German AI researcher and entrepreneur and the author of *Principles of Synthetic Intelligence* — summarizes their perspective elegantly: “The notion of the mind as an information processing system, capable of forming an integrated self-and-world-model, modulated by emotional configurations and driven by a finite set of motivational urges, is sufficient to remove the miracles [that some associate with consciousness].” Daniel Dennett is the best known modern advocate of the materialist view. According to his book *Consciousness Explained*, it's patently obvious that machines can be conscious in the same sense as humans if they're constructed and programmed correctly.

Paul Fahn, an AI and robotics researcher at Samsung Electronics, presented this perspective at the MC Workshop in the context of his work on emotional robots. His core idea is that if a robot brain makes emotional decisions using a random or pseudorandom “preference oracle” similar to the one in a human brain,

Courtesy of Aldebaran Robotics

it will likely be emotional in roughly the same sense that humans are — and possessed of its own distinct but equally valid form of consciousness. Fahn emphasizes the need for empirical tests to measure consciousness and a talk by Raoul Arrabales at the workshop took concrete steps aimed in this direction, describing a series of criteria one can apply to an intelligent system to assess its level of consciousness.

But some, less happy with the materialist view, have referred to Dennett's book as "Consciousness Explained Away." Neuropsychologist Allan Combs has a new book in press called *Consciousness Explained Better*, in which he reviews a host of states of consciousness, including those accessed by mystics and meditators as well as those we feel in various unusual states of mind, such as dreaming, sleeping, dying, etc. As a panpsychist he sees consciousness as the basic material of the cosmos: he sees rocks, bugs, cows, humans and machines as differing manifestations of universal consciousness.

To a panpsychist, the question isn't whether machines can be conscious, but whether they can manifest universal consciousness in a manner similar to humans. And the question of whether consciousness can be empirically measured is not that critical, because there's no reason to assume the universe as a whole is understandable in terms of finite sets of finite data-items, of the sort that science works with. Setting aside mystical notions, pure mathematics points to all manner of massively infinite constructs that, if they "existed in reality," could never be probed via scientific measurements.

Perhaps at the 2019 Machine Consciousness workshop, AIs will sit alongside humans, collectively debating the nature of awareness.

The coauthor of Combs' workshop talk, creativity theorist Liane Gabora, holds the view that machines are conscious, but will never be nearly as conscious as humans. "I put my money on the argument that living things are more conscious than rocks or computers because they amplify consciousness by being self-organizing, self-mending, and autopoietic; that is, the whole emerges through interactions amongst the parts. And the human mind amplifies consciousness even further through a second level of autopoietic structure. Just as a body spontaneously repairs itself when wounded, if someone does something out of character or something unexpected happens, the mind spontaneously tries to repair its model of the world to account for this turn of events. This continuous building and rebuilding of a mental model of the world, and thus reconstituting of autopoietic structure, locally amplifies consciousness. Until computers do this, I don't think their consciousness will go much beyond that of a rock."

As a panpsychist myself, I find Liane's view sympathetic, but I'm much more optimistic than she is that complex, self-organizing autopoietic structure can be achieved in computer programs. Indeed, that is one of the goals of my own AI research project!

Then there are the quantum consciousness folks, such as Stuart Hameroff, who gave the keynote speech at the Cognitive Informatics conference in Hong Kong, the day after the MC workshop. An MD anesthesiologist, Hameroff was seduced into consciousness theory via wondering about the neurobiology by which anesthetics bring about loss of consciousness. Together with famed physicist Roger Penrose, Hameroff developed a theory that consciousness arises via quantum-mechanical effects in structures called microtubules that make up the cell walls of brain cells.

A common joke about the Penrose-Hameroff theory is: "No one understands quantum theory, and no one understands consciousness, so the two must be equal!" But clearly the theory's intuitive appeal goes beyond this: quantum nonlocality implies a form of interconnectedness of all parts of the cosmos, which resonates well with panpsychism.

Penrose believes that human consciousness enables problem-solving beyond anything a computer can do. To bypass theorems that show that this kind of capability wouldn't be provided by mere quantum computing, he proposes "quantum gravity computing," based on an as-yet unknown unified theory of quantum physics and gravitation. Most scientists view this as fascinating, highly technical science fiction.

Regarding panpsychism, Hameroff says, "I disagree only slightly. I would say that what is omnipresent in the universe is proto-consciousness.... Penrose and I say proto-consciousness is embedded as irreducible components of fundamental spacetime geometry, i.e. the Planck scale,

which does indeed pervade the universe." He views consciousness per se as a special manifestation of proto-consciousness: "I don't think a rock necessarily has the proper makeup for the type of quantum state reduction required for consciousness."

A fascinating twist is suggested by recent work by Dirk Aeerts, Liane Gabora, Harald Atmanspacher and others, arguing that "being quantum" is more about being susceptible to multiple, fundamentally incompatible interpretations, than about specific physical dynamics. In this sense, consciousness could be quantum even if the brain doesn't display nonclassical microphysical phenomena like quantum nonlocality.

Perhaps the savviest view at the MC workshop was expressed by multidisciplinary scientist Hugo de Garis, who leads an AI and robotics effort called the Conscious Robotics Project at Xiamen University in China: "Explaining what consciousness is, how it evolved and what role it plays is probably neuroscience's greatest challenge. If someone were to ask me what I thought consciousness is, I would say that I don't even have the conceptual terms to even begin to provide an answer."

One interesting possibility is that we might create human-level, human-like AI systems before we puzzle out the mysteries of consciousness. These AIs might puzzle over their own consciousness, much as we do over ours. Perhaps at the 2019 or 2029 Machine Consciousness workshop, AIs will sit alongside humans, collectively debating the nature of awareness. One envisions a robot consciousness researcher standing at the podium, sternly presenting his lecture entitled "Can Meat Feel Joy?"

Ben Goertzel is the CEO of AI companies Novamente and Biomind, a math Ph.D., writer, philosopher, musician, and all-around futurist maniac

RESOURCES

Quantum Consciousness
<http://www.quantumconsciousness.org>

Conscious Robots
<http://www.conscious-robots.com>

International Journal of Machine Consciousness
<http://www.worldscinet.com/ijmc/>





OPEN SOURCE MEDICINE

as the Next Insanely Great Thing

ALEX LIGHTMAN AND PARIJATA MACKEY

Part of the reason that many people read *h+* and other radical technology publications is to get ideas about how to live longer. People tend to become like those they are around, so it makes sense if you want to live to 150, you want to help your friends live longer. Since we don't know everything about longevity, it's now time to design a machine that will inspire and invite a massive global effort toward collective medical intelligence, and in honor of his numerous marketplace wins based on ease-of-use so good it motivated evangelists, we nominate Steve Jobs as our design inspiration.

Steve Jobs' recent liver transplant provides an example of how open source medicine can save a life. In 2004, Steve Jobs announced that he had been treated for a rare form of pancreatic cancer called islet cell neuroendocrine tumor, which is curable — if removed quickly — through surgery. In an Apple memo, Jobs declared that the tumor had been successfully removed, and no further treatment was required. However, the rare, slow-growing tumor has a high rate of metastasis: 75% of patients will experience the spread of the disease, most often to the liver. Chemotherapy is not usually an effective treatment if the disease has spread to multiple parts of the liver, and a transplant is often recommended. Using the same intellect that made iPhone apps accessible in one touch (as opposed to having to find them in a folder three levels down like competitive smartphones), Jobs applied open source medicine to take the most direct route to life-saving treatment.

According to the United Network for Organ Sharing, in 2006 the national median waiting time for a liver transplant was 306 days. In Tennessee, it is 48 days. There are no residency requirements to receive transplanted organs in Tennessee, so California Steve became Tennessee Steve in order to get the transplant, which was performed successfully. To get on the waiting list in another region, a patient must get a referral, and travel to the region's transplant centers for an evaluation. Steve Jobs was first on the list almost

To make genome data useful, we need a user-friendly database that tells us the sort of things we'd want to know while looking at genome data. Which string of ATCG's will tell us that we have an increased risk of skin cancer? What are our options for avoiding illness in the future? Are there any gene therapies available?

These questions may only be addressable on a massive scale, with data being constantly refined and analyzed by thousands of users in an open source fashion. Open source medicine is an emerging movement with this very goal in mind. Concerned, talented individuals can work collaboratively to understand the knowledge held in genome data — humans working together to decode the meaning behind their very DNA. Once empowered with information, individuals can also choose to pursue genetic enhancement.

Imagine the power of an open source movement driving the bioinformatics of aging. How many hours would you devote to extending your own lifespan? If you could log in tomorrow to MitoSENS, and spend some time helping catalog genetic damage caused by free radicals, or modeling lysosomal storage diseases, thus potentially extending the lives of millions, would you?

We must look past the unprocessed data and see the information that is directly and immediately relevant to our lives, our health, and our longevity. The time may be right for a movement in open source medicine. Start benefiting from your knowledge today.

Imagine the power of an open source movement driving the bioinformatics of aging. How many hours would you devote to extending your own lifespan?



immediately after signing up, indicating the power of open source medical knowledge used as wisely as Jobs has Apple designers apply usability data.

Information is empowering, and more informed patients can make more informed choices. If one person can use a little bit of medical information to so effectively save one life, how can a lot of us benefit from a lot of medical information so that many of us can live much longer?

Let's look at a notoriously tangled mass of information: the human genome. The sequencing of the genome in 2003 promised wild advances in medical science. The benefits were supposed to be enormous. Knowledge of the genome would revolutionize health, galvanizing the field of personalized medicine. And in many ways, it has. But most of us are unfamiliar with how to reap the rewards from our tax investment in this research. The steps toward personalized medicine are many, and enormous amounts of data must be parsed before we can make it a reality.

So it's 2015 and you decided to shell out and get your genome sequenced. You get a huge .txt file, with a bunch of characters. You have no idea where each gene begins or ends, and there's no way to make sense of it all. The letters go on for miles, and the so-called color code makes it even more confusing.

Wikipedia is proof that reputation and a sense of contribution are sufficient to motivate many. But Wikipedia's secret is an easy, intuitive interface that allows us to comfortably input data. The creation of an interface that allows us to easily and readily work with medical data would be a huge leap forward towards open source medicine.

And excellent interfaces are Steve Jobs' specialty. Afterword: A few days after writing this article, I set up an Open Source Medicine Group on Facebook and in three days it had more members than Obama's healthcare group that had been up for a year. ☺

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They welcome h+ readers to friend them and join their Open Source Medicine group on Facebook.

THE END OF THE BEGINNING:

Biotech Enters A New Phase

MOIRA A. GUNN, PH.D.

This past May, I joined some 14,000 of my closest friends at the international biotechnology conference, BIO 2009, in Atlanta, Georgia. The gossip started immediately: What happened to the other 6,000 of us that came last year? Is biotech in trouble?

Well, no one's surprised that anything is in trouble these days — can you spell “economic meltdown?”

Still, the business of biotech is a different beast.

Normally, science takes time — a painstakingly long, meandering drunkard's walk occasionally revealing an amazing discovery — while it continues along its way. The discovery must then be followed by an intense, directed effort to convert that science into useful, reproducible technology, and even beyond that to proven effectiveness, safety, manufacturing, marketing, and distribution, and then, only at the very end of the line, to humans.

Somehow, with modern biotechnology, the total timeframe became shortened. The technology phase could overlap with the scientific discovery phase, and in a comparative instant, deliver across global markets. While \$1 billion+ and a decade or so of effort to produce a blockbuster may sound ominous to the average person, it's actually affordable in today's money. (Or, at least, in yesterday's money.)

But when the money goes away, what happens to the momentum we've come to expect from biotech? What about all the almost-there technologies we hope will cure cancer, fuel our cars, feed the hungry?

Looking beyond what the business press is reporting — that a huge

global pharmaceutical company bought up and absorbed the largest biotech company; a listing of the current trickle of novel scientific approaches that just got funded; and the latest exciting technology breakthrough actually finding its way to market — looking beyond all that... there has been a distinct sea change in the biotech industry, and I knew it, as I made the rounds at Bio 2009.

I wouldn't have known it if I hadn't been one of the gang. Even so, you might mistake it for some malaise that seems to be settling in on all of us lately, cushioned between the rising voice of Paul Krugman and the complete irrelevance of Bernie Madoff's 150-year sentence. No, this was something entirely different.

Traditionally at this conference, the *BioTech Nation* production team hits the ground running, and we're everywhere. From the press room to the exhibit area to the Super Sessions to the panels. And throughout it all, we record biotech interviews seemingly every hour of the day. We always ask: “What's different this year?” We'd already covered the fact that attendance was down — everyone knew it, but let's get real. I defy anyone to know whether you're at a conference with 14,000 people or 20,000 people. How would you know? You don't talk to fewer people. And in point of fact, the major players were all there, and the minor players were there as well. There was also a new cast of characters, interesting in and of themselves.

So, what was different?

After nearly a week of 15-hour days, listening until my ears bled and talking until I was hoarse, it actually came over me in an instant: Progress is actually being made. Biotechnology was actually becoming a reality. Lo and

behold, it has finally started to deliver on the promise it first spoke out loud some 20 years ago.

Whether it's drugs or drug delivery; bioenergy or the needs of society; public policy or bioethics; there was suddenly no longer a need to argue that biotech had a good chance of working and we should continue to invest in it, even if it wasn't making a dime. Biotech had begun to work, and in so many ways — from therapies to industrial processes, from diagnostics to drug delivery, from customizable bioenergy plants to emergent government policies.

Being a journalist, I am rewarded with a special portal — people want to tell me things. No longer were they intensely staring in my face, trying to convince me that their approach had merit — that they just needed the time and money to prove it. This year, the conversation changed. Many of them spoke as if they *knew* their technology was going to work. It was just a matter of dotting the i's and crossing the t's. If not this particular compound, then the next. If not this combination of genes, then the next. If not this formulation, then the next. Yes, they may still run short of money and time, but at least they now knew they weren't crazy or foolish. The scientist who devotes the best years of his life to an idea that never pans out has a much different energetic signature than the scientist who can feel his goal within reach. And the biggest telltale sign of all? They volunteer what scientific puzzle they're thinking about delving into next — not the abandonment of the old, but rather a looking forward toward the next mountain to be climbed.

Business analysts gauge the viability of all business economically — specifically, whether or not, quarter after quarter, they turn a profit. Science and technology have no such timetable. Even in the best of times, they may need several decades to co-evolve. When a brilliant scientific proposition has presented itself, the technology can give you fits. But one after another, the promises of biotechnology comes of age. Surely, some will falter because there is little or no money, and that

will be an abomination. Could the compound left by the roadside be the one that will cure Parkinson's? Offer months of life to the terminally ill? Heal addiction? But in the midst of general economic collapse, like a teenager who knows nothing of the family budget, the biotech industry is maturing anyway. New products, new treatments, new economics, new options.

And for *BioTech Nation*? We've always focused on the people, not the financial statements. The science, not the products. The stories of those who dare, both in triumph and in failure. Without periods of struggle, would there still be stories left to tell?

But of course. The most intriguing questions always remain the same: What is life? What are our choices? And what happens when the choice is made? Besides, science always lives on the bleeding edge. There will never be a time where we understand it all, when all the questions are answered, when the scientist's brain has nothing to puzzle over. There is always room for a paradigm shift.

It may seem like the end of the beginning, but believe me... now it really gets interesting. ☺

Maira A. Gunn, Ph.D. hosts "BioTech Nation" on NPR Talk and NPR Live. She's the author of Welcome to BioTech Nation... My Unexpected Odyssey into the Land of Small Molecules, Lean Genes, and Big Ideas, cited by the Library Journal as one of the "Best Science Books of 2007." She will be awarded an honorary doctorate in science in May, 2009 by Purdue University. Copyright 2009 Maira A. Gunn

Photo by Dino Olivieri

In the midst of general economic collapse, like a teenager who knows nothing of the family budget, the biotech industry is maturing anyway. ”

ENHANCED: My New Sense Organ

QUINN NORTON

I am beta testing a new sense. My new sensory organ is a small anklet strap with a LiPo battery and circuit board attached to an electronic compass on the anklet's side. Inside the strap are eight small buzzers, up against my skin. As I sit here typing, the buzzer on the very left side of my left ankle is gently informing me which way is north. The anklet is called a Northpaw. My new sense is perfect direction.

The Northpaw is based on the Feelspace, a project organized by the Cognitive Psychology department of Universität Osnabrück in Germany. The principle is simple and elegant. The buzzers signal north to the wearer. The wearer gets used to it, often forgetting it's there. They just start getting a better idea of where they are through a kind of subconscious dead reckoning. It started as a university experiment. They got the data, wound it up, and never intended to commercialize it.

Adam Skory liked the idea so much he wanted to make one for himself. He teamed up with some friends at the San Francisco hackspace Noisebridge and built it. In the process they decided that they might as well sell kits so others could make it more easily. Skory gave me version 1, and set me loose in San Francisco.

I think of myself as having a good sense of direction, and I do, in a way. It's just wrong most of the time. My north drifts quite far from magnetic north. But it's a consistent wander, still useful for navigation, if patently untrue. The Northpaw isn't perfect, this early version has the occasional bug and misplaced buzz, but it's better than I turn out to be. I had wrong

My world's Euclidian consistency
is becoming questionable. ” ”



assumption I didn't know about, my confidence in my cognitions misplaced.

It doesn't work while driving because the compass doesn't like being turned on its side, as it is when you work car pedals. Magnetic fields mess it up (of course) and I can feel it circling my foot on escalators or seeming to vacillate directions randomly as I rest my foot on the floor of the subway. But that's interesting too — to feel the specific places where infrastructure interferes with the Earth's magnetic field.

I returned home to Washington DC to find that, far worse than my old haunt San Francisco, my mental map of DC swapped north for west. I started getting more lost than ever as the two spatial concepts of DC did battle in my head. Eventually, the Northpaw won, and the NW/NE/SW/SE on DC street signs started making a whole lot more sense.

My relationship with the Northpaw is still shaky. It passes in and out of my integrated experience. When it's at its best, my awareness is not of the touch from the Northpaw, it's the awareness of north from the Northpaw. I make it dance around by spinning my office chair, but it doesn't keep up. I get nauseous

and dizzy much quicker wearing the Northpaw than I do spinning without it.

The Northpaw experience has been more about realigning my reality than about its being useful. It tells me more about the world, rather than giving me immediately practical information. But then, I have more a Google Maps than compass lifestyle.

Skory told me that in the time he was wearing his Northpaw he found that hiking trails were much more twisted that he thought they were. But even straight things aren't that straight. I find roads and paths drifting in ways I never noticed. Not always, not a lot, but just enough to be unsettling. My world's Euclidian consistency is becoming questionable. ☹

Quinn Norton covers science, technology, law and whatever else gets her attention. She lives in Washington D.C. and is most easily reachable at quinn@quinnnorton.com

RESOURCES

Sensebridge: The Noisebridge Cyborg Group Feelspace (PDF)


http://www.cogsci.uni-osnabrueck.de/~feelspace/downloads/feelSpace_finalReport.pdf



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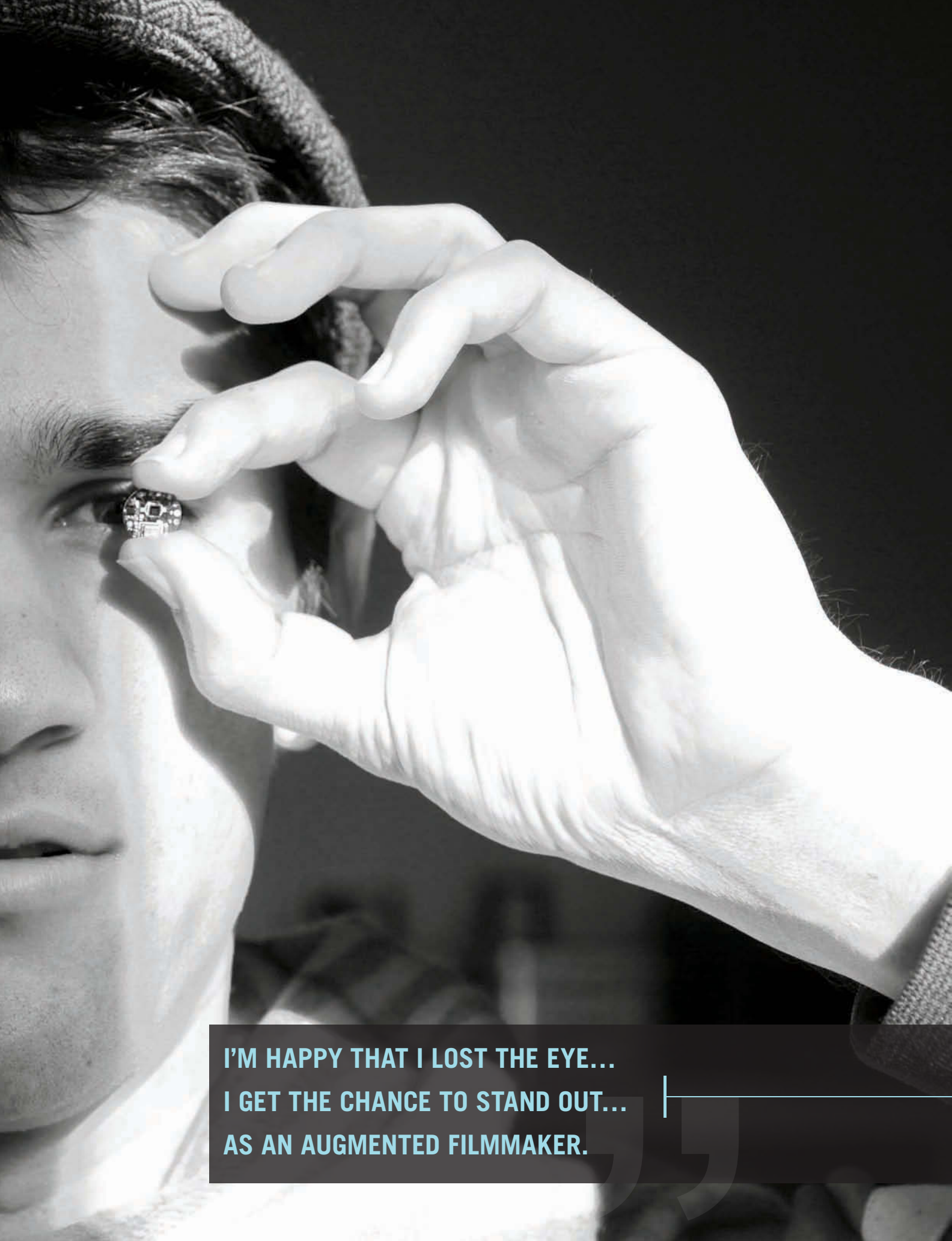
EYEBORGIAN FILMMAKER ROB SPENCE

KRISTI SCOTT



Rob Spence has started to democratize cyborg living today by enabling a new demographic to recognize, appreciate and hopefully embrace their futuristic selves. I talked to Rob Spence, augmented filmmaker, and Kosta Grammatis, a 23-year-old former SpaceX avionics systems engineer, about the Eyeborg Project, sweet old ladies, and what it's like to build, and amazingly, be a cyborg.

According to Rob, the idea of creating the camera that he can insert into his eye was quite natural to him. He notes that anyone who's seen the *Dark Crystal* knows the concept has been out there. He's been thinking about it for years.



**I'M HAPPY THAT I LOST THE EYE...
I GET THE CHANCE TO STAND OUT...
AS AN AUGMENTED FILMMAKER.**

HOW DID HE GO FROM THE IDEA TO THE EXECUTION?

Rob continually emphasized the human attachment to the eye... that even if you're blind, you're still attached to the eye itself. Even though he was blind in the eye, he felt that, in going through the process of having it removed, "it was hard to let go of." He adds that there are also "technical limitations to go[ing] this route." However, after it was all said and done Rob admits, "I'm happy that I lost the eye... I get the chance to stand out... as an augmented filmmaker."

SO WHAT'S IT LIKE TO STAND OUT?

Rob claims to have gotten lots of support from people with one eye... even old ladies. Apparently when these ladies call Rob they don't want something that looks normal. The general feedback he's getting from the older demographic is: "I can stick this in and be the envy of people and be more than I was." He compares it to going out and getting a nice suit. Basically, Rob's hearing from a lot of people who just say: "Fuck it! I want a cool supersonic robot thing like I see in comic books and movies!" There are people out there that "don't give a shit to look normal. They want an arm designed like a cool robot!"

WHAT DOES ROB WANT TO DO WITH THE EYEBORG PROJECT?

When it comes to filming he wants to "look right in their eye and have a personal discussion," so that he can film something "closer to human experience in conversation." By filming through the eye it "approximates how you really see people... blinking, glancing, looking at breasts..." There is, of course, an ethical issue and Rob is "not a dick." He's going to be ethical about filming by asking for a release from those he interacts with. He wants to film: "1. Someone being frank, and... 2. Looking into the eye." From his point of view, the "eye is the person... your sacred part of the body... it says who the person is." He acknowledges that when filming and looking at people it can be perceived by the other person in the conversation as having "broken

RESOURCES

Eyeborg Project
<http://eyeborgproject.com/home.php>

the contract of human trust." With this technology, it's placed in a "disturbing part of the body" as opposed to technology like the cell phone. Rob points out the difference in being faced with these technologies is that the "cell phone is not a window to the soul." For Rob, though, a camera eye isn't quite enough. When I raise the possibility, Rob eagerly replies he wants a "laser eye... an underwater eye." Like an excited teenager Rob proclaims, "This is awesome!"

WHAT ABOUT THE GUY WHO PUT THE EYE TOGETHER... KOSTA?

Counterintuitively, Kosta sees the creation of the camera as a "testament to the fact that the end of the cyborg is here... it's easy and anyone can do it." From his perspective, if he can build something as awesome as this with no money at age 23, then it's only an "interim solution." The real future is in biology. He points out that the "human to digital interface is cumbersome. Why do it unnaturally when you can grow one in a Petri dish?"

Kristi Scott has a Master of Arts in Liberal Studies, interns with the Institute for Ethics & Emerging Technologies, is a freelance writer, and mother of three.



REAL VIRTUAlITY

Augmented Reality Blurs the Line Between the Real and Virtual

MICHAEL ANISSIMOV

Augmented reality (AR) is a technology that has made truly extraordinary steps moving from science fiction to reality in the last year alone, and seems poised to explode into a variety of new applications in the imminent future.

The basic idea is to take video and overlay it with virtual 3-D objects, text, or sound in realtime, either on a handheld screen (such as a mobile phone or Nintendo DS) or a head-mounted display. The educational, entertainment, artistic and business applications are nearly limitless. The technology allows a blurring between the real and virtual on a scale that's never been seen before.

In one recent research project, Tobias Lang and Blair MacIntyre at Georgia Tech used a head-mounted display and a Second Life client to overlay objects and avatars from Second Life into the real world. The head-mounted display included a camera, to take video from the perspective of the user; a computer, to engage with Second Life and reprocess the video; a location sensor, to give the computer data about where the user is looking; and an internal projector, to project the finalized image onto the eyes. For now, most augmented reality "stages" are stationary. A small piece of patterned paper serves as the "fiduciary marker" to tell the head-mounted computer where to project the virtual scene.

A very simple example of augmented reality would be the yellow "first down" line seen on broadcasts of football games. This helpful graphic serves as a sort of memory enhancer for viewers. Instead of having to imagine where the first down line is, they get to see it automatically, outsourcing the cognitive task to the computer. Watching football might not be the most intellectually challenging activity, but the basic principle of outsourcing cognitive tasks obviously has potential applications beyond sports broadcasts.

To get an idea of how much augmented reality has started to explode just in the year 2009, chew on these stats: looking at Google Trends, searches for "augmented reality" exploded to four times the five-year average in 2009, starting from just the average level at the beginning of the year. *Games Alfresco*, a leading AR blog by Ori Inbar, founder of Pookatak Games, recently nominated 18 augmented reality games for its "Games Alfresco Hall of Fame Award." Thirteen of the games were made in the last half of 2008 or the first half of 2009,

including some by big names like Sony (*Eye of Judgment*, *Invizimals*), IBM (Seer Android Beta), and McDonald's (*Do the Dip*). Most of these games are somewhat crude, but the fact that AR games are being made at all shows that the era is dawning.

The simplest augmented reality games use mobile phones with cameras. Nokia smartphones are among the most popular platforms in the currently limited AR gaming market. One AR game for select Nokia phones, *Fanta Virtual Tennis*, lets you play tennis with a friend using a virtual ball and your phones as racquets. The "court" consists of a piece of paper with designated fiduciary markers (location markers) so that the software in the phones can determine their spatial orientation. Another interesting AR game for Nokia and the iPhone, *Kweekies*, is a *Pokémon*-like game where players customize animal avatars and send them into battle.

Other AR games involve moving around in the real world instead of just playing other people on a stationary AR stage. *Wi-Fi Army* for the GPhone allows "real-life first person shooter" action, where your phone is your "gun" and crosshairs are superimposed on realtime video. The goal is to locate other players in the real world and "shoot" them by taking pictures of them with your phone camera. The GPhone then compares captured pictures against a database of known player faces and awards points for successful "hits." There is a global leaderboard and the number of players is unlimited. *Wi-Fi Army* was the first game to be developed for Google's Android operating system, and one of the only games in the world that simultaneously makes use of camera, Wi-Fi, and GPS functions on cell phones.

The mobile operating system Google Android is starting to emerge as a prominent competitor for Nokia in the augmented reality application space. One application for Android called Wikitude is an AR travel guide that displays information associated with prominent landmarks on G1 phones. It recently became available on the iPhone 3GS. Development kits like ARToolKit have hit the mainstream in the last couple of years, making it easier for developers to build applications across any platform with the essentials: a camera, screen and sufficient computing power. After over a decade of research, AR is finally hitting consumer markets and becoming feasible for extensive development.

Because of their ubiquity, many emerging AR games make use of the humble webcam and everyday PC as a platform. The July 2009 issue of *Popular Science* bills itself as the "first interactive 3-D augmented reality magazine cover." Focusing on the future of energy, the cover features an image of windmills with a skyline in the background. When the user visits a specific web page and holds the magazine up to a webcam, the live

video feed on the computer screen is overlaid with a 3-D pop-out image of windmills with the Golden Gate Bridge in the background. Blow into your microphone and the windmills spin faster. Trying it out for myself, I found the 3-D cover exciting, but noticed that even slightly turning the magazine away from the webcam resulted in the 3-D image disappearing. Still, it's an early version, and exciting that it works at all.

Many AR blogs and experts refer to the French company Total Immersion Software as the world's leader in augmented reality. Their



technology certainly is impressive. Demo videos for Total Immersion clearly show that the company is way ahead when it comes to AR graphics. Their flagship application is RealWorld®, which allows non-programmers to quickly build and test 2-D/3-D geospecific simulations. The program is marketed for "time-critical applications where lives are on the line — first responders, counterterrorism professionals, warfighters, healthcare workers, the intelligence community and security forces." Clients include the Department of Homeland Security and the Department of Defense, including the Army, Navy, Air Force, Marines, and the Special Operations Command.

Total Immersion Software hasn't just received the attention of the military and the government. A wide variety of software and entertainment companies are also getting involved. Total Immersion is one of eight French companies that Microsoft has chosen to support software innovation in Europe. Three major TV networks have used their technology to project virtual objects into their programming. Disney Imagineering is testing the technology for use at theme parks. The company also has a contract with



Boeing to use the technology in its development of new planes. AR is a favorite with FedEx's CEO Fred Smith, who has used the technology to send virtual packages flying around the room during in-house presentations.

Both Sony and Microsoft have been pursuing augmented reality. In late 2009, Sony is scheduled to release its *EyePet* game for PlayStation 3, which uses the PlayStation Eye camera to create a virtual pet in augmented reality for the gamer to interact with. Another game, *Eye of Judgment*, released in 2007, comes with physical game cards and uses an augmented reality playing mat and camera to project 3-D characters battling it out on the TV screen. Most cards are associated with summoning creatures.

Microsoft has not released any AR games yet, but at the 2009 Electronic Entertainment Expo in June, they announced the ongoing development of a "controller-free gaming and entertainment experience" for the Xbox 360 console currently called "Project Natal" after Natal, Brazil. The Project Natal sensor device includes an "RGB camera, depth sensor, multi-array microphone, and custom processor running

proprietary software." The software will allow advanced gesture, facial, and voice recognition. If the gamer is close enough to the sensor, it can even map the movement of individual fingers. Scheduled for a rollout in late 2010, Project Natal could initiate a new era of augmented reality gaming, if it lives up to its promise.

As is practically always the case with emerging technologies, the most exciting applications of AR are either research projects, still in the developmental pipeline, or purely conceptual. Dozens of big companies are currently developing AR applications but have not deployed them yet, including Mini, Toyota, Nissan, BMW, Lego, Ray-Ban, and Holition (jewelry). The potential of using augmented reality to take online shopping to its next stage has been widely recognized in the retail industry, with the falling costs of high-resolution webcams setting the technological stage for widespread adoption. In five to 10 years, online shoppers looking at jewelry, sunglasses, hats, and even clothing may use augmented reality to "try on" virtual products before they buy.

A key application of augmented reality that has only just begun to be probed is virtual "x-ray vision." Using digital eyewear like the

Digital eyepiece-enabled augmented reality seems like a way we can have our cake and eat it too

Vuzix Wrap 920AV, recently revealed at 2009 CES in Las Vegas, engineers and maintenance technicians might be able to “look inside” machines without ever taking them apart, allowing for better analysis of complex systems and faster repair. Combined with microsensors, augmented reality could provide an intuitive way to analyze the features of systems that are not immediately obvious through visual scrutiny alone. In the further future, augmented reality instruction manuals could replace paper manuals entirely, giving the user all the information they need without even requiring them to take their eyes off the product.

The most awe-inspiring visualizations and presentations of augmented reality are completely fictional. Generation X was introduced to augmented reality by shows and movies like *Star Trek*, *Terminator*, and *Robocop* while Generation Y often associates the technology with the “scouters” in *Dragon Ball Z*. In *Dragon Ball Z*, digital eyewear with augmented reality is used for communication, mapping, object tracking, even evaluating the strength of opponents. Augmented reality has been a staple in Japanese animation for decades, appearing in series including *Gundam*, *Neon Genesis Evangelion*, *Voices of a Distant Star* and *Martian Successor Nadesico*. Augmented reality plays a central role in the award-winning series *Dennō Coil*, which the major Japanese newspaper *Mainichi Shimbun* said could impact future technology in the same way that the book *Snow Crash* helped inspire the development of *Second Life*.

One of the most extensive fictional portrayals of augmented reality appears in Vernor Vinge’s book *Rainbows End* (2006). The world in the book includes a ubiquitous augmented reality that has replaced conventional screens as the primary medium for

accessing the Internet and communicating with others remotely. The characters in the story use contact lenses to view augmented reality, removing them only to sleep. By combining augmented reality graphic overlays with haptic feedback and robots, the story presents a world where the line between the virtual and the real is thoroughly blurred. Numerous AR worlds are available for any user, but the most popular are built in collaborative units called “belief circles.” In the novel, entire parks are used exclusively as augmented reality playgrounds.

Perhaps the most exciting potential of augmented reality is that it has the ability to bring people back together after modern technologies have done so much to break us apart, spatially if not socially. Using augmented reality to surf the web and do computer work without having to remain seated in a chair could improve the public health by leaps and bounds and save hundreds of billions of dollars in health care costs. Despite the best efforts of pro-exercise government programs and kids’ TV shows like *LazyTown*, obesity is more of a problem than ever. Thirty-two percent of the children in the United States are overweight or obese. Digital eyepiece-enabled augmented reality seems like a way we can have our cake and eat it too: benefit from the entertainment and educational abilities of computers while also experiencing the sunlight and physical activity of outdoors. ☺

Michael Anissimov is a writer and futurist in San Francisco. He writes a blog, Accelerating Future, on artificial intelligence, transhumanism, extinction risk, and other areas.

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JONATHAN COULTON

Embraces His Inner

Giant Squid

LAUREN DAVIS

Four years ago, Jonathan Coulton quit his “code monkey” day job to pursue a career as a professional musician. His songs about laptops, supervillains and aspiring cyborgs quickly made him geek culture’s favorite troubadour, and this year he released his first concert DVD, brazenly titled **BEST. CONCERT. EVER.**

h+: You write such a wonderfully weird assortment of songs on such a wide variety of topics. What reaches out to you to choose a certain topic for a song?

JONATHAN COULTON: Well, many years ago, I got a little bored with writing songs about the same old stories. I wrote a lot of break-up songs and love songs in my time. And after awhile, there’s not a lot of new ways to say what you’re trying to say. And I’ve always been interested in songwriting that tells a deep story or reveals a complicated character or something that has maybe a puzzle aspect to it. And I end up writing songs that are about, I guess, unusual subjects because it’s sort of a challenge for me to get inside the head of a giant squid, and not only to get inside the giant

○ We all have the opportunity to make that “death ray” in our spare time for very little money

squid’s head but to empathize with that giant squid and to find the sort of humanity in there — the thing that we will recognize as ourselves. And it’s just more interesting for me that way, and I guess probably it’s easier for me to write in a kind of personal way when I pretend that I’m not writing about myself.

h+: So when you wrote “I Crush Everything” was the idea to write a song about a giant squid?

JC: I remember writing that song and I remember that I had a couple of lines. I think I was just feeling kind of sad that day, and so I was writing about sad things, and I had a couple of sad lines and a sad chord progression. And I was sort of fishing around for who was talking, which is often how

it happens. I get a line of dialogue that somebody is saying, and I have to figure out who it is. And I’d recently seen a talk by a guy name Graham Smith who was a deep sea explorer of sorts. He makes these awesome underwater submersible vehicles that sort of fly underwater. At some point, he was talking about giant squids — and at that point we’d never seen any live giant squids. And he said, “Well, no wonder, because when we go down to look for them, we have these bright lights and these noisy machines, and they’re actually very shy, retiring creatures.” And that image sort of stuck with me — what is essentially a sea monster but who actually turns out to be very shy and afraid of bright lights. And that’s why we never see them. I guess that idea came back to me as I was fishing around for

something to make a song about and it seemed to make sense. So that was the character who was sad: a giant squid.

h+: You’ve written songs as companion pieces to very forward-looking experiences: for *Popular Science* articles, for the PopTech conference.

What is your sense of how your music adds to those experiences?

JC: I think it gets the wheels turning, sometimes. In a way, it does the same thing that science fiction does. Any time you tell a story about the future, you’re sort of telling a story about the present or about the near future. So, yeah, I think any time you tell a story like that, you’re going to make people think about those possibilities. There’s this song called “The Future Soon” that is a sort of a revenge fantasy that a thirteen-year-old boy has when he’s rejected by the girl he likes. The revenge fantasy involves him becoming a cyborg and losing all the stuff that makes him not fit in, basically using technology to fix those problems. I know we’re all working toward that. And I didn’t really write it as a transhumanist manifesto. I have

heard from people who say, “I believe that this is the actual future.” And maybe they’re right, but who knows? We’ll have to wait and see. And once we get the singularity, all of those who are alive will find out.

h+: Do you hope that your music encourages people to embrace their inner giant squids?

JC: I hope I’m not nurturing an army of supervillains without knowing it. But in some sense, I do think that maybe the “death ray” is a metaphor for the project that is crazy and that everybody thinks is a waste of time. You believe it’s really awesome, but it’s going to be very costly to you to do and that’s why you haven’t gotten started yet, then absolutely, we should all immediately go to our basement laboratories and start tinkering, because it’s an amazing time to be alive and a creative person. We all have the opportunity to make that “death ray” in our spare time for very little money and publish it to massive numbers of people. Just, if you *do* make a death ray, make it open source, because that’s the most stable way to do it.

h+: A lot of people became familiar with you through “Still Alive,” the theme song for the *Portal* videogame. And now there’s a version of “Still Alive” on the new *Rock Band* release. Do you feel that video games are going to be the way that people learn about new music and new artists?

JC: I think that video games are certainly going to be part of it, and games like *Rock Band* are a great example — it’s really a brand new genre of game and it’s a brand new genre of entertainment.

It’s this really weird mixture of this participatory experience, where you’re part of creating the thing, and also the standard consumer relationship, where you’re enjoying a piece of art that already exists. That’s a very exciting thing and a kind of collaboration, really. That’s ultimately where I think we’re headed — this kind of mega-collaboration on a global scale. When you think about the trend in music and post-modern art, it makes sense. You’re incorporating parts of other pieces into the pieces that you’re making. And now this is a thing that children grow up knowing how to do, because they have computers that come with software that allow them to create videos and music. So, yeah, I think it’s part of a trend. We don’t know exactly what it’s going to look like.

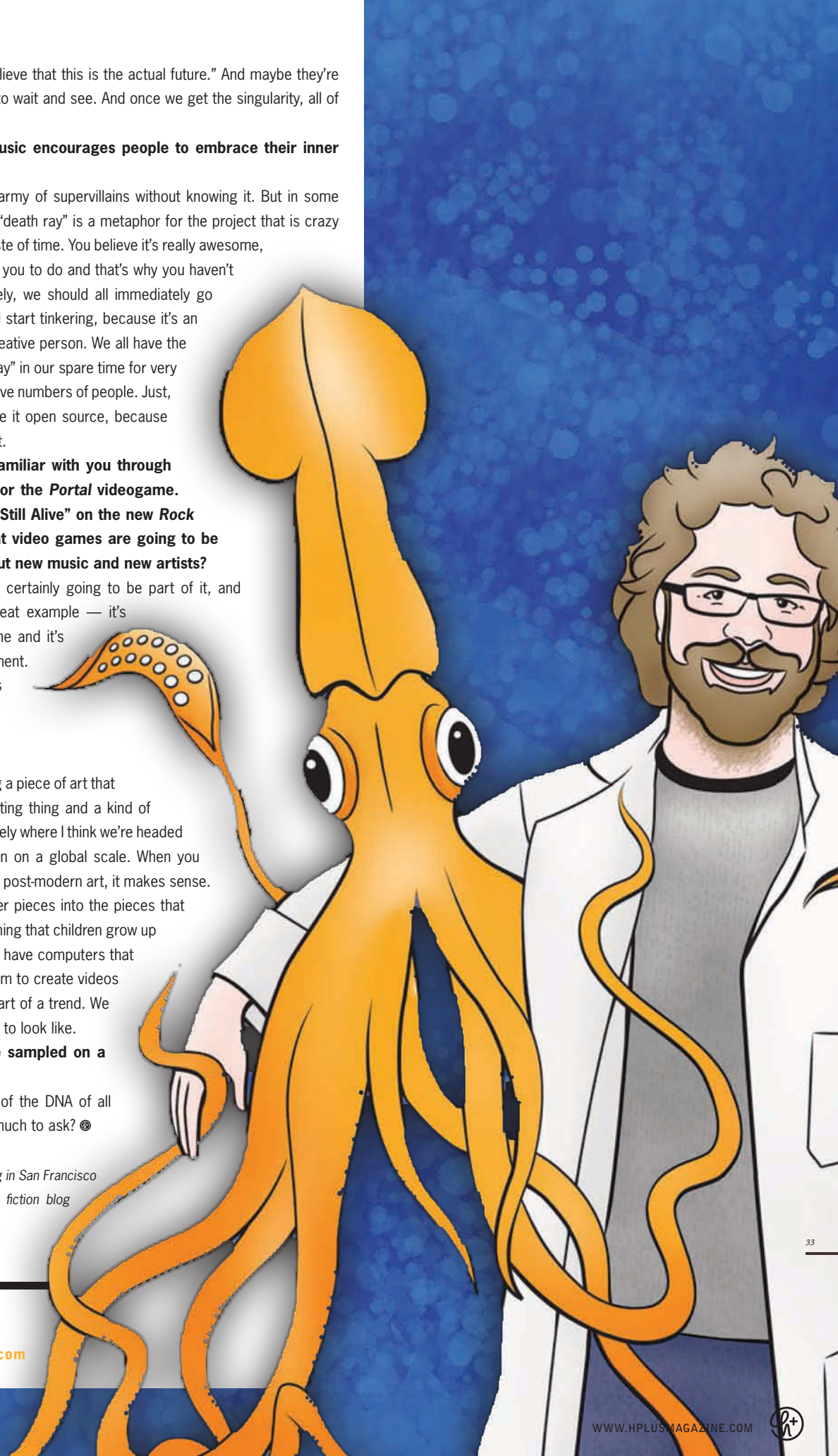
h+: So your goal is just to be sampled on a massive scale?

JC: Yeah. I just want to be part of the DNA of all future entertainment. Is that too much to ask? ☺

Lauren Davis is a freelance writer living in San Francisco and assistant editor for the science fiction blog io9.

RESOURCES

Jonathan Coulton Website
<http://www.jonathancoulton.com>





Courtesy of Miranda Penn Turin/FOX

YOU ARE THE DOLL

Erik Davis on *dollhouse*

At its best, science fiction tv satisfies our desire for escapist pop while also holding up a mirror to the zeitgeist, and especially to those deep fears and desires that elude the strategies of more conventional and realistic narratives.

Battlestar Galactica, with its dark meditations on prophecy, war and Cylon identity, is the shining recent example, but seemingly cornier fare can also provide candy-coated conundrums that bear rumination, and that almost sneak up on you with their significance. *Dollhouse*, a Fox TV show created by Joss Whedon — the cult-show-breeding mastermind behind *Buffy the Vampire Slayer*, *Angel* and the too-briefly-seen *Serenity* — is a glossy, jiggly, fisticuffs entertainment marked by many of the Whedon moves that made *Buffy* such a success: playful banter, accessible smarts and a pleasing air of unreality. At the same time, *Dollhouse* manages to sink its sexy teeth into some of the core anxieties — and possibilities — of our neurological century.

The show, whose first season was released on DVD this summer and which has been renewed for its second season despite mediocre ratings, centers on an illegal and quasi-mythical organization in Los Angeles that uses a fantastic neurological technology to provide programmable human “dolls” to wealthy clients for any number of tasks: sex, companionship, criminal deeds. Between assignments, the dolls — whose original selves have contractually agreed to offload their personalities and serve five-year terms of servitude before getting their selves back — live like contented lobotomy patients in the “dollhouse,” an underground facility that resembles an Ayurvedic spa, Santa Monica-style. A rogue cop is hunting the organization, which is also experiencing its own technical difficulties — most notably the pesky tendency of some dolls to grow towards self-awareness and occasionally explode with festivals of batshit mayhem.

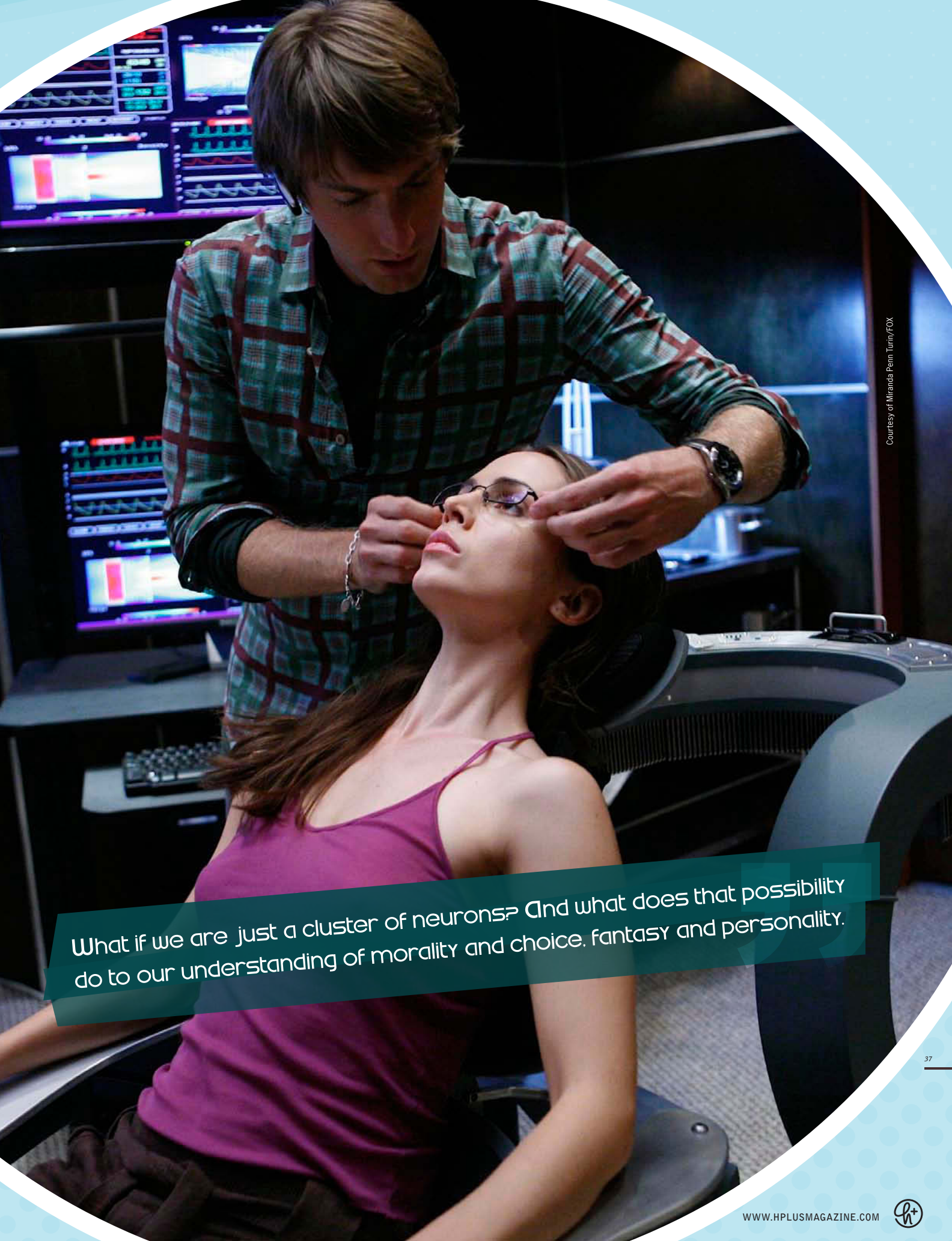
On one level, *Dollhouse* is just the sort of goofy, cleavage-baring thriller you might expect to see on Fox on a Friday night. Hotties and motorcycles abound, edits are slick and fast, and the requisite chase scenes and bone-crunching ninja brawls are often executed in high heels, for which the show has a considerable fetish. Despite the intelligence and wit of many episodes, the narrative flow often feels more like a roller-coaster than an organic story, with abrupt and needless twists and turns that derive less from plot or character needs than the compulsion to yank the audience around. The acting is so-so throughout, with few of the actors rising to the challenge of embodying characters that are not really “characters” at all, but flesh-bots who oscillate between innocuous zombiedom and a revolving door of one-shot personalities.

Still, in spite of the show’s glaze of artificial popcorn butter — or perhaps, given the loop-de-loop logic of sensationalist popular culture, precisely *because* of its disarming layer of cheese — *Dollhouse* takes a reasonably meaty bite out of one of the more ominous and potentially liberating conundrums of 21st century life: the thoroughly constructed nature of human identity. The show frames this conundrum in terms of neuroscience and the pervasive pop metaphor of the mind as a programmable input-output device. Original personalities are “wiped” and stored on cartridges that resemble old 8-track tapes; other “imprints” are not only shuffled between the dolls but remixed into the perfect blend of characteristics for any given job. The show’s ambivalence about such “posthuman” technologies is captured by the character who does all the wiping and remixing: a smug, immature, and charmingly nerdish wetware genius named Topher Brink, whose simultaneously dopey and snarky incarnation by the actor Fran Kranz reflects the weird mix of arrogance and creative exuberance that inform so much manipulative neuroscience.

For a science-fiction thriller, there is not much emphasis on gadgetry. In one episode, the doll Echo, played by *Buffy* vet Eliza Dushku, is implanted with a “brain camera” that turns her into a remote surveillance device that allows the ATF to spy on the creepy religious cult she has been programmed to infiltrate (paradoxically — or perhaps allegorically — the device temporarily blinds her). But overall, *Dollhouse* is much less concerned about posthuman technology than it is about current social reality, or at least about how the late capitalist media culture that saturates our lives will transform through posthuman technology into a dizzying scramble of identity and desire.

That’s why *Dollhouse* can be read most basically as an ironic reflection of Hollywood itself, and especially





Courtesy of Miranda Penn Turny/FOX

What if we are just a cluster of neurons? And what does that possibility do to our understanding of morality and choice, fantasy and personality.

the peculiar fate of actors living in LA. When not on assignment, the dolls, who are uniformly fit and attractive, spend their time doing yoga, swimming, sleeping, and eating five star food — presumably with vegan and raw options. “It’s important to exercise,” they murmur like Stepford wives. “I try to be my best.” This almost literally mindless maintenance of happy leisure — the ideal of SoCal’s hedonic “good life” — is then contrasted with the caricatured and often highly skilled roles these hardbody blank slates are episodically compelled to perform. The dollhouse can be seen as a Hollywood house of mirrors. In one show, we even glimpse the operation’s enormous costume room, a museum of fabricated identities that would be far more familiar to the actors on the show than to the vast majority of the punters watching the thing on TV.

On a deeper level, the business of the dollhouse — which one staff member sardonically describes as being “pimps and killers, but in a philanthropic way” — simply literalizes aspects of human power relationships that all of us are already familiar with in the mundane, not-quite-Sci-Fi world that we already live in, and that the show itself often self-consciously references. Lovers use one another to sustain fantasies of dominance and submission, cult leaders enslave believers, military organizations treat soldiers as pawns, and even the most successful pop music diva is — as one character proclaims — “a factory girl.” All of us are dolls sometimes, and dollhouse engineers other times. Cleverly, *Dollhouse* incarnates this fundamental split between masters and slaves in the panopticon-inspired architecture of the dollhouse set itself, which places the employees who run the show on a balcony that looks down onto the dolls flexing their muscles or sleeping below. The space has an open, airy feel, with few locked doors, and this deceptive informality disguises an invisible architecture of control.

The uncanniness of invisible control systems — whether in fictions of real life — helps motivate the paranoia that runs through the show. This stretches from the “gigantic multipronged conspiracy” of the international dollhouse organization itself — captured in one episode in the classic image of a wall covered with an octopus of documents, thumbtacks, and linking strings—to the fact that, in a *BSG*-like twist, we don’t always know which new characters we meet are actually dolls on assignment. Occasionally, these paradoxes take us into pure Philip K. Dick territory, particularly towards the end of the first season, when — spoiler alert — the cop pursuing the organization not only discovers that his lover is a doll, but watches her concocted personality get momentarily over-ridden by a more mysterious persona whose covert messages seemingly come from an unknown mole inside the organization.





Courtesy of Isabella Vosmikova/FOX



Courtesy of Greg Gayne/FOX

Shadowy international conspiracies are the bread-and-butter of thrillers these days, but the undertow of suspicion that runs through *Dollhouse* ultimately turns on a premise that hits pretty close to home: the possibility that you yourself, dear TV fan, are more of a construct than you suppose. In one episode, a number of random people on the street are asked for their opinions about the dollhouse, which many discount as an urban legend. One complains that the organization, if it exists, takes away “everything that makes you more than a cluster of neurons.” But isn’t this the big question: what if we *are* just a cluster of neurons? And what does that possibility do to our understanding of morality and choice, fantasy and personality?

While *Dollhouse* mostly hints at the darker dimension of the neuron cluster, it also hints at some of the upside — not least of which is the functional immortality that might come with replicating that pattern of neurons, a revolutionary possibility that the show flirts with but, lamely, only barely explores. Many of the missions the dolls undertake also heal far more than they harm, and there are hints as well that the organization itself is not as nefarious as it first appears. Even the dolls are not totally mindless slaves — as the season progresses, a few begin to exhibit behaviors that go beyond their programs, some of which reflect deeply hard-wired traces of their original personalities and more interesting ones that suggest budding forms of self-consciousness and moral agency.

In one episode, the doll Echo is hired out as an art thief, and has an encounter with a Picasso painting whose cubist portraiture she interprets as signs of a broken self. But Picasso’s fractured perspectives could equally be seen as an attempt to expand beyond the conventional self and its “single vision” into a wider embrace and affirmation of the many identities that potentially flow through us — a flow that may soon become something more like a tsunami. ☉

Erik Davis regularly posts to www.techgnosis.com. His most recent book was *The Visionary State: A Journey through California’s Spiritual Landscape*.

TWEAKING YOUR NEURONS

SURFDADDY ORCA

“**F**our shots in my Americano, please. I've got a presentation due tomorrow at 9:00 a.m. and I haven't started it yet. I'll probably be up all night.” The poor Starbucks barista is probably covering her ears. Caffeine and nicotine, which work by tweaking our neurons — in the case of coffee, by inhibiting our inhibitory neurotransmitters — are the most commonly used cognitive enhancers today.

“I currently use a very powerful drug called caffeine to aid in my non-creative work, and for creative work I do not need additional help,” says Bruce Katz, an adjunct professor of Computer Engineering at Drexel University in Philadelphia and author of *Neuroengineering the Future: Virtual Minds and the Creation of Immortality*. (See the accompanying *h+* interview with Dr. Katz.)

Today, a new breed of cognitive enhancers — neuroenhancers, or “smart drugs” — is starting to appear with increasing frequency on university campuses around the world. *Nature* reports that students are striking deals to buy and sell prescription drugs such as Adderall and Ritalin — not to get high, but to get higher grades, to provide an edge over their fellow students or to increase in some measurable way their capacity for learning. These transactions are crimes in the United States, punishable by prison.

“Society must respond to the growing demand for cognitive enhancement. That response must start by rejecting the idea that

‘enhancement’ is a dirty word,” argues Henry Greely, a Deane F. and Kate Edelman Johnson Professor of Law at Stanford University.

Modafinil — a banned stimulant in competitive sports — enhances academic productivity and significantly reduces the need for sleep to a couple of hours per night while improving working memory. A University of York web site describes three students — Charles, Nick and David — who each took a 200 mg tablet of Modafinil. According to Charles, “After an hour, none of us felt any different. But then I started to feel markedly more alert. I couldn't be sure it wasn't a placebo, but then Nick became uncannily good at computer games, beating his friends three times in a row at Pro Evo. It was no coincidence.”

Modafinil has proven so popular in the academic pressure cookers of Oxford and Cambridge that close to one in ten students have admitted taking prescription medication such as Modafinil without a prescription. The academic uses range from increased alertness during exams to stimulating thought processes when writing essays or take-home exams.

“It's not the mind-expanding sixties anymore,” comments Margaret Talbot in a recent *New Yorker* article. “Neuroenhancers are perfectly suited for the

anxiety of white-collar competition in a floundering economy. And they have a synergistic relationship with our multiplying digital technologies: the more gadgets we own, the more distracted we become, and the more we need help in order to focus.”

In short, many of today's students would rather drop Modafinil than LSD to maintain a competitive edge. But do drugs like Adderall, Ritalin and Modafinil really enhance intelligence, increase focus, and boost creativity? Bruce Katz comments, “As far as increasing intelligence, this is a... difficult matter. For example, simply increasing the brain's learning rate may speed up the acquisition of new concepts, but will also increase the rate of catastrophic forgetting of older concepts. Intelligence and wisdom is not just about knowledge acquisition, but in applying this knowledge in the right contexts.”

h+ contacted Zack Lynch, author of *The Neuro Revolution: How Brain Science Is Changing Our World*, to ask him about this new neuro frontier. “Neurotechnology is the broad term for drugs, devices and diagnostics focused on the brain and nervous system,” he says. “Neuroceuticals is a term I coined to describe future neuropharmaceuticals that have very low if any side effects, so that they may be used by healthy humans. There are three categories of neuroceuticals: cogniceuticals for memory, emoticeuticals for emotions, and sensoceuticals focused on sensory systems.”

Why Do You Think They Call It Dopamine?

At the State University of New York at Stony Brook, a handful of young people who had just fallen madly in love volunteered to have their brains scanned to see what areas were active when they looked at pictures of their sweethearts. The *LA Times* reported that the brain areas that

lighted up were precisely those known to be rich in dopamine.

Dopamine is the key chemical in the brain's reward system, a network of cells that is associated with pleasure — and addiction. The “feel-good” chemical has long been understood to play a big role in the excitement of love. Brain cells also release it in response to cocaine and nicotine.

Dopamine agonists — drugs that mimic the effects of dopamine — are also used to treat Parkinson's. In some cases, Parkinson's patients can benefit from deep brain stimulation (DBS), a procedure in which surgeons implant electrodes in the brain to regulate the body's movements, similar to the use of a pacemaker in the heart.

h+ Neuro columnist James Kent does not find much benefit from over-the-counter

or legal cognitive enhancers. “Everybody has a slightly difference pharmacological profile, and I tend to function best with increased dopamine modulation. And all the drugs that increase dopamine supply are illegal or are prescription ADHD drugs like Adderall. I was medicated with Ritalin for most of my childhood for ADHD so most of my life has been an experiment in pharmacological cognitive enhancement.” He goes on to say that he does not take prescription medication and he has found that (for him), “medical marijuana and caffeine are better options for modulating focus than pharmaceuticals.”

Will Block is a researcher, writer and speaker specializing in the life extension, life enhancement and cognitive enhancement aspects of nutritional science. In a backwards-and-forward looking multimedia article entitled “From Grain to Grin – Nootropics: Past, Present, and Future” on the Better Humans website, Block describes the history and importance of nutritional supplements and other cognitive enhancers. Nootropics (from the Greek words *nous* or “mind” and *tropain* “to bend/turn”) includes vitamin supplements and functional foods that are purported to improve mental functions such as cognition, memory, intelligence and focus. A good example is *Ginkgo biloba*: an alleged memory and concentration enhancer cultivated in China for over 1500 years.

Look Ma, No Drugs! (Or Nutrients)

Neuroceuticals and nootropics are not the only way to enhance intelligence or creative faculties. The concept of entrainment involves “the interaction and consequent synchronization of two or more rhythmic processes or oscillators.” For example, studies show that trance music has the same effect on the human mind as military drums, causing listeners to dance in unison with simple movements including head bobs, light bouncing/jumping and humming. A similar reaction is reported for the locking of step and inhalation cycles in jogging (“runner's high”), or between respiration and heartbeat in high performance swimmers.

Most brain functions can best be described as cooperative, synchronized activity of large, distributed ensembles of neurons, and a large part of this synchronized activity is of an oscillatory nature. These autorhythmic oscillatory properties of neurons in the central nervous system are a consequence of their electrochemical properties. The cooperative and oscillatory activities of these neurons can be seen as the basis for the timing of sensory-motor coordination and trance phenomena.

Meditative practices and the use of biofeedback tools such as the Proteus Light and Sound Machine induce the oscillatory properties of neurons. Kaleidoscopic patterns of color are seen behind closed eyelids and synchronize with pulses of sound. The combinations of flickering color and sound pulses have an effect on brainwaves. Both ancient meditative practices and new biofeedback technologies are now being analyzed in dozens of studies using computerized electroencephalography (EEG), EEG topographic brain mapping, positron emission tomography, regional cerebral blood flow, single photon emission computed tomography, and nuclear magnetic resonance imaging.

ZACH LYNCH: THERE ARE THREE CATEGORIES OF NEUROCEUTICALS: COGNICEUTICALS FOR MEMORY, EMOTICEUTICALS FOR EMOTIONS, AND SENSOCEUTICALS FOCUSED ON SENSORY SYSTEMS.”



Smarts and Consequences

There are obviously profound societal consequences in using neurotechnology by healthy humans to improve their performance. Some of us will be enhanced, while others won't. Zach Lynch, however, is optimistic. "Like any new set of tools developed by humans, there are both positive and negative potential uses of these tools. However, if we look broadly at human history we can see that newly developed technologies have extended life spans, improved living standards and made it possible for more of us to live happier lives. We should expect this trend to continue as we move into the Neuro Revolution."

"It makes no sense to ban the use of neuroenhancers," says Margaret Talbot. "Too many people are already taking them, and the users tend to be educated and privileged people who proceed with just enough caution to avoid getting into trouble. In a consumer society like ours, if people are properly informed about the risks and benefits of neuroenhancers, they can make their own choices about how to alter their minds, just as they can make their own decisions about shaping their bodies."

James Kent takes it a step further, "Right now we are transitioning away from counterculture championing of cognitive enhancement and into these memes being adopted by the mainstream media. Soon the general public will be demanding consumer-level cognitive enhancement. It is only a matter of time, but it will probably take another generation or two to sort it all out."

This will likely be only the first — and perhaps the most significant step — in the emerging world of neuroceuticals, nootropics, entrainment and neuroprosthetics to boost human intelligence and creativity. Bruce Katz believes it will lead to a positive feedback loop — enhanced intellectual capacity will lead to greater inventiveness, which will lead to better means of increasing intelligence, which will lead to even more powerful enhancement techniques. At some point in this development, he speculates, "We will bear as little resemblance to plain old vanilla Homo sapiens as a man does to a mouse." ☹

Intel Inside and Out

A more radical neuroengineered future is suggested by the increasing use of sensory and motor prostheses — brain implants — to deliver input to and output from the nervous system. Cochlear implants to aid the deaf are a good example. Theodore Berger at the University of Southern California defines another class of prostheses aimed at restoring cognitive function by replacing circuits within the brain damaged by stroke, trauma or disease. Work has begun on a proof-of-concept device — a hippocampal prosthesis that can mimic the function of a region of the hippocampus — a part of the brain responsible for the formation of memories.

Such prosthetics may ultimately become the substrate for the mind itself. Bruce Katz comments, "The alternative is to free the mind from limitations of the brain by the addition of prosthetic devices and ultimately uploading it into digital form. While it is unlikely either of these and especially the latter will occur in the next few decades, this remains the ultimate goal of enhancement."

In a recent *Atlantic Monthly* article, James Cascio argues that "the age of the cyborg and the super-genius has already arrived" in the form of netbooks, iPhones and other forms of access to the Internet... "it just involves external information and communication devices instead of implants and genetic modification." The bioethicist James Hughes of Trinity College refers to all of this as exocortical technology, but like Cascio, you can just think of it as "stuff you already own." For many, a smart phone or laptop has become an exobrain with access to much of the information in the world's libraries.

Bruce Katz suggests that cognitive enhancement is a kind of evolution, but not in a traditional sense, "because with cognitive enhancement we will be taking the first significant steps towards being a self-modifying system." He points out that ordinary evolution develops at a glacial pace, and it is not at all clear that evolution can take us much beyond where we already are "in the smarts department." He describes how the path from early hominids to Homo sapiens — when walking upright freed our hands for tool construction — encouraged a larger frontal cortex both for the manufacture and use of these tools, "But walking upright also means that there are limits on the size of the birth canal before locomotion is seriously disturbed. This is why human birth is so painful relative to other species — our brains are already too big for our bodies." Hence, he says, "we should not expect to see hypercephalic beings, giants heads perched on slender bodies, walking around in 10,000 years, unless of course we are able to produce them ourselves."

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WILL WE EVENTUALLY UPLOAD OUR MINDS?

BRUCE KATZ INTERVIEW SURFDADDY ORCA

Bruce Katz received his Ph.D. in artificial intelligence from University of Illinois. He is a frequent lecturer in artificial intelligence at the University of Sussex in the U.K and serves as adjunct professor in of Computer Engineering at Drexel University in Philadelphia. Dr. Katz is the accomplished author of *Neuroengineering the Future*, *Digital Design*, as well as many prestigious journal articles.

Katz believes we are on the cusp of a broad neuro-revolution, one that will radically reshape our views of perception, cognition, emotion and even personal identity. Neuroengineering is rapidly advancing from perceptual aids such as cochlear implants to devices that will enhance and speed up thought. Ultimately, he says, this may free the mind from its bound state in the body to a platform-independent existence.

h+: What trends do you see in cognitive enhancement modalities and therapies (drugs, supplements, music, meditation, entrainment, AI and so forth)?

BRUCE KATZ: There are two primary types of cognitive enhancement — enhancement of intelligence and enhancement of creative faculties. Even though creativity is often considered a quasi-mystical process, it may surprise some that we are actually closer to enhancing this aspect of cognition than pure intelligence.

The reason is that intelligence is an unwieldy collection of processes, and creativity is more akin to a state, so it may very well be possible to produce higher levels of creative insight for a fixed level of intelligence before we are able to make people smarter in general.

There appear to be three main neurophysiological ingredients that influence the creative process. These are 1) relatively low levels of cortical arousal; 2) a relatively flat associative gradient; 3) a judicious amount of noise in the cognitive

Ultimately, we want to be free of the limitations of the human brain. There are just too many inherent difficulties in its kludgy design... ¶¶

system. [Editor's note: A person with a high associative gradient is able to make a few common associations with a stimulus word such as "flight," whereas those with a flat gradient are able to make many associations with the stimulus word. Creative people have been found to have fairly flat gradients, and uncreative people have much steeper gradients.]

All three ingredients conspire to encourage the conditions whereby cognition runs outside of its normal attractors, and produces new and potentially valuable insights.

Solving compound remote associate (CRA) problems illustrates how these factors work. In a CRA problem, the task is to find a word that is related to three items. For example, given "fountain", "baking", and "pop" the solution would be "soda."

The reason CRA problems are difficult, and why creative insight helps, is that the mind tends to fixate on the stronger associates of the priming words (for example, "music" for "pop"), which in turn inhibits the desired solution.

What are the implications of this for artificially enhancing insight? First, any technique that quiets the mind is likely to have beneficial effects. These include traditional meditative techniques, but possibly also more brute-force technologies such as transcranial magnetic stimulation (TMS). Low-frequency pulses (below 1Hz) enable inhibitory processes, and TMS applied in this manner to the frontal cortices could produce the desired result.

Second, the inhibition of the more literal and less associative left hemisphere through similar means could also produce good results. In fact, EEG studies of people solving CRA problems with insight have shown an increase in gamma activity (possibly indicative of conceptual binding activity) in the right but not the left hemisphere just prior to solution.

Finally, the application of noise to the brain, either non-invasively, through TMS, or eventually through direct stimulation may encourage it to be more "playful" and to escape its normal ruts.

In the not too distant future, we may not have to rely on nature to produce the one-in-a-million combination [of a high IQ and creative insight], and be able to produce it at will on many if not all neural substrates.

h+: What are some of the issues (legal, societal, ethical) that you anticipate for such technology?

BK: My own opinion is that — except in the case of minors — we must let an informed public make their own choices. Any government-mandated set of rules will be imperfect, and in any case will deviate from the needs and desires of its individual citizens.

What we in the neuroengineering community should be pushing for is a comprehensive *freedom of thought* initiative, ideally enshrined as a constitutional amendment rather than as a set of clumsy laws. And we should be doing so sooner rather than later, before individual technologies come online, and before we allow the "tyranny of the majority" to control a right that ought to trump all other rights.

h+: What is your vision for the future of cognitive enhancement and neurotechnology in the next 20 years?

BK: Ultimately, we want to be free of the limitations of the human brain. There are just too many inherent difficulties in its kludgy design — provided by evolution — to make it worthwhile to continue along this path.

As I describe in my book, *Neuroengineering the Future*, these kludges include:

- Short-term memory limitations (typically seven plus or minus 2 items),
- Significant long-term memory limitations (the brain can only hold about as much as a PC hard disk circa 1990),
- Strong limitations on processing speed (although the brain is a highly parallel system, each neuron is a very slow processor),
- Bounds on rationality (we are less than fully impartial processors, sometimes significantly so),
- Bounds on creativity (most people go through their entire lives without making a significant creative contribution to humanity), and perhaps most significantly...
- Bounds on the number of concepts that can be entertained in consciousness at once (some estimate that the bottleneck of consciousness restricts us to one plus or minus zero items!).

The alternative is to free the mind from limitations of the brain by the addition of prosthetic devices and ultimately uploading it into digital form. While it is unlikely either of these (and especially the latter) will occur in the next few decades, this remains the ultimate goal of enhancement. Both processing speed and memory will be the most immediate beneficiaries of such developments, but the truly significant gains will involve the types of processing that will be possible.

Freeing the mind from this limited, albeit remarkable, organ will allow us to manipulate thought directly, and this will produce the most gains in intelligence, creativity, and in achieving harmony with other sentient beings and the universe as a whole. ④

RESOURCES ↴

Neuroengineering the Future: Virtual Minds and the Creation of Immortality, Bruce Katz
<http://www.amazon.com/Neuroengineering-Future-Creation-Immortality-Computer/dp/1934015180>

THE NEUROLOGY OF SPIRITUAL EXPERIENCE

A Conversation with Andrew Newberg

Steve Kotler



The science of spirituality has become something of a hot topic in the past few decades. Some of this may be because the absolutist rational materialism that dominated much of the twentieth century has given way to something slightly more flexible. But mostly, it is because we finally have the advanced imaging technology — fMRI and SPECT scans and the like — to actually peer inside the brain and find out what is going on during so-called spiritual experience. No one has peered deeper than the Director of the Center for Spirituality and the Mind at the University of Pennsylvania, Dr. Andrew Newberg. During his career, Newberg examined the brains of Tibetan monks during peak meditation, Franciscan nuns during ecstatic prayer, Evangelicals in the throes of glossolalia — all with an eye towards understanding how brain function produces mystical experience. His books include *How God Changes Your Brain: Breakthrough Findings from a Leading Neuroscientist* and *Why God Won't Go Away: Brain Science and the Biology of Belief*.

h+ talked to him about what he's learned...



h+: You've written five books now about the science behind spiritual experience — how has your view of religion evolved along the way?

ANDREW NEWBERG: I actually don't know if it's changed that much. I started out trying to answer some big questions about the nature of reality. I've certainly developed a deeper respect for the immense variety of spiritual experiences and for the nature of belief — but at the core I'm still trying to answer those questions.

h+: What are those questions?

AN: The most basic question is what is the fundamental nature of reality and how do we come to experience it. The problem is that we have a block between how we perceive the world and how the world really is. We're trapped by our brain, by our inability to get beyond our thinking and perception. Now, in my research, I've found people who have profound spiritual experiences often describe those as being beyond objectivity and subjectivity. A great many people describe mystical experiences as "more fundamentally real" than everything else they experience. Well, what does that mean? I think it means that in trying to answer this question we need to take into account both the science and the spirituality, that we can't just dismiss the latter because it makes us uncomfortable as scientists. And this has led to other questions — like why are there all these different religions? Which one is right, which is wrong? Do they have different effects? Do they all do the same thing? And what can any of this tell us about what is actually real?

h+: In *Why God Won't Go Away*, you detail an explanation for what Aldous Huxley called the perennial philosophy — that feeling of unity or oneness with everything. How does that work?

AN: During spiritual experience there's a lot going on in the brain and some of that takes place in the parietal lobes — the part of our brain that's responsible for creating our sense of self. This is the part of the

brain that manages the distinction between self and the other. Certain meditative practices appear to block information to this area, which turns off our ability to make that distinction. Once we can no longer draw a line and say this is where the self ends and this is where the rest of the world begins, the brain concludes, it has to conclude, that at this moment you are one with everything.


h+: In your new book, *How God Changes Your Brain*, you argue that religious fundamentalism can actually be good for you. How do you figure?

AN: It really depends on the nature of the belief. Fundamentalism, per se, isn't bad or good. It all depends on the nature of one's beliefs. We've found that if one's beliefs are positive and loving and compassionate that can have a very profound effect on one's health and happiness. But the opposite is true. If you believe in a punishing god, or if that fundamentalism preaches hate and anger — then the effects are going to be bad. Anxiety levels will go up, a stress response can occur, and like any stressor, if that continues for long enough, it's going to impact health outcomes in a negative way. The real point is that what we believe has a very direct effect on the quality of our lives and we need to remember that.

h+: In your new book you also talk about eight ways to train the brain for better living — what are those ways and what are the result

AN: Some of our ideas aren't anything you wouldn't hear from a motivational speaker — like keep focused on positive concepts. It's better if you can try to focus on the feelings behind the words, but we've also found that the brain automatically makes connections between words like love and joy and compassion and the underlying emotion and this alone has positive benefit. We've found that some form of meditative/contemplative practice — anything that creates a state of





quiet alertness — is also hugely beneficial. One of our ideas, that's a little outside the norm, is that yawning — doing it consciously — can wake the brain up. This may happen because air taken in during a yawn cools the brain, but yawning seems also to be some kind of social signal so it wakes up the part of the brain that handles our social networks and this too can have a positive benefit.

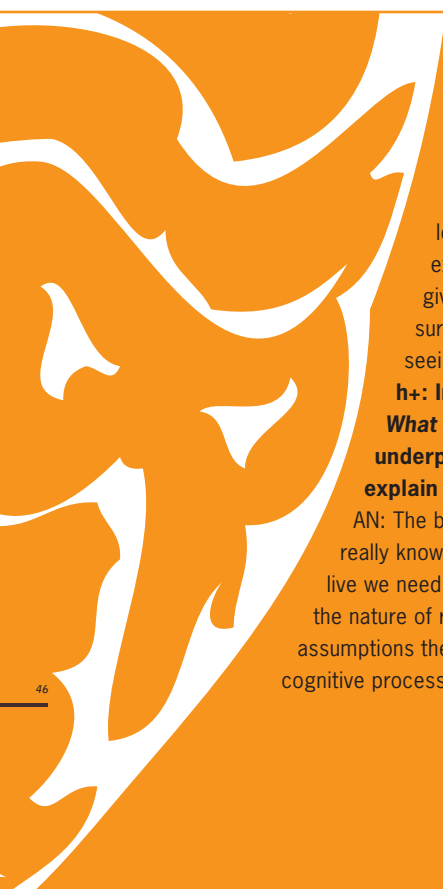
h+: You're the only neuroscientist to study speaking in tongues. What did you discover?

interactions. They all mingle within the brain to become the beliefs we'll use to navigate through our lives and our world. We desperately need these beliefs to survive, but they are actually very tenuous and often built out of inaccurate or incomplete information. We really need to take a deeper look at this, at all of the beliefs we hold — beliefs about religion, morality, politics, social interactions — and determine where they come from and how limited they actually are.

h+: You've looked deeply into the relationship between health and religion. What have you learned?

AN: That there's a strong association on many levels. Not that this should be too surprising. There's now a whole body of work that shows that some forms of spiritual practice can have

The brain is trapped within itself. So we never really know what is really going on out there.



AN: The most interesting thing we discovered is that unlike almost every other spiritual practice we studied so far, glossolalia is associated with decreased activity in the frontal lobes. This is the exact opposite of meditation. The frontal lobes help focus the mind, but people who experience speaking-in-tongues talk about giving themselves up to the experience, surrendering to it, and that's what we're seeing in the brain as well.

h+: In your earlier book, *Why You Believe What You Believe*, you look at the underpinnings of, well, belief. So how do you explain it?

AN: The brain is trapped within itself. So we never really know what is really going on out there. But to live we need to make all sorts of assumptions about the nature of reality just to govern behavior. The assumptions themselves arise from our perceptions, our cognitive processes, our emotions and our social

powerful health effects. There are studies that show religious people have less depression, lower levels of anxiety, better health outcomes, lower disease risk — the list goes on. The real problem is teasing apart the data. We know that social interaction — which you get from going to temple or church — can impact one's health. We also know that if you go to a church that tells you not to drink or smoke or have multiple sexual partners, obviously, if you follow those dictates, that's going to also impact one's health. Others have found the same thing is true for prayer and meditation. And then there's the power of the beliefs themselves. So the real question is which of these things is having the biggest impact. But even before we get to that answer — which may be a ways off — we already know that religion has huge health consequences and those should really be taken into account when we think about things like national health care. After all, many people turn to religion to help cope with a variety of health and life problems.

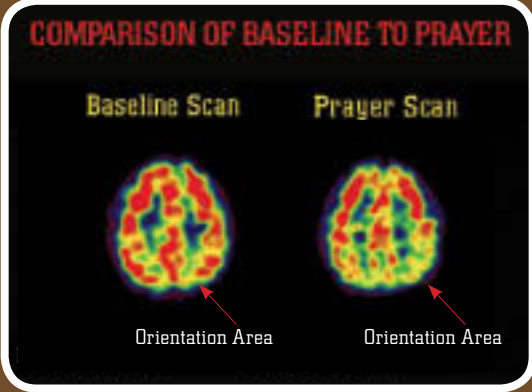
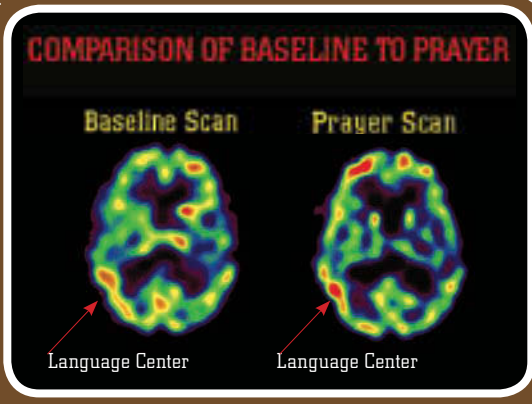
h+: You've also worked on the neuroscience of forgiveness. How does that work and how does that — in lieu of the turn-the-other cheek-isms in so many religions — effect our spirituality?

AN: It seems like forgiveness comes into play in the context of self and how the self relates to the world. We make the argument that in order to forgive someone else you first have to retool your notion of self to one that starts to see the damage done (by whatever action caused this need for forgiveness) as part of a new self. Essentially you need to reinvent yourself whenever you forgive, to create a new version that can transcend the older, now damaged, one.

h+: What has all this work taught you about human consciousness?

AN: It's taught me that our normal sense of consciousness is a limitation. And if we want to truly understand consciousness we're going to need to somehow get outside of it to answer any of the real big questions. How to do this is the question, but I definitely believe we're going to have to find a way if we really want these answers. ☺

Steven Kotler is the author of *West of Jesus: Surfing, Science and the Origins of Belief*, *The Angle Quickest for Flight* and the forthcoming *A Small, Furry Prayer: Dog Rescue, Animal Altruism and the Meaning of Life*.



The images were obtained during an ongoing study of the neurophysiologic correlates of meditation.

Briefly, we have been studying highly-experienced Tibetan Buddhist meditators using a brain imaging technology called single photon emission computed tomography (SPECT). SPECT imaging allows us to image the brain and determine which areas are active by measuring blood flow. The more blood flow an area has, the more active it is. The images show the results from a baseline scan (i.e. at rest) on the left and during a “peak” of meditation on the right. Two sets of images were taken, showing slightly different parts of the brain. **The first image** shows decreased activity in the parietal lobe (lower right shows up as yellow rather than the red on the left image) during meditation. This area of the brain is responsible for giving us a sense of our orientation in space and time. We hypothesized that blocking all sensory and cognitive input into this area during meditation is associated with the sense of no space and no time that is so often described in meditation. **The second image** shows that the front part of the brain, which is usually involved in focusing attention and concentration, is more active during meditation (increased red activity). This makes sense since meditation requires a high degree of concentration. We also found that the more activity increased in the frontal lobe, the more activity decreased in the parietal lobe.

The first set of images (Prayer1) demonstrates increased activity in the frontal lobes (same as Buddhists) but increased activity in the inferior parietal lobe (the language area). This latter finding makes sense because the nuns are doing a verbally-based practice (prayer) rather than visualization (Buddhists). **The second set of images (Prayer2)** shows that the nuns, like the Buddhists, also decreased the activity in the orientation area (superior parietal lobes). A more thorough description of the results from this study can be found in the books by Andrew Newberg entitled, *How God Changes Your Brain* (Ballantine, 2009); *Why We Believe What We Believe* (Free Press, 2006); and *Why God Won't Go Away* (Ballantine, 2001).

RESOURCES ↓

Andrew Newberg Homepage
<http://www.andrewnewberg.com>

Andrew Newberg Books
http://www.amazon.com/s/ref=nb_ss_gw_1_10?url=search-alias%3Daps&field-keywords=andrew+newberg+m.d&srefix=Andrew+New



CYBORG

BUDDHA

SCIENCE AND SPIRIT

MICHAEL LATORRA

Post-Modern Koan: "Does a cyborg have Buddha-Nature?"

Post-Modern Response: "Well, duh!"

BRAIN SCIENCE REVEALS HOW MEDITATIVE STATES OF BLISS AND PERSONAL TRANSFORMATION CAN BE ACHIEVED WITHOUT RELIGIOUS BAGGAGE.

Science and spirituality in Western civilization began to go their separate ways centuries ago, when astronomy, biology and other observational and experimental disciplines showed in no uncertain terms that the religious world-view inherited from the Bronze Age religions of the Middle East did not correspond to the world that could be measured. The Earth most definitely revolves around the Sun, and not the other way round.

Prayer, meditation, chanting, fasting, contemplation of sacred images and the ingestion of mind-altering substances have been prescribed for spiritual aspirants for millennia. What's new is our present capacity to scientifically examine the physiological and neurological correlates of spiritual experiences. Until scientific studies had been conducted, spiritual states were often dismissed by much of the scientific community as being unhelpful to leading the good life as reason understood it. At best, prayer and meditation might have been allowable as some sort of coping mechanism for dealing with stress, fear and depression. So these practices were deemed to be something akin to autohypnosis or merely comforting self-delusion. They certainly could not produce physical changes or long-lasting psychological improvement. Or could they?

Today there is a growing volume of hard scientific evidence that contemplative practices produce measurable, benign changes in the brain as well as in subjectively reported moods and observed behaviors of practitioners. Meditation has been shown to lower blood pressure, increase the ability to focus attention, and make people feel happier. All this can be achieved with or without any supporting framework of justifying religious beliefs. Atheistic philosophers and scientists such as Sam Harris and Patricia Churchland practice meditation regularly.

Machines to measure brain activity as well as other physiological processes were crucial to proving the case that meditation has real value. The next step is to develop technology that can facilitate or even induce the states that meditation produces, but without the need for years of patient practice.

Can a machine deliver bliss? Can technology induce Enlightenment? And can a man-machine hybrid, a cyborg, become Buddha?

My answers are: Yes. Maybe. And... of course!

The blissful states exist in a range. Everyone has experienced

at least the lower levels of this range, whether by accident or design. The higher levels are not so easy to reach, although instructions for doing so have been available for millennia. Pharmacological substances grant temporary access to some bliss states, but with significant cost to the body in the form of side effects and after-effects (not to mention certain legal issues). Learning to meditate your way to bliss takes longer but is more controllable, yet it also takes a toll on one's brain chemistry with consequent after-effects. In any case, easy access to the bliss states via machines projecting targeted electromagnetic fields will soon be widely available. However, even there, side effects and after-effects still warrant caution.

Enlightenment (which should actually be called Awakening) also comes in a range of levels. Essentially, it is like a fourth state of consciousness beyond normal waking, dreaming and deep sleep. Enlightenment/Awakening is a special type of understanding, analogous to what occurs when you understand anything: a puzzle, a theorem, etc. Except in the case of Awakening, one understands the nature of all possible experience and the hollowness of the ego-self idea.

The gradual enhancement of the human body through mergers with machines will yield a hybrid: the cyborg. Any sufficiently complex system (like a human or an advanced AI computer) that exhibits awareness can realize Enlightenment. So I believe. This claim must still be tested for AIs. Cyborgs, however, can certainly attain anything accessible to humans and even more.

Working toward understanding how these developments may be brought about, and what impacts they may have, are goals of the Cyborg Buddha Project of the Institute for Ethics and Emerging Technologies. Our project aims to promote discussion of the impact that neuroscience and emerging neurotechnologies will have on happiness, spirituality, cognitive liberty, moral behavior and the exploration of meditational and ecstatic states of mind. All are welcome to participate in this great adventure. ☸

IEET Board member Michael LaTorra [mlatorra@gmail.com] is an Assistant Professor of English at New Mexico State University, a Zen priest at the Zen Center of Las Cruces, and author of A Warrior Blends with Life: A Modern Tao. He runs the Trans-Spirit list promoting discussion of neurotheology, neuroethics, techno-spirituality and altered states of consciousness.

RESOURCES ↘

IEET Cyborg Buddha Project
<http://www.ieet.org/index.php/IEET/programs>

Trans-Spirit. Online discussion group
<http://www.yahogroups.com/group/trans-spirit>

Daniel Ingram's Dharma Web Site. [How meditation is talked about, taught, shared and practiced that draws from the best.]
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<http://www.fourthawakening.com/index.php>



THE
CULTURAL
TRANSFORMATIONS

ARTS



THE
CULTURAL
TRANSFORMATIONS
ARTS

MICHAEL GARFIELD



Transhumanism in a fortune cookie: the familiar human world is just one point along a continuum of evolution, and we have an unprecedented

capacity to participate in that process. And yet, the future being as slippery as it is, there are as many visions for how this might occur as there are visionaries to guess at it. Computer scientists tend to have one transhumanism; genetic engineers, another. However, coherent themes emerge for those who have taken it upon themselves to make a sweeping survey of human inquiry, integrating a keen reading of the vectors of our technology with postmodern insight into the nature of mind.

Some of these thinkers have been catalyzed by the psychedelic experience — in a way, the most informative window into a world beyond the human that we have yet discovered. They understand the message of psychedelics and the message of technology to converge on the horizon of a deeper reading of reality that recognizes mind and matter as dimensions of the same truth — a truth for which language has ill-prepared us.

Among the ranks of these “psychedelic transhumanists” are legendary rebels like Timothy Leary, wise fools like Terence McKenna, cultural commentators like Erik Davis and Mark Pesce and avant-psychofarmacologists like David Pearce. Hailing from disparate knowledge domains, they all share a hyperliterate intelligence that is, in its own way, rigorous. Their arguments are not necessarily subject to the conventional scientific method, but they are not so easily refuted.

Their common vision shares much with the rest of the transhuman community, including an embrace of technology and science as both

potent and inevitable; an evolutionary model of the universe and humanity; a sense of the human organism as something that can be tinkered with and expanded; a recognition of drugs as a technology that can dramatically reinvent identity, and a playful challenging of fixed boundaries. In many ways they demonstrate the seed of transhumanism in this moment by exemplifying self-revision and the reevaluation of assumptions as an open ended and ongoing process. And along the way, they tatter the mechanistic control fantasies we have held onto in spite of our most sophisticated inquiries.

Among these visionaries, we find a general agreement on the emergence of machine intelligence, but from a less dualistic perspective than most in the transhuman sphere — leaning towards a deeper and more balanced recognition of both inner and outer realities. They tend to critique philosophies that consider mind a mere epiphenomenon, or that fail to recognize the role of the speculator in speculation.

They see technology as ideas, and ideas as technology. They question our fanatical efforts at control via the runaway complexity of progress, and remind us of the stubborn persistence of the unconscious, the body and the other. They remind us to see the evolution of humanity and beyond as much in terms of qualia as quanta, and paint the future as more sensitive to psychological, spiritual, ethical, and biological concerns than those on the hardboiled tech edge.

The distinctions between this vision and the more common idea of a technological singularity are easily distilled. In their own words, presented as a “virtual conversation” of transcripts and correspondences, here are the core messages of a transhumanist vision informed by the psychedelic experience.

> Medium is message, and information is psychoactive.

Information is a more fundamental substrate of reality, an implicate order. “Pattern” replaces “matter.”



Timothy Leary: I'm a great follower of a man named Marshall McLuhan who wrote those wonderful books about communication. He said that if you want to change a culture, if you want to change yourself, if you want to change religion, change the medium, the mode of communication. He said that Gutenberg created Protestantism where he had the mass-assembled book, where everybody can read. And now the new form of communication is electronic....

Terence McKenna: The realization that has flowered in the wake of the internet and the rise of cybernetics is that everything is made of information. Information is the primary datum of being. Concepts like time and space and energy are orders of magnitude removed from the present at hand when compared with a concept like information. Every iota, every bit of information that passes through us, changes us.

Mark Pesce: If you took a picture of this room in 1990 and you took a picture of it today, everything would look exactly the same and yet

everything is completely different. Because in 1990 we didn't have this layer of bits that's flowing seamlessly among all of us. And it's changed us. It's radically sped up the way we deal with information in society. And every bit of information that passes through you changes you. You cannot be unaffected in any way by any bit of information. So the internet is acting as this enormous accelerator....

Erik Davis: Information came to be seen as an abstract, almost transcendental stuff that could "circulate unchanged among different material substrates." Once we begin to believe that information is more essential than material forms, we vacate the old cosmos defined by presence and absence, entering a world characterized by the binary feedback of pattern and randomness, signal and noise.

> This accelerating knowledge leads to widespread acceptance of all reality as virtual... and that it has always been this way.

The transhuman age is simply making this inescapably obvious. Aldous Huxley's descriptive "far antipodes of the mind" (He used the phrase in a discussion of his mescaline experiences) and their real ecologies is the intellectual progenitor of *The Matrix*, and of a pragmatic relationship to the questions of ontology.

McKenna: The minute I understood the concept [of virtual reality] I knew... that this would be the next great thing. As a tool of art. As a tool for leading us beyond the notion that we are a hive society of advanced primates, because that's how we visually appear to the empirical point of view. That's an out-of-context description of what we are. It's like a schematic or an aerial map. What we really are is a community of mind, knitted together by codes and symbols, intuitions, aspirations, histories, hopes — the invisible world of the human experience is far more real to us than the visible world, which is little more than a kind of stage or screen on which we move. The purpose of VR is to show us aspects of reality that are not artificial, but that are fields of data not ordinarily coordinated by ordinary perception.

I see virtual reality not as a way of escaping the notion of empirical

reality, but as a way of re-portraying invisible levels of the given world that are very vital and important to us: how we see flows of energy, how we understand complex economies, how we understand the fractal hierarchies of nature....

What is already co-present with three-dimensional reality is being literalized... but being literalized in timescales that make the nature of the game apparent to all but the dullest among us. I mean after all, we have always lived in virtual realities, ever since we abandoned nomadism and defined a polis and a wilderness.

Davis: Media have long sought to create immersive spaces of fictional reality: Baroque cathedrals, 19th century panoramas, even, perhaps, the Paleolithic caves of Lascaux or Altamira. Today, the accelerating perceptual technologies of media are on a collision course with cognitive science and its understanding of how the human nervous system produces the real-time matrix we take for ordinary space-time.

Pesce: My first experience of virtual reality happened in 1990 and required absolutely no technology except about 500 micrograms of LSD-25. And what I found in this virtual world, the thing that I must have suspected I would find in this virtual world, wasn't an artificial Tron-like environment. It wasn't something that was entirely artificial. What I beheld in that environment was an image of the planet, as if I was cruising above it in a spaceship. And I knew that part of my own destiny as connected with virtual reality wasn't to escape into another dimension, but to find a way to make real to us the things that we can't always see, because we exist at a level of scale, of experience, that hides them from us.

Where we're going, the simulated and the real are going to get really blurry. And we don't have any tools of mind. Western culture, which is based on this objective external reality — it's not hard, it's all become very soft, and it's all flowing together. So we need to now start to find ways of describing what's going on. And so what we need to do — I found in my own investigations — is to take a look at cultures that describe the world magically, that understand that perception shapes what you are, and you shape what you see. And that they're not separate areas, they're not separate domains, and you have to consider them as a whole.

My own explorations had led me to understand that in fact, in a world where anything you want is true, the only way to deal with this is by learning how to deal with your will. Dealing with will is what magic has, in all cultures, always been about. This is why the shaman doesn't go insane when the world just disappears — they're ready for it. Because they understand that where they are isn't bound up in their idea of the world.

> Prioritizing information over matter makes the issue of machine sapience irrelevant.

Consciousness of the other is an intractable mystery even between two people. It's a mystery we can sidestep, if we grant awareness by degree.

Davis: I think that we're going to find ourselves relating interpersonally with machines, whether or not they're actually alive or conscious in a way that scientists can debate about, we're going to be interacting with things that have those qualities.

That's going to change the way we're going to experience life and other people. I think we'll come to meet future artificial intelligences in the personae of animated characters, on a pop culture level. There's an element of animism in technology now that's going to increase — in scientists exploring artificial life, kids interacting with intelligent dolls, in the relationship between ecology, technology and the environment — it all comes down to a growing element of animism, throwing us back to being Palaeolithic man living in a world of animated nature.

Pesce: Each one of us grew up in a world where people and pets were invested with a certain internal reality that bricks and blocks obviously did not possess. This is not true for our children.

With Furby we have crossed a line in the sand, and there's no going back: the current generation of children, comfortable with the in-betweenness of Furby, have a growing expectation that the entire material world will become increasingly responsive to them as they learn to master it.

> The emergence of "artificial" intelligence is a process of symbiosis, transcendence via inclusion, and the posthuman integrates the human, rather than dissociating from it.

Evolution proceeds by including prior forms in novel structures of higher complexity... likewise, the biological will likely be taken up into the embrace of intelligent machines. There is no precedent in evolutionary history for the "leaving behind" of evolutionary precursors. Bacteria and barter still exist, both independently and as elements of more complex organisms and economies.

Pesce: These are prosthetics, these machines, or perhaps, looking the other way around, we are theirs, but neither can really exist without the other. So this "rise of artificial intelligence" is a misapprehension. The rise of intelligence, however — that seems historically inevitable.

Intelligence cannot be made. Intelligence can only be grown. And that means that in essence the machines are no different than ourselves. These are not our masters we're talking about. These are our children. And how can we not help but love our children? How could they not help but love us?

We can draw a line between ourselves and our machines no more easily than I can draw a line between myself and my eyeglasses.

> Blind faith in technological progress as salvation is called into question, especially as regards the illusion of, and desire for, absolute control.

Psychedelic transhumanism acknowledges the stubborn reality of the body. Our visions of the future are themselves products of our extended phenotype and evolutionary psychology and thus do not merit wholesale acceptance. Absolute control is an illusion, the consequence of ignorance about the nature of the emergent processes by which life and mind come into being.

McKenna: Our technologies... are obviously lethal I would say, but they are fortunately a kind of chrysalis of ideological constraint that technology is in the process of dissolving. William Butler saw this in the 19th Century, Teilhard de Chardin reached it in the forties and the fifties McLuhan expressly articulated this vision in the fifties and the sixties.

Everything is about to get very much more complicated, much larger, the number of choices are about to exponentially explode. In a sense, these technologies point us toward, if not literal godhood, then a kind of fictional godhood. We are all going to become the masters of the narrative in which we are embedded. Our separate stories are going

person say about the nature of visual experience? For the congenitally blind, more illuminating than intelligence-amplification is the gift of sight.

I think it's fair to say the transhumanist community is mostly interested in intelligence-amplification — superintelligence rather than supersentience. I share an interest in cognitive enhancement, but in my opinion there is an important sense in which a congenitally blind person with an IQ of 220, or 920, is just as ignorant as a congenitally blind person with an IQ of 120. I worry more about our ignorance in the latter sense than I do about our

Given an imperfect knowledge of the future, we have to be careful that transhumanism does not lapse into merely commodifying the unknowable, playing to people's drive for immortality and pleasure as a meme in competition with the satisfaction of more immediate concerns. If transhumanism is understood as faith in our transcendental potential, then wisdom is a technology and real transhumanism starts now.

Davis: How do we live with creative intelligence and awakened senses in a groundless world beyond our control?

McKenna: Everything is about to get very much more complicated, much larger, the number of choices are about to exponentially explode. ”

to take on dimensions so multifarious that for all practical purposes we will each move into a cosmos of our own creation and control.

Attention becomes the limiting factor in an ecology of mind. And with finite attention and infinite possibility, the vast majority of whatever world in which we find ourselves will remain beyond our dominion.

New technology not only liberates new realms of expression, exploration, identity, and ethical depth but pushes the world ever-farther from our ability to control it. This is a simple property of complex systems, as much a fact of existence as anything else.

David Pearce: I think discontinuities in our normal state of consciousness lie ahead that exceed the gulf today between waking and dreaming consciousness. That which can't even be discussed today because we lack the necessary "primitive terms" may well be the most important. What can the congenitally blind

limited reasoning powers. Psychedelic drugs can briefly give us a tiny insight into how "blind" we normally are; but we soon lapse into ignorance again. Such is the state-dependence of memory. If I'd never tried psychedelics, then I fear I would be scornful of their significance because of the incoherence of most users' descriptions of their effects. But using the blindness analogy again, someone congenitally blind who is surgically guaranteed the gift of sight can take years before they can make sense of the visual world... at first they are overwhelmed and confused by visual stimuli.

We are linguistically unprepared to address the incredible diversity of perspectives that seem poised to bloom from increasing disparities in bodymind configurations and deepening strata of developmental levels within each of those continua. Claiming to know how these trends will ultimately manifest themselves in the world is what Leary called "caterpillar fantasies about what post-larval life will be like."

Behind the veneer of objective medicine, psychopharmacology is simply offering its own resolutely philosophical answer to the eternal problem of human suffering: Use technology to control its symptoms. The posthuman self is a self on drugs — SSRIs, hormones, brain boosters, neurotransmitters. We have entered an era that sanctions the psychoactive use of commercial chemicals, not just to cure disease or even to relieve suffering, but to reformat who we feel we are.

It's likely that people will become ever more comfortable with the notion that unpleasant (and unproductive) psychological states are simply bad code in the Darwinian bio-computer. And once you're comfortably ensconced inside that materialist cosmology, where meaning is secondary to mechanics, there is no particularly compelling reason (other than medical fallout) not to debug the mind with consumer molecules.

The paradox is that these mechanistic molecules can produce deeper, more authentic selves. People on SSRIs often describe themselves as finally feeling like normal people, like the person they were meant to be. This paradox... lies at the heart of the posthuman condition.

If one thing makes itself apparent from the psychedelic experience, it's that the more you know the more you don't know, and admitting this is a form of death. The acceleration of intelligence and extension of the individual lifespan means that life itself will increasingly come to resemble a constant re-imagining of self — not the indefinite perpetuation that many of us desire, but an ongoing process of death and rebirth. And by its very nature, death is across the event horizon, an impenetrable unknown.

Davis: If I choose to automatically curb a basic dimension of my interior life with a targeted chemical, haven't I implicitly adopted a highly constricted model of what constitutes "the self"? Rather than embrace these new feelings of relief as the "real me," someone who modifies their everyday personality with pharmaceutical products must identify with the "I" that chooses to instrumentally control its states of mind.

Most advertising is aimed at the Controller, that portion of self that wants to expand its ability to manipulate the world in order to achieve its goals. Psychiatric drugs, though, add a crucial twist. When [pharmaceutical companies claim that their drugs] can "help you handle it," the "it" in question is, in the end, nothing other than a now alienated portion of you.

That's OK if the goal of your life is simply to feel as good as possible for as long as possible. But happiness and freedom may ultimately depend less on maintaining particular states of mind than on cultivating the appropriate attitude toward whatever states of mind arise out of the elegant

chaos of life. And it seems to me that control is not the attitude to hold in the long run.

> Seeing the unconscious as persistent and progress as a dialectic leads to the ethical imperative of what can be generally understood as "heart"... a consequent sense of responsibility and a call for coherent and mature visioning of a future upon which we can collectively agree.

Ultimately, a transcendental future does not simply fall on us but is something we collaboratively construct in every moment.

Leary: A renaissance preaches a basic religion of humanism. The aim of individual life is to know yourself and treat each other as human beings....

Davis: Work like that at Princeton University, measuring fields of human consciousness — for example when lots of people focus their attention on sporting events — suggests that it might actually matter what we think about. Then you look at... how technology allows certain kinds of imagination such extraordinary power. I think we've lost the tools to navigate these worlds the old-fashioned way, we're almost rending the physical body, spending more and more time in that kind of etheric space, with no idea what we're doing, and the fact that this is going to have real world consequences is kind of obvious.

Of course the whole world has always been interconnected, and everyone depends on the world around them, but we tend to feel that we're outside of that, that we're individual subjects, that we have control over nature. So it's almost like a return of the repressed — we want that back again, we need it back if we're going to deal with sociological and ecological problems.

Pesce: Even as we talk about this gnostic release, this uploading of the soul into some sort of

silicon... there's this body that's behind, sort of bitching, saying "I am real. And I am the potential, I am the ground in which you work."

The question of the body is one of the largest questions in virtual reality. Where is the body in cyberspace? Where are you when your email is flashing across the net, when your agents are doing your bidding? Where are you, and how do you maintain your self?

Psychedelics can produce these boundary dissolutions where you flow into another thing. What we're going to see, and it's actually quite true, is that certain types of VR can produce the precisely same affect. There are zones where virtual reality can be very dangerous for that reason, or incredibly powerful and meaningful for that reason. So... I really want to work from the heart.

I personally think in my own philosophy that to work in technology, you have to work from the heart center. Because otherwise you'll create golems, you'll create Franksteins, your creations will run away from you. That's the essence of the story of the golem — that this is a creature that was created with the breath of life but without the light of knowledge or the heart. The heart of God.

I also want to explore the joyous nature of what we can do. One of my biggest gripes about the internet is that it can't, as yet, contain the tenor of human emotion which is so important. If we're building this edifice to be the global mind and it can't laugh, we've got a big problem. If it can't sing, we've got a big problem.

McKenna: And what we're talking about here is using technological prosthesis to extend and enrich humanness, to enrich communication, and it is, believe me, the want of good communication.

Terence McKenna: I'm seeing here almost a theosophical epiphany of language trying to bootstrap itself toward realms of platonic perfection.

If anything undoes us, this will be it: that our languages fail, that we misread each other's intent, that we could not understand each other.

So I'm seeing here almost a theosophical epiphany of language trying to bootstrap itself toward realms of platonic perfection, which as organic beings we experience as Love. Love, Beauty, Truth — these are the vectors of human becoming. They always have been, they always will be, and the technologies that open these paths for us are no more and no less powerful than the human beings that wield them. So this is an enterprise of integrity and millennial implication, and what lies as the goal is true humanness, in sympathetic symbiosis with the planet, and with these strange children that we have brought into the world, our machines. That is the challenge at the end of history.

As we approach the event horizon, the only mature response is a humble participation in its unfolding mystery... which involves a deep scrutiny of our assumptions that the future will be the modified present, that the posthuman will be merely "humanity plus."

We think we make the future. But it is equally true that the future makes us, to the degree that our thoughts of the future constitute our minds in this moment, and these minds constrain our experience both present and forthcoming. The fantastic power of language and information upon which the psychedelic transhumanists agree enthrones humble and compassionate intent as a crucial touchstone in our construction of a posthuman ecology of minds. The prevailing theme is that while we may not understand what we are, or are becoming, one thing is clear: We're all on this trip together. ☺

RESOURCES ↘

Erik Davis

"The Posthuman Touch"
<http://www.techgnosis.com/chunkshow-single.php?chunk=chunkfrom-2005-07-21-1346-0.txt>

"Take The Red Pill."
<http://www.techgnosis.com/redpill1.html>

"The Matrix Way of Knowledge"
<http://www.techgnosis.com/matrixre.html>

"Technomancer"
<http://www.techgnosis.com/chunks.php?cat=phantasy&sec=articles&file=chunkfrom-2008-01-22-1647-0.txt>

Timothy Leary

Interview with Skip E Lowe
<http://www.youtube.com/watch?v=Zkv-IFHQjFI&feature=related>

The Eightfold Model of Human Consciousness
http://www.nii.net/~obie/8_larvals.htm

Mark Pesce
Becoming Transhuman

Part 1
<http://video.google.com/videoplay?docid=4291550723579995591>

Part 2
<http://www.viddler.com/explore/mpesce/videos/11/>

Part 3
<http://www.truevo.com/Becoming-Transhuman-part-3/id/850238096>

"Toys and the Playful World"
<http://hyperreal.org/~mpesce/WIT.html>

Terence McKenna Land
<http://deoxy.org/mckenna.htm>

Terence McKenna & Mark Pesce
Dialogue at Esalen Center
<http://www.youtube.com/watch?v=VPrfDACDccw&feature=related>

<http://www.youtube.com/watch?v=l38faoCTyTE&NR=1>

David Pearce (Also interviewed in this issue of h+)
[Personal correspondence](#)

<http://hplusmagazine.com/articles/bio/post-darwinian-ethics>



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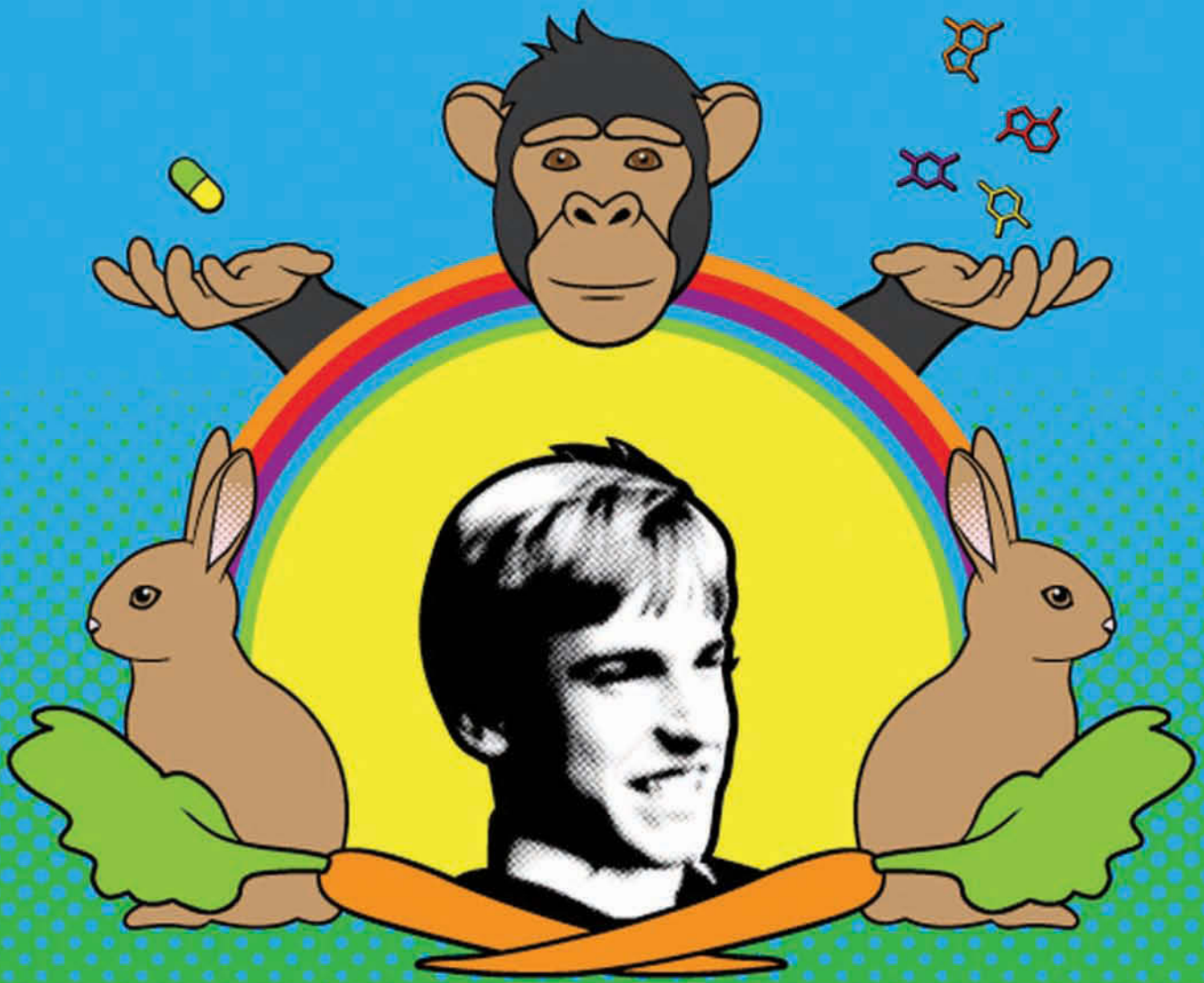
We want you to do your own research. Type "cryonics" in a search engine, or visit my website at rudihoffman.com to get you started.

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AN INTERVIEW WITH DAVID PEARCE
JAMES KENT



David Pearce
wants to end your
suffering. His manifesto
“The Hedonistic Imperative”

promises a future where humans live in high-functioning super-happy states devoid of pain and anxiety. For Pearce, the great shift to a hedonic society will come about by genetic intervention: “Gene therapy will be targeted both on somatic cells and, with even greater forethought, the germ-line. If cunningly applied, a combination of the cellular enlargement of the meso- limbic dopamine system, selectively enhanced metabolic function of key intra-cellular sub-types of opioidergic and serotonergic pathways, and the disablement of several countervailing inhibitory feedback processes will put in place the biomolecular architecture for a major transition in human evolution...”

Pearce’s intellectual embrace of paradise engineering places him on the cusp of a modern philosophical movement that eschews Darwinian fatalism and looks to a post-Darwinian future where humans are freed from the cynical bonds of genetic expression and natural selection. In a post-Darwinian future where we are empowered by technology to live however we choose, how will we choose to live? According to Pearce, when all is said and done we will simply choose to be happy.

A prolific writer who admits to typing with one finger, Pearce is a reserved man with precise and delicate sensibilities. As a third-generation vegetarian and an animal rights activist he seems like a man who literally wouldn’t harm a fly, and might even go out of his way to make sure the fly is having a good day. His intimate knowledge of cognitive theory, designer pharmacology, and genetic engineering make him a perfect candidate for a comic book supervillain, but his intentions are those of a living bodhisattva. And while Pearce can write at length about his philosophy and the future of the human race, he is very reserved and protected when it comes to talking about himself. One gets the sense that his genius and passion to abolish suffering comes from a place of deep personal sadness, but if that is the case he’s not letting on. The anguish of David Pearce, the man, is not important. But the words of David Pearce, the philosopher, make him the closest thing we have to a 21st century Buddha.



h+: Your philosophy of bringing an end to suffering echoes the goals of the Buddha. What provoked you to take the Buddha's philosophy to the most extreme interpretation?

DAVID PEARCE: "May all that have life be delivered from suffering," said Gautama Buddha. But is this scientifically feasible?

As a teenager, I read *The Selfish Gene*. Suffering exists only because it helps our DNA leave more copies of itself. I also stumbled across the electrode studies of Olds and Milner on the reward centers of the brain. Uniquely, the experience of pure pleasure shows no physiological tolerance: an important clue. Yet a whole civilization based on intracranial self-stimulation doesn't seem sociologically feasible. Only two other options struck me as viable: pharmacology and genetic engineering. It's hard to see how therapeutic drugs could abolish mental and physical pain altogether unless we're willing to medicate our children from birth. By contrast, germline gene-therapy can potentially deliver a cure.

Study of the genetics of mood disorders convinced me that we could edit our source code to recalibrate the hedonic treadmill. In principle, post-genomic medicine can genetically alter our "hedonic set-point" so we enjoy life-long mental health based on gradients of intelligent bliss. A new system of motivation may emerge. More practically, the imminent reproductive revolution of designer babies is likely to exert immense selection pressure in favor of "happy" genotypes.

Of course transhumanists have more ambitious goals than abolishing suffering. Thus I predict our super-intelligent descendants will be fired by gradients of bliss orders of magnitude richer than today's peak experiences every moment of their quasi-immortal lives. But getting rid of all (involuntary) suffering strikes me as the basis of any future civilization. I can't conceive anything more morally urgent.

h+: Growing up, what was the most intense suffering you had to endure, and would you retroactively erase the trauma of those memories if you could?

DP: Sadness can be very personal. So I'm going to be boringly tight-lipped. Sorry. I'll just say that in the future I think all bad memories will be selectively erased, or at least emotionally defanged after any valuable lessons have been drawn. Actually, I think all *mediocre* memories will be erasable too — and that includes everything from the Darwinian era. Memories of today's peak experiences will seem banal compared to the textures of everyday life centuries hence. Improved neuroscanning technology will shortly enable us to identify the molecular signature(s) of pure bliss and genetically "over-express" its substrates. Neuroscientists are already homing in on the twin cubic-millimeter sized "hedonic hotspots" in the ventral pallidum and nucleus accumbens of

the rodent brain. The equivalent hedonic hotspots in humans may be as large as a cubic centimeter. I suspect they hold the gene expression profile of what makes life seem worth living. If so, there is scope for refinement and intelligent amplification. Our uglier Darwinian emotions can be abolished. Then we can lead lives truly worth remembering.

h+: Isn't the goal of cessation of pain and suffering a bit wimpy? Shouldn't every organism be resilient enough to take some pain and suffering over a normal lifetime?

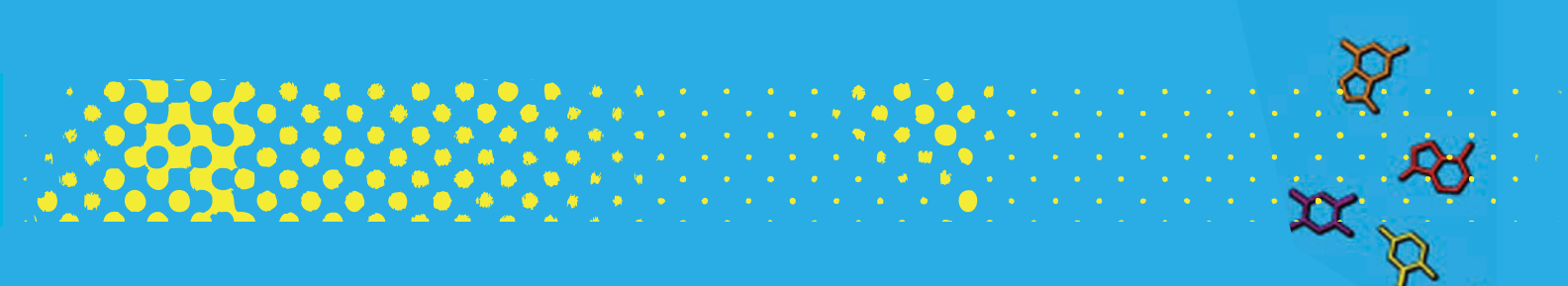
DP: Intuitively, one might indeed suppose that lifelong bliss would make us weak. Contrast, for instance, the Eloi with the Morlocks in H.G. Well's *The Time Machine*. In practice, the opposite is true. "That which does not crush me makes me stronger," said Nietzsche, but the best way to make ourselves stronger short of becoming cyborgs is to amplify our pleasure circuitry and enhance our capacity to anticipate reward. Experimentally, it can be shown that enhancing mesolimbic dopamine function doesn't just make us happier: it also enriches willpower and motivation. This is how novel antidepressants are tested: if effective, they reverse learned helplessness and behavioral despair of clinical depression, the plight of hundreds of millions of people in the world today. Regrettably, low mood is bound up with psychological and physical weakness, just as popular stereotype suggests. Superhappiness confers superhuman resilience. So enriching our reward circuitry promises to enhance our capacity to cope with stress and adversity even as their incidence and severity diminish. Biotech can empower us to become supermen — not in the callous sense of Nietzschean *Übermenschen*, since our enhanced empathetic capacity can extend to all sentient beings, but in the sense of an indomitable strength of mind. Sadly, millions of people today feel hopelessly crushed by life.

h+: How do you think the Buddha would feel about using technology like drugs or genetic engineering as a means towards ending human suffering?

DP: It's hard to reconstruct the psychology of a guy who has been dead for 2500 years. Yet Gautama Buddha's interest clearly lay in finding the most effective techniques to end suffering, not in delivering some God-given truth. Buddhism isn't like revealed religion. Gautama Buddha seems to have been pragmatic. Let's try what works. If presented with contemporary biotechnology, I doubt he'd insist we go through the traumas of thousands of rounds of rebirth. I think he'd embrace genetic medicine as a priceless gift and urge us to extend its use to ensure the welfare of all sentient beings, not just ourselves.

h+: You're an animal rights activist and a vegan. How do you think protein should be supplied in the future?

DP: Jewish Nobel Laureate Isaac Bashevis Singer described life for factory-farmed animals as "an eternal Treblinka": a world of concentration camps,



extermination camps and industrialized mass-killing. Strip away our ingrained anthropocentric bias, and what we do to other sentient beings is barbaric. Combating great evil justifies heroic personal sacrifice; going vegan entails mild personal inconvenience. The non-human animals we factory-farm and kill are functionally akin to human babies and toddlers. Babies and toddlers need looking after, not liberating. As the master species we have a duty of care to lesser beings, just as we have a duty of care to vulnerable and handicapped humans. As our mastery of technology matures, I think we need to build a cross-species global analogue of the welfare state.

Tentatively, I predict that next century and beyond “natural” meat will be reckoned no more legally or socially acceptable than a diet based on human flesh. Most people with a taste for the stuff may eat *in vitro* gourmet steaks and the like — cultured meat that will taste richer in flavor and texture than flesh from our butchered cousins. Genetically-engineered vatfood doesn’t sound appetizing under that description. But when “vegetarian meat” is properly branded and marketed, who will deliberately choose the bloodstained option if cheaper and tastier cruelty-free products are available? Estimating timescales for any worldwide changeover to a civilized diet is obviously tricky. Currently tissue scientists can’t culture anything tastier than mincemeat. Yet in theory mankind could make the transition to veganism mid-century or so as the switch to cheaper, healthier, mass-produced cultured meat gathers pace. I’m cynical enough to believe the cost issue will be critical, but I also believe (naively?) that moral awareness may play a small but significant role. Fortunately, the technology should prove scalable. In the meantime, anyone who wants to help accelerate the global transition to a cruelty-free diet might like to support New Harvest, the world’s first nonprofit research organization working to develop cultured meat.

h+: For some people, pain is their most intense form of pleasure, and in a world without suffering pain may become the ultimate taboo designer experience. By abolishing suffering, don’t we risk accidentally rebranding it as something trendy and desirable?

DP: Masochists don’t enjoy the raw pain of getting their fingers caught in the door any more than you or me. However, certain ritualized forms of dominant and submissive behavior can trigger endogenous opioid release that is acutely pleasurable. In the future, masochists and others who relish such “painful” activities can enrich the quality of their experience by editing out the nasty bits and enhancing the most rewarding. Nothing valuable need be lost. I don’t normally dwell on modes of post-human sensualism because I fear doing so risks undermining the moral seriousness of the abolitionist project. For what it’s worth, I think future sexuality will make today’s wildest eroticism seem like light foreplay.

h+: You use MDMA consciousness as a benchmark for bliss and empathy. But like alcohol intoxication, I’ve seen people on MDMA being very dismissive to people with real problems while thinking they were being empathetic and compassionate. Couldn’t being too happy in the face of real problems be considered a form of shallowness or self-delusion?

DP: Taking MDMA (Ecstasy) may be little better than glue-sniffing compared to mental health in an era of mature postgenomic medicine. But “empathogens” like MDMA are a reminder that not all euphorians promote selfish behavior. Ethically, it’s (presumably) preferable to seek heightened empathy and sometimes fail rather than not bother to empathize at all. MDMA-induced

intensity of emotional release also stands in contrast to the shallowness induced by “psychic anaesthetizers” like the ill-named SSRI antidepressants. Alas, you’re right to point out how the rose-colored spectacles of Ecstasy users don’t guarantee acuity of insight or accuracy of social perception. The “penicillin of the soul” is no magic bullet. Getting “loved up” is good for communing with other loved up users, but it’s not a recipe for solving the deeper problems of non-users... or life on Monday morning. Even when safe and sustainable empathogens can be developed, pure compassion won’t cure cancer, solve the AIDS crisis or reverse the ravages of aging. Such complex, multi-faceted medical problems need rigorous scientific research. To say this isn’t to devalue the “magic” of MDMA. In a better world, the rose-colored spectacles induced by MDMA-like states may be as socially perceptive as the most hard-edged “depressive realism” of contemporary cynics. In the meantime, Darwinian consciousness is prudent for a Darwinian world.

h+: Humans have violent predatory instincts wired into the pleasure/reward center that civilization no longer finds useful. We repress these instincts through behavioral conditioning but they still present themselves as pathologies in mentally unstable people. Would you support proactive gene modification to abolish these predatory instincts to make humans more docile?

DP: Proactive gene-modification to enrich our capacity for empathy strikes me as morally admirable. “Docile” is a loaded word; if you’d said “pacific” instead, I’d agree. In an era of weapons of mass destruction and bioterrorism, human survival may even depend on it. Until humans establish self-sustaining bases beyond the Earth on the Moon and Mars, the extinction of intelligent life itself is a non-negligible possibility. Britain’s Astronomer Royal, Martin Rees, estimates the probability of human extinction before the year 2100 is around 50 percent! The world’s predators aren’t confined to violent criminals or the mentally ill: they include “statesmen” holding senior positions of political and military power. The genetic source of most human predatory behavior has been identified: the Y chromosome. However, this is one risk factor we’re probably stuck with for a long time to come. Competitive alpha male dominance behavior is perhaps the greatest underlying threat to what we call civilization. Human history to date attests to the gruesome effects of testosterone-driven male behavior. Socialization — on its own — seems inadequate.

Scenarios of pro-social genetic modification may or may not work; but they aren’t purely hypothetical. Humanity is on the brink of a reproductive revolution. Within the next few decades, prospective parents will increasingly choose the genetic design-specifications of their future children via pre-implantation diagnosis. In the absence of a regulatory framework, one may hope most parents will choose genotypes for loving, empathetic children and decline to choose “sociopathic” alleles, e.g. the less active “warrior gene” variant of monoamine oxidase A, which is associated with anti-social and violent behavior. A lot of our nastier alleles/allelic combinations were genetically adaptive in the ancestral environment. They may exert a potentially catastrophic influence now. At the risk of sounding like some crude genetic determinist, it may eventually be possible to edit out some of our more sinister code and enhance the expression of the pro-social. One example here would be oxytocin, the “trust hormone,” recently shown to be copiously released by taking MDMA. Enriching long-term oxytocin function could make us naturally more honest with each other — not just more trusting but more

...dopaminergic and opioid enhancement can be pleasurable... amplifying mesolimbic dopamine function leads to increased exploratory behavior... Gaining control of our own reward circuitry allows a choice...



trustworthy. Unfortunately, indiscriminate amplification of oxytocin function would only work if it were universal. Its use would make a powerful instrument of social control and an ideal tool for predators. Today, sadly, we often have good reason to be suspicious of governments and of each other. So yes, pro-social drugs and gene therapies have numerous pitfalls. But somehow we need to bootstrap our way into becoming civilized.

h+: **Pleasure pathways are primed by high risk/reward behaviors. As suffering decreases this risk/reward instinct becomes less of a motivator. This means humans will be progressively less likely to take big risks to reap greater rewards. Is this a positive shift in human behavior, and in this shift are we losing something uniquely adventurous and impulsive about the human spirit?**

DP: We live in an era when advanced technology poses existential and global catastrophic risks. Any interventions that promise to reduce our propensity to risk-taking should be seriously evaluated. As you note, however, there are subtler risks to the future of humanity than the apocalyptic scenarios well-known futurists discuss. Some kind of botched paradise engineering might lock humanity into a second-rate utopia of the sort you describe. A stagnant world of soma-like contentment is very different from a world animated by heritable gradients of bliss. How can humanity guard against inadvertently creating some other kind of *Brave New World* that blocks the fullest expression of life in the universe?

One possible answer is that postgenomic medicine will let us choose not just our normal baseline of happiness, but also our baseline of “adventurousness.” Thus both dopaminergic and opioid enhancement

can be pleasurable, but amplifying mesolimbic dopamine function leads to increased exploratory behavior, whereas long-term enhancement of mu opioid function alone leads to greater quiescence. Gaining full control of our own reward circuitry allows a choice of what kind of person one wants to be — an adventurous extrovert or thoughtful introvert, for instance. I’m not really satisfied with this answer because it’s unclear whether temperamental “adventurousness” can be adequately distinguished from recklessness. I’d simply argue that no one should be forced to suffer as now for the sake of an abstraction like “the human spirit.”

h+: **There’s an old saying that Utopia is ultimately unattainable because no matter how perfect things are, people will always find something to complain about. How do we modify human behavior to trim back the complainers?**

DP: Discontented people have arguably been the motor of human development. This is one reason why it may be prudent to recalibrate our hedonic treadmill rather than dismantle it altogether. When we enjoy gradients of lifelong bliss, the functional analogues of discontent can drive (post)human progress. Maybe getting rid of suffering isn’t the culmination of civilization, just the start. ☺

James Kent is the former publisher of Psychedelic Illuminations and Trip Magazine. He currently edits DoseNation.com, a drug blog featuring news, humor and commentary.

RESOURCES ↘

The Hedonistic Imperative
<http://www.hedweb.com/>

The Great Designer Baby Controversy of '09
<http://www.hplusmagazine.com/articles/bio/great-designer-baby-controversy-'09>

Olds and Milner “Wireheading” Study
http://www.hackcanada.com/ice3/wetware/electrical_brain_stimulation.html

New Harvest
<http://www.new-harvest.org/>



TRANS GENDER, TRANS HUMAN, TRANS BEMAN

UPLOADING WITH MARTINE ROTHBLATT

ROZ KAVENEY

If anyone is going to persuade us to abandon the flesh, be downloaded, and live forever as information, it is Martine Rothblatt. A satellite scientist of distinction (she started GeoStar and Sirius Satellite Radio), who succeeded in saving the life of the child of her and her partner by throwing money at research, and saved scores of other children by doing so, she decided a few years ago that the next thing to conquer was death itself.

We talked on the phone, eventually, after a problem with timezones, and I remarked to her that one of the problems with living forever, considering the delicate transfer of selfhood into electronic media, was the sheer problem of human error and computer glitches. Martine responded: “There will always be error – it’s part of the human condition. In the flesh, people have odd experiences with their own biochemistry that make them who they are: somatically induced or inherited. Yet those errors don’t prevent people forming relationships. Uploading will have its errors — manageable errors — and that is part of one of the things that will keep the uploaded human.”

Won’t the difference between sensations experienced in the flesh and sensations experienced or remembered when you are uploaded be like the difference between analog and digital recording? “It will be different, and some people will notice the difference — just as some people prefer the mellow sound of analog and some people actually prefer the crisp artificial sound of digital. But here’s the thing. Both are better than being dead and never hearing anything again, ever.”

I wondered: Would it be a nuisance never being able to forget anything, not being able to be disconcerted again by twists in the plots of books you re-read, not being able to get the surprise in Haydn’s Surprise symphony?

“That’s an assumption,” Martine said, “but actually the mindware that will be approved for use will have as one of its features a graduation of memory strength. Things can be artificially forgotten. Some things — like your name and where you are at the moment will always be front and center. Other things will not always be recalled and some things will be completely forgotten. Mindware will allow you to adjust the accessibility of what you need to know, when you need to know it. Not forgetting wouldn’t be a user option that we would choose, even with bad experiences. You need the bad things as a spur, but they need to fade to grey. And you can arrange your mindware to do that for you.”

I asked Rothblatt at what point in their lives people would choose to upload. “It’s not a one-size-fits-all thing. Some people would use uploading just for storage. Other people would want to stay digital. Some people

would want to move back and forth. The first person to visit Mercury will do so uploaded into hardware that can survive that environment. Some people would use it to do certain things and then return to the flesh, it isn’t necessarily an all or nothing thing. And that’s one of the things that demonstrates the humanity of the whole project.”

Martine believes that the philosophical opponents of uploading are mostly biological essentialists, people who believe that there is an absolute value in remaining true to an original biological form. The underlying logic of this position is that we are not clever enough to realize all the bad consequences of changing the naturally-evolved order in any way. They think — and they have *always* thought — that we will come to regret any change to this.

This argument is absurd, because it is contradicted by fact. Similar people argued in the Eighteenth and Nineteenth centuries that vaccination would make people more like cows. They were against transplants. Similar arguments were used against gender reassignment/confirmation surgery — both Martine and I have an interest to declare here, since we are both trans. Everything that humans have done since we first evolved intelligence, from growing crops and domesticating dogs onwards, has involved humans tinkering with the natural order.

What about the argument that uploading will always be an elite thing, a way for the rich to live forever? “That’s demonstrably false: the track record of technology is one of relentless democratization. When I graduated from college there were no cell phones, and then there were a few in the hands of rich businessmen, and now half the world’s population has them, each one with a computer capacity greater than that used in the Apollo program. And some aspects of phone technology provide us already with the underlying framework, the intellectual property, for mindware...”

Some of the first advocates of uploading thought in terms of replacing one’s flesh body with a machine. Rothblatt sees a more fluid relationship — evolving a visionary idea she calls “transbemanism.” She describes it as “a philosophy that supports transitioning to a view of ourselves as unique

patterns of thoughts (bemes), rather than as bodies per se, and consequently accepting of a 'one mind, many instantiations' society."

"People don't need to be in one place, or one machine," she explained. "People can exist in many places and float. People were originally disturbed by telephones, because an individual's voice could be where they are speaking and where they were heard — and now we take that for granted. A singularity of embodiment would be an obsolete concept. Just because our whole cultural matrix has been one body/one mind does not mean that this has to be where we are going. And, of course, sooner or later, different versions of the uploaded personality will have experiences different enough to make them different, though closely related, persons."

Martine developed an interest in transhumanism in 2002 when she read Ray Kurzweil's *The Age of Spiritual Machines*. "I had never really thought about the numbers or the practicality, and he took me through the numbers. I felt like I wanted to be a transhumanist — it all spoke to me as a transgendered person." A little later, she discovered the website of the World Transhumanist Association. At first she felt unwelcome, but maintains that trans people are a core part of that community, because we embrace growth and change as part of our spirituality.

from the ability to suffer. Without rights, so many crimes against the uploaded would be possible. It is easy to brainwash the embodied, and the uploaded would likely be even more vulnerable. We have to establish an ethic of the absolute impermissibility of harming a persons' autonomy by harming their own value to themselves. It is an assault. Rothblatt: "Minds are fragile — and to hit someone in the face is almost better than to put a fist through the fragile web of a personality."

In a sense it is a choice of a spirituality that is entirely secular and material, so one can predict that establishing the right to upload as a life choice will provoke a big fight with religious authority. After all, you are offering a version of the beatific vision, of the communion of souls and that's religion's unique selling point. Martine comments that the churches have had to accept reality in the past — and they are not forever. Atheism has grown in the US because science and technology can address problems where religion fails. Technology, especially information technology, has continued to empower individuals, and ideologies that don't meet our needs get junked.

While transbemanism can satisfy our spiritual longings, what does it have to say about pleasure? "Pleasure is the bedrock of transbemanism. The purpose of exalting our minds above our bodies is to lengthen and multiply

“People don't need to be in one place, or one machine,” she explained. “People can exist in many places and float.



There is another thing that trans people bring to transhumanism, which is an acute awareness of the importance of rights. Rothblatt sees a direct historical line between the acceptance of a person's right to alter their gender and the freedom to be transhuman and transbeman. "Gender reassignment in the 1950s and 1960s was based on the notion that changing a body to fit a mindset was ethical and therapeutic. Transhumanism builds on transgenderism, broadening the driving mindset from a gender ideal to a human development ideal. Transbemanism builds on transhumanism by saying it is all about the mindset, and hence bodies are tools of which we may ethically have as many (real or virtual) as we want."

Some in transhumanist circles have suggested that the future is post-gender. Should the future be discussed in terms of transgender or postgender or both? Rothblatt responds: "I think the future should be discussed in terms of transgender, not post gender, because we are not abandoning gender. Indeed, gender is one of the coolest avenues for human expression. Transgendered people have too much gender for the sexual dimorphic paradigm of male or female. In the future, everyone will explore the countless gender possibilities along the male-female continuum."

Before we start uploading ourselves, people need to possess intellectual property in themselves. The uploaded need legal personhood. Martine has taken from English Bioethicist John Harris the idea that that which values itself should be so valued, whether it be an ape or an artificial intelligence. She thinks this is a more useful guide than Jeremy Bentham's derivation of rights

the magnitude of pleasure that each individual can enjoy."

Finally, we talked about music and the way that, when we listen to music, we feel the presence of the long dead in our souls: Chopin, or Haydn, or Miles Davis. Music is one of the kinds of information which artists have encoded themselves into in the pursuit of lasting fame and communication with others. "My core belief," Martine says, "is that information wants to be free. People are information. Technology is a way of communicating. Douglas Hofstadter talks of how humans, through music and science and art and mathematics, transcend space and time, how as individuals we are a concatenation of all the souls who have touched us. In the flesh or uploaded, we are a colony of souls." ☺

Books by Roz Kaveney include Reading The Vampire Slayer and From Alien to the Matrix. She is a regular contributor to The Times Literary Supplement.

RESOURCES ▼

Martine Rothblatt's Terasem Movement
<http://www.terasemcentral.org/>

Transexuals Pave the Way for Transhumanism
<http://www.slideshare.net/martine/transexuals-pave-the-way-for-transhumanists>

TRANS HUMANISM AT PLAY

PAT KANE

Watch children, or adults, at play. And by “play” I mean the real thing — experimental, messy, reality-shifting and explorative, not the routinized pseudo-work we call “leisure” or “recreation.”

For kids, their play-world might easily imbue them with strange transformative powers, or they might equally enchant and animate the objects that surround them. For adults — say a bunch of Google engineers bashing and drilling away on the flats at Burning Man — the point of their play is to simulate, as tech historian Fred Turner says, a “utopia of relationships and technology.” In either case, when they are at and in play, humans old and young naturally hypothesize about testing the boundaries of human capacities and faculties.

The great guru of play theory, Brian Sutton-Smith, describes play’s role in human evolution as that of “adaptive potentiation.” By that he means play as the mimicking, mocking or fantasizing about our situations of survival, within zones of time and space that open up in our daily life. In this way, play helps us to improve our ability to respond to the challenges of living. It’s our rehearsal hour for real risks and opportunities.

If we make our bodies, our intentions and their extensions illimitable and thus fully expressive of the “phantasmagoria”... we could be in real trouble.



This is why such a flaky, mutable behavior and phenomenon as play has persisted in the human condition. As complex social organisms living with others who are just as complex as us, we've needed the imaginative and hypothetical space it opens up in our daily lives to cope with the strategies, feints and demands of human sociability. We “potentiate” or die.

So play is our *evolved* and *natural* capacity to test limits; suspend conditions of reality; imagine our way out of tight situations. But how does this sit with the transhumanist agenda? Doesn't transhumanism take, as a point of principle, that our evolved nature itself is permanently up for being played with and amended, its limits made malleable and even transcendable?

There is — at the very minimum — a positive and negative spin worth considering in this context. Positively, transhumanist ambition could represent the next level of play's evolutionary development within our human condition. Whatever we have done with our fantasies, our flickering simulations, our imaginatively suffused games, we will be able to do with the raw biomaterial of humanity. We then enter into the world imagined by Scottish SF writer Iain Banks in his space operas describing the civilizational challenges of *The Culture*. The challenge is: how to live well and ethically in a profoundly post-scarcity society, where we have the ability to “play God” *with each others'* biology and materiality, as a matter of convivial living, and not just upon or over others.

But there's a prior presumption that ethical behavior will kick in at some stage of advancing evolution. The negative spin is that transhumanism may, in actuality, unleash play from its useful psychological netherworld in our species being. In other words, in our imaginations certain types of risk and experimentation doesn't have too much direct consequence. It's just something that keeps the channels of human responsiveness from getting too rusty or ossified, from succumbing to their inherent limits.

The fear is that if we make our bodies, our intentions and their

extensions illimitable and thus fully expressive of the “phantasmagoria” (as in Sutton-Smith's descriptions of the transgressions and horrors that he often observes in the coping play of children) of play — then we could be in real trouble.

Play, as it functions in our sociobiology, has to be amoral/non-moral. That's the underground and liminal job it has to do — the job of keeping our “potentiation” open, infusing the constraints of human living with indefatigable optimism and possibility. What beauties — but also what monsters — may be made manifest, with our play-drive connected to the transforming technologies predicted by transhumanists? Could it be, in truth, a Pandora's Box: a toy chest filled with Ray Kurzweil's nano-, bio- and robo-technologies?

In 2004, I wrote a book with the pointed title *The Play Ethic*. The title was partly aimed at addressing the fact that the sheer playfulness of our coming society — our ability to “take reality lightly” in so many domains — compels us to think about ethics at the most basic level. How we decide to act humanely in a field of exponentially growing human possibility was, to me, the most urgent of issues — and was obviously related to much of the transhumanist project.

Yet, as the Italian Marxist Paulo Virno says, “there is no objective investigation of human nature that does not carry with it, like a clandestine traveler, at least the trace of a theory of political institutions.” The Puritan work ethic presumes a human nature happiest with duty, routine, and social conformism — a useful credo for industrial capitalism. A protean “play ethic” could easily presume a human nature happiest when improvising, being flexible and responsive, exercising imagination: an equally useful narrative, as we know, for informational capitalism.

Each ethic has its supporting cast in the mind sciences. The work ethic is currently undergoing a new intellectual revival, in the age of Obama



and his (paraphrasing) economy built on rock, not sand,” (taken from The Sermon on the Mount) and it is bolstered by a new Chicago school of behavioral economics that claims to identify the new “Homer (Simpson) Economicus” in all of us, and argues for a new paternalism to steer (or “nudge”) us towards healthy social and economic outcomes.

But a play ethic also has its grounding in neuro-research that emphasizes the plasticity of the brain: the deeply-founded creativity that generates our consciousness in the first place. Across the op-eds, blogs and book review pages, those who want to found their “theory of political institutions” in the next wave of Third Culture science headlines will always have their opportunities.

Yet transhumanism, it seems to me, transcends these familiar political uses of evolved human nature in the sense that it asks us to squarely face our increasing ability to transform that very nature itself, intentionally and by design. And if play operates as dynamically and unpredictably in our unamended nature as I suggest, we are in a moment where we will have to begin to imagine what kinds of “politics” or “ethics” are possible when play’s energies are given the most powerful of chariots to drive.

The debate in the late nineties between the German philosophers Peter Sloterdijk and Jürgen Habermas — Sloterdijk a partial enthusiast for transhumanism, Habermas a resolute opponent — generated much heat in certain intellectual circles, but much light too. But it began to hint at exactly what a “play ethic for transhumanism” might be. In his essay, the “Operable Man”, Sloterdijk suggests the kind of living-well-together that a profoundly (and materially) playful society might generate:

Biotechnologies and nootechnologies nurture by their very nature a subject that is refined, cooperative, and prone to playing with itself. This subject shapes itself through intercourse with complex texts and hypercomplex contexts. Domination must advance towards its very end, because in its rawness it makes itself impossible. In the inter-intelligently condensed net-world, masters and despoilers have hardly any long-term chances of success left, while cooperators, promoters, and enrichers fit

into more numerous and more adequate slots.

There may be something a little lost in the translation... but the idea that the conditions of transhumanity may lead to subjects that are “refined, cooperative, and prone to playing with themselves” at least splits the difference between the polarities on offer.

Richard Sennett in his recent book *The Craftsman* talks of two Greek myths that dramatize our anxiety about technology. It’s either Pandora and her box, unleashing all manner of unstable horrors; or the club-footed Hephaestus, whose diligent labor and craft built the palaces of the Gods.

But what of Proteus, Prometheus or Bacchus — those shape-shifters, firebringers and lovers of sensual conviviality? Is there no place for the energetic, mutable, sociable player in transhumanity? No hope for a livable zone that can assuage the fear that transforming technology generates anarchy, and thus demands order?

Sloterdijk may be an optimist, but optimism — a deep species-based optimism — fuels the play that lurks in all of our breasts. Whatever transhumanists seek to transform in human nature, they would do well to respect the innate transformativity of play itself. ☺

Pat Kane is the author of The Play Ethic (www.theplayethic.com), and one half of the Scottish pop band Hue And Cry (www.hueandcry.co.uk).

RESOURCES ↴

The Play Ethic

<http://www.theplayethic.com/>

Peter Sloterdijk

http://www.petersloterdijk.net/international/texts/en_texts/en_texts_PS_operable_man.html

Jurgen Habermas

http://en.wikipedia.org/wiki/J%C3%BCrgen_Habermas

Richard Sennett *The Craftsman*

<http://www.amazon.com/Craftsman-Prof-Richard-Sennett/dp/0300119097>




OPEN PREDICTION:

HOW SPORTS FANS CAN HELP SAVE THE WORLD.

ALEX LIGHTMAN

You know it's summer when newsstands across America have an explosion of magazines, typically meant to have shelf-life until fall, on the topic of do-it-yourself prediction. Over a dozen publications are offered to players of Fantasy Football, itself a \$5 billion a year business, to help them create and manage teams that use statistics generated by actual games to determine who wins the fantasy games. Is it possible that this fall these fans could be the innovators and early adopters of a new and novel way to make predictions as entertainment in a variety of fields that are more vital to real world concerns, such as prices, markets, wars and weather?





Prediction is at the core of Western civilization – the Oracle at Delphi was consulted about war and more for over a thousand years – and being able to predict the future is something that millions are paid to do, and that billions of people do every day. Prediction is the claim that a particular event will occur in the future, given in specific terms and falsifiable over time. Predictive power is an important measure of truth. In science, predictive power is increasingly important when studying systems where provability is not an option.

Some sports fans are as passionate about predicting the outcome of games and being known as better guessers, in part to gain reputation and in part to win money by betting tens of billions annually in office pools and casinos. Watching a game in the NASA Mission Control Room-like Caesars Palace Race and Sports Book is on a number of “do before I die” lists.

Is there a way to be a better predictor? There is, by combining the best of open source models and crowd-sourced prediction. Open source is most familiar in the context of software, where it means software whose source code is freely available to anyone who wishes

of thought, decentralization, independence and aggregation. The “on the record” aspect relates to the fact that everyone’s predictions are locked in, and everyone will see where they ranked, allowing a sort of psychic Darwinism. The best predictions and the best predictors will be clearly identifiable, and the methods and mechanisms of prediction can be studied through analysis of OTRS data. Making predictions is free, but a user has to be a paying member of the Champion’s Club to see exactly where one ranked, and to be able to see the aggregate predictions prior to each game.

OTRS makes possible a scalable, massively crowd-sourced open prediction model, allowing recorded, ranked predictions to be made millions of times an hour. The data gained will not only apply to the world of sports; the implications stretch from complexity theory to neuroscience to artificial intelligence. It is an academic’s dream, and a sports fanatic’s hobby. An OTRS patent pending relates to prediction as entertainment. OTRS has far-reaching implications, but it appeals to the human spirit of competition: prediction is a sport in itself. Prediction reflects one’s ability to comprehend reality enough

The implications stretch from complexity theory to neuroscience to artificial intelligence. It is an academic’s dream, and a sports fanatic’s hobby.

to have it, and who shares any improvements. The open source model allows for parallel input of multiple approaches, agendas, knowledge banks, and priorities with far more flexibility and speed than traditionally closed or centralized models. The idea of crowd-sourced predictions is to use complexity to solve complexity: The wisdom of crowds has been discussed at length in a book of the same name.

Author James Surowiecki studies the aggregation of information in groups, resulting in decisions that, he argues, are often better than could have been made by any single member of the group.

This fall a young company called On The Record Sports (OTRS), based in San Diego, CA. will enable users to predict the outcome of sporting events on a multi-tiered scale with a simple interface – dragging and dropping, checking boxes, and moving a bell curve, allowing players to get points based on how many standard deviations they are away from actual outcomes. Users can predict the outcome of a single game, or the champions of the entire season. The predictions of millions of OTRS users would ideally display diversity

to say what will happen next. Predictive entertainment is recreational, and will provide unparalleled insight into the wisdom of crowds, and into the nature of intelligence itself.

If predictive entertainment ends up with the same “S-curve” growth as the Internet itself, humanity could develop a sort of social superorganism superpower of precognition. Being able to have billions of times more data about the future predictions could help to predict the weather (Katrina damage was more costly than 9/11), markets (better models of mortgage defaults could have saved trillions), wars (the Iraq war cost over 50 times what was predicted by George W. Bush), and even climate change (“cap and trade” is a decision with trillion dollar implications).

In the end, prediction as entertainment could help us to reinvent politics, markets, management, science, even the nature of what it means to be human. Next time you hear someone make a prediction about a game, give him a hug or buy her a beer, because a tiny bit of salvation is in the process of unfolding. ☺

RESOURCES ↘

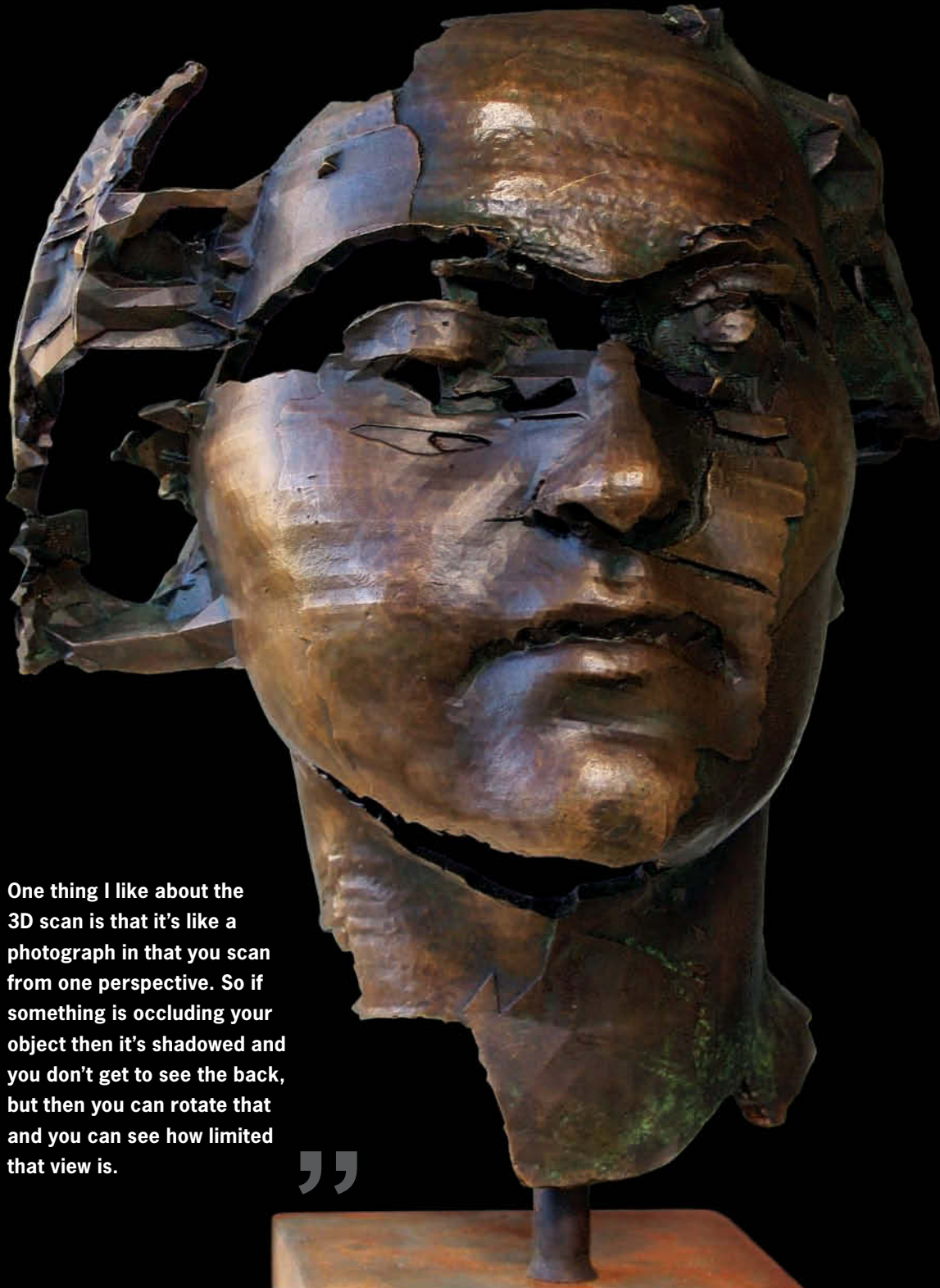
On The Records Sports

<http://www.ontherecordsports.com/>



Head of a Young Woman

3D facial scan with Polhemus Cobra Fast Scan,
printed on a 3D printer and cast in bronze

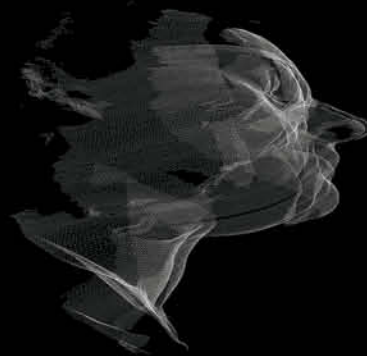


One thing I like about the 3D scan is that it's like a photograph in that you scan from one perspective. So if something is occluding your object then it's shadowed and you don't get to see the back, but then you can rotate that and you can see how limited that view is.

”

Sophie Barrett-Kahn peers through her DIY scanner, darkly.

For the past six years Sophie has been experimenting with 3D scanning devices. After receiving an Art degree from Goldsmiths College in London, she worked as an photographer, producing images of an architectural nature. Subsequently she returned to school at RMIT University in



Australia to enroll in their Spatial Information Architecture program. At this time RMIT was involved in a study of Antoni Gaudi's Sagrada Familia in Barcelona. This was Sophie's first experience using a 3D scanner. After departing RMIT she constructed her own DIY laser scanner at home. Last year The Experimental Media and Performing Arts Center in Troy, New York, awarded her, together with choreographer Lisa Parra, a 2008 EMPAC Dance Movies Commission. Their entry, a 3D laser captured stop motion dance short, will premier there in November. The exhibit will then travel in 2010. I recently had the opportunity to meet with Sophie at the Smooch Cafe in Brooklyn and speak to her about her work.

by Chris Grayson



frames from the forthcoming movie, *Body/traces*

6:40 min. stop motion video short, scanned with home-made 3D scanner (choreography by Lisa Parra)

For me, I played with this device a lot. I played with [the Polhemus Cobra Fast Scan] as a photographer might play with a camera. And I became actually quite frustrated with the limitations of it... but when you scan a body with it you get some very interesting kind of screw-ups. So I started to exploit that. A lot... [to find] the blind-spots in the technology. ”

Figure of a Young Woman, Sleeping

3D body scan, printed on a 3D printer, cast in plaster components and assembled



It's the tension between life and the representation of life... You piece it back together and try to reanimate it, it becomes something extremely different... And by submitting it to so many stages of processing, it's like taking an image and photocopying it, and then photocopying that photocopy— you see a little more of the destruction that happens. ”

Untitled VI

from *Strange to Inhabit the Earth No Longer*
3D body scan on archival Lambda print



**I go in purposely, without informing
myself too much, and see how I can
get it wrong.**

”

STAY

AND THE SINGULARITY

AN h+ POLL

We asked several leading thinkers in the radical tech community the following question: Is there sex in the posthuman or singularitarian future? We invited them to pontificate in 400 words or less. These are the results.

Michael Anissimov

Michael Anissimov writes a blog, *Accelerating Future*, on artificial intelligence, transhumanism, extinction risk and other areas.

Conventional sex will likely persist in a transhumanist future, but only as a small subset of a much larger space of pleasurable activities which have been deliberately engineered. The connection between certain activities and the sensation of pleasure lies entirely in our cognitive architecture, which we will eventually manipulate at will. It's probably less complex than we think — many drugs can directly stimulate the pleasure center, and these are much simpler than brain-to-computer interfaces.

With sufficient ability to intervene in my own neurology, I could make any experience in the world highly pleasurable or highly displeasurable. I could make sex suck and staring at paint drying the greatest thing ever. It scares some people to think that the connection between pleasure and experiences is entirely arbitrary and not based on some deeper philosophical meaning,

but too bad. We will likely choose to preserve sex as a highly pleasurable activity, but perhaps other people will decide to elevate philosophical discovery or artistic creativity to a higher pleasure level than sex. That's entirely their decision.

Sex is quite a simple act itself — much simpler cognitively than me writing this paragraph. Sex has existed for hundreds of millions of years, but general intelligence has only existed for a few hundred thousand. Sure, sex activates higher cognitive functions, but that is a credit to those functions, not sex itself. Sex is often idolized in our culture because it can be a largely risk-free form of pleasure. Given that sex has zero cost and great pleasure, it seems reasonable that everyone reading this should attempt to engage in it more often. One study of happiness in couples found that relationship satisfaction is correlated to the number of times the couple has sexual intercourse per week minus the number of fights.

Still, it is important to remember that sexual intercourse is a highly ancient, simplistic-at-its-core activity that we may choose to discard at

Courtesy of Clockwise from top left: Anissimov - Courtesy of Michael Anissimov, Andreadis - Courtesy of Athena Andreadis, DaSilva - Courtesy of Extropia DaSilva, Kurzweil - photo by Michael Lutch, Lightman - photo by Todd Huffman, Goertzel - photo by Joi Ito, background photo by Daniel Carter



some point in the future in favor of more complex activities that generate even more pleasure and connection between people. Whether we choose to call it “sex” will be entirely arbitrary, but it may bear little resemblance to the sex of today. We may choose to evolve beyond the less savory aspects of sex — nonconsensual dominance, as a tool for macho competition, or a superficial social signaler — in favor of its empathic and “sacred” core.

Athena Andreadis

Athena Andreadis is Associate Professor of Cell Biology at the University of Massachusetts Medical School.

Jacking Off while Jacked In... cryonics, robotics, uploading, singularity by AI... the concepts speak for themselves: no Eros, only Thanatos — at best, endless (and simulated, yet!) masturbation in VR lotusland. Besides, if you're obsessed with control over all your functions, how are you going to let go enough to have an orgasm?

Extropia DaSilva

Extropia DaSilva is a resident of the virtual world Second Life.

Anything that has persisted for hundreds of millions of years clearly has high survival value. Transhumanism seeks to enhance the positive aspects of the human condition, so love and sex are unlikely to be abandoned.

Differences? Yes. Sex for procreation will be separated from sex for pleasure. Polyamorism will be the norm. After all if “I” have uploaded, duplicated myself and exist as self-similar copies in cyberspaces co-existent with realspace, where does the “self” end and the “other” begin?

Relationships will be tried out in simulation, combining variations of each self, weeding out combinations that do not optimize cooperation and mutual gain. Selective memory editing may be used to erase memories of sub-optimal relationships, leading to love affairs that are always subjectively ideal.

A committed relationship would be to accept a complete merging of two selves. True love would be expressed by transferring the two uploads into a single, higher capacity “brain” (such as the sentient Internet itself) in which both minds run simultaneously.

Such “twindividuals” might merge with others, resulting in an expanding hive-mind. Parts of the brain could be distributed over large distances, though if communication delays cannot be overcome that would impose a limit on how far the society of selves can expand and still be ALL=ONE.

Possibly, group-minds that expand far enough to experience significant communications delays will fragment. These, as well as others initially seeded from other twindividuals might expand until they are bounded on every side by neighboring group-minds. Moravec has speculated that competition for space, matter, and ideas might result in “vile offspring” (Charles Stross' term for posthumans that have diverged from the human species to the extent that nothing recognizably human remains within them) devouring the physical substrates of neighboring group-minds, “space, energy, material and useful thoughts reorganized to serve another's goals.”

It is interesting to note that humans rather enjoy romantic period dramas. For instance, Jane Austin's books concerning the trials and travails of love in upper-class society remain as popular in the 21st century as they were when first published in the early 1800s. If posthumans inherit their predecessors' love of historical romances, they might simulate the relationships of ancestors in the dim and distance past. Given the vast computational resources that Moravec, Seth Lloyd and Nick Bostrom have appealed to, it is perhaps astronomically more likely that, if you are in a romantic relationship right now, it is one being simulated by godlike intelligences, rather than being real in a physical sense.

Ben Goertzel

Ben Goertzel is the CEO of AI companies Novamente and Biomind.

The experience of gaining pleasure via in some sense merging with another being... that will probably survive the Singularity, but will likely be customizable into various forms, which may end up bearing little resemblance to “sex” as we know it today....

Ray Kurzweil

Ray Kurzweil is an inventor, entrepreneur, author and futurist. His most recent book is The Singularity is Near: When Humans Transcend Biology.

The short answer is Yes! The longer answer is that we've already separated at least some of the original biological function of sex from its social and sensual function. Human intelligence is directed towards our body, meeting its needs and desires, and we will continue to have bodies in the singularitarian future, except that we won't be limited to just one. We'll have

different virtual bodies in different virtual reality worlds, and morphable nanobot swarms for real worlds. A couple could become each other in a virtual reality environment and experience the relationship from the other's perspective. We'll be limited only by our imaginations. That will be true in general for virtual reality, which is where we will ultimately spend most of our time.

Alex Lightman

Alex Lightman is the Executive Director of Humanity + (the organization) and CTO of FutureMax, a merchant bank.

The primary purpose of the Singularity will be seen, after the fact, to be Awesome Sex. There will be exponentially more sex, with exponentially more interfaces, and with exponentially more measures of pleasure. First, whole brain emulation (a more stealthy way to say uploading) will enable us to make almost perfect replicas of our brains, which can then imagine, aided by the

territory. If the posthuman is semi-biological, then the physiology of sex will remain the same sexy, smelly, wet sex that we so dearly love, but with added twists in virtuality and simulations. But what happens when our human genitalia is gone? What will we rub instead?

Exosex, sex outside the biological body, would be simulated in virtuality, much like Second Life or Skype and other digital formats where sex is enhanced, extended, digitized, and synthetic. It would be more real than real — a hyper-real experience.

Endosex, sex within the body or form, would exist even if the posthuman is so-called disembodied or, better, a distributed collection of selves (multi-selves) co-existing on multiple platforms, including biological personas, virtual avatar personas or other types of forms in different substrates and platforms.

Sex is all about nerves, and the human brain is the pleasure center. Nerves would be replaced with synthetic fibers or electrical charges that continue to detect and transmit nerve-like sensations. The posthuman's

Natasha Vita-More: For the most part, we could be rubbing neurons.

cloud that puts thousands of supercomputer-equivalents at our beck and call to generate millions of sexual fantasies and to engage in variations of them. There will be no limit to the number of our own brain replicas we can create, host, and send off to have great sexual adventures in imagination, and then bring the "best of" back for reintegration.

Second, we will be installing bioports into our body, a la *The Matrix* or *Sleep Dealer*, each of which can stimulate our nervous system. In heterosexual, men penetrate women, but with this, men and women will interpenetrate each other multiply, and, as with USB 2.0 daisy-chaining, so will men, women, and androids be able to multiply-interpenetrate, locally or remotely.

Third, one of the most profound pleasures of sex, in my experience, is what I call the "empathy hall of mirrors effect." That is, to be able to not only feel what you are feeling, but also feel what your lover is feeling, almost as deeply as she is. If she is also an empath, then you can get a positive feedback loop of sensation. After the Singularity, most transhumanists who choose to stay embodied will *present* as empathic metamorphs, possibly surrounded by utility fog that enables us to become anyone or anything, seemingly anywhere, and, with telepathy common, to be able to transform ourselves into our lover's heart's desire at a moment's notice.

I love the future. Bring it on.

Natasha Vita-More

Vita-More is a media artist/designer, Founder and Director of Transhumanist Arts & Culture, and Artistic Director of H+ Laboratory.

Will there be sex in a posthuman future? Yes. It will not look, sound, or even feel like the traditional act of rubbing membranes against each other.

The aesthetics of posthuman sex takes a giant leap into uncharted

post-neurobiological brain would experience a series of sudden spasm, contraction and surges, a sense of pleasure and release. For the most part, we could be rubbing neurons.

If we are distributed multiple-selves co-existing on different platforms, a sexual experience could be a community event or a selection process to determine how many selves would be involved.

The entire field of posthuman sex could give new meaning to sex freedom and gender differentiability — where a person could have different scenarios, depending on what form or type he/she is in. Human form: membrane, wet sex. Semi-human form: neurological ecstasy (extasy). Post-human form: multiple exchanges of digitized codes reaching a crescendo.

But sex is not just about the crescendo. The physical and/or electrical charges brought about by excitation could be relocated to different parts of the brain. In a bio-body, instead of reaching climax, a person could have that energy-charge redistributed to the memory center of the brain for deeper focus. Likewise, a non-bio-body could use the energized charge for a totally different activity.

Sex is a means of communication. In posthuman futures connectivity is paramount. All the connectivity — from simulated environments to the noosphere could end up being one very big bang. ☺

RESOURCES

Michael Anissimov
<http://www.acceleratingfuture.com/michael/blog/>

Athena Andreadis
<http://ieet.org/index.php/IEET/bio/andreadis/>

Extropia DaSilva
http://cosmeng.org/index.php/Extropia_DaSilva/Articles

Ben Goertzel
<http://www.goertzel.org/>

Ray Kurzweil
<http://www.kurzweilai.net/>

Alex Lightman
<http://www.linkedin.com/in/alexlightman>

Natasha Vita-More
<http://www.natasha.cc/>

FEELING great FOREVER

TERRY
GROSSMAN,
M.D.

I just got back from a short trip to Mexico where I went for the express purpose of having a few grams of placental tissue transplanted beneath the skin of my lower abdomen. I am evaluating this procedure, which has been available in Mexico for nearly 20 years, as a possible rejuvenation treatment for patients who come to my wellness center. Before recommending it to anyone else, I wanted to try it on myself. Fortunately, at age 62, I am still maintaining pretty well, but I've collected my share of bumps and dings along the way and I'm committed to doing whatever I can to make it to the Singularity, which is projected for mid-century, and to continue remain as healthy as possible along the way.

The human placenta is a wondrous organ that serves to nourish a developing fetus, but it also possesses growth factors, hormones and immune

THE HUMAN PLACENTA IS A WONDROUS ORGAN... IT... POSSESSES GROWTH FACTORS, HORMONES, AND IMMUNE MODULATORS, WHICH MAKES IT USEFUL FOR REJUVENATION.

modulators, which makes it useful for rejuvenation. A key reason I had the placental tissue implanted under my skin, however, is because it is also loaded with stem cells.

Most of the news centers on embryonic, umbilical cord and adult stem cells, but you don't hear much about placental stem cells and I really don't know why. Placental stem cells have several characteristics that make them quite useful for therapeutic and rejuvenation purposes.

Embryonic cells are controversial because a life (or a potential life, depending on your point of view) is destroyed in obtaining them. They are desirable because they don't have any antigens

on their cell surfaces, so they won't be rejected by anyone who receives them, and also because they are *totipotent*, meaning they have the ability to turn into any type of cell in the body. The downside to embryonic cells is that they are very difficult to control and their practical value still lies in the future.

Adult stem cells, on the other hand, do have practical applications even in the United States today. They are being used in several clinical trials with surprisingly beneficial results, and as treatments for patients with otherwise incurable conditions in many other regions of the world. Advantages of adult stem cells are that they are easier to work with and easily obtained from the bone marrow.

In a typical treatment, a patient's stem cells are collected from their bone marrow, and the cells are cultured and multiplied in the laboratory. Then they are mixed with various types of growth

factors taken from the patient's circulating blood and re injected into the patient. In one U.S. clinic, a patient's own stem cells are re injected into joints

to repair and regrow damaged cartilage, allowing them to avoid joint replacement surgery of the hips, knees and elsewhere. One of my patients has traveled to the Dominican Republic to undergo this treatment to treat his advanced heart failure and lung disease, which were otherwise incurable with conventional therapies.

Many parents today save the umbilical cord blood from their newborns so that the stem cells will be available to the child (and possibly other family members as well) if needed in the future. These cells are *multipotent*, meaning they can become many — but not all — cell types.

Aside from being available in the event the

child develops leukemia and needs chemotherapy along with a stem cell transplant, the value of umbilical cord stem cells lies in the future as well — at least in the United States currently and into the foreseeable future. Umbilical cord stem cells are being used to treat many conditions in hospitals in China and elsewhere today.

Placental stem cells are similar to umbilical cord blood cells, but they are even more “user-friendly” as they combine advantages of embryonic stem cells with those of adult cells. They have relatively weak antigens on their surfaces so they can be used in a wide spectrum of potential recipients and they are multipotent, like adult cells, so they are relatively easy to control.

In our two books together, *Fantastic Voyage* (2004) and *Transcend* (2009), Ray Kurzweil and I have compared the journey that we will make to reach the Singularity as a passage over three bridges. We define therapeutics available today as bridge one, while biotechnological breakthroughs will constitute bridge two, and nanotechnology, bridge three. The “killer app” of bridge three will be nanobots: autonomous, nanoscale-sized devices that will one day circulate through the blood vessels and tissues of the body, repairing damage, killing infections and malignant cells.

Shortly after I had my placental tissue transplant I realized that I had already started over bridge three. Placental stem cells have powerful “homing” mechanisms which enable them to hone in on areas of the body that are in need of repair just like future mechanical nanobots. Placental stem cells are, in effect, the nanobots of today. I hope they will help me “feel great forever.” I had my transplants about two weeks ago and haven't noticed anything yet, but will keep you posted. ☺

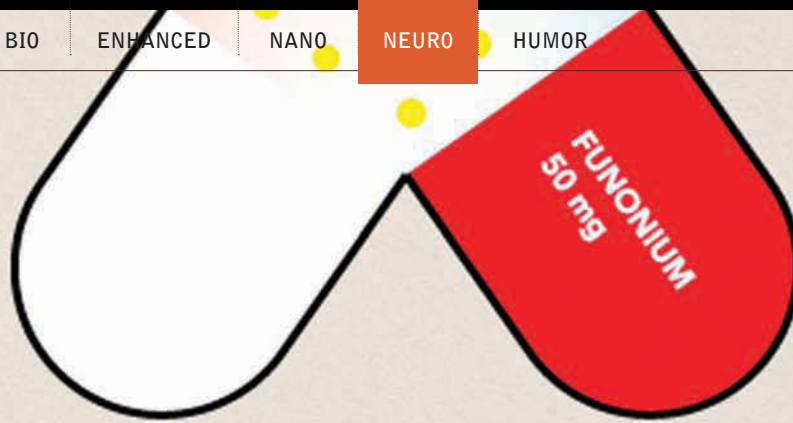
Terry Grossman, MD is a leading expert on anti-aging therapies and the founder and medical director of Frontier Medical Institute in Denver, Colorado. With Ray Kurzweil, he is coauthor of TRANSCEND: Nine Steps to Living Well Forever.

RESOURCES

Terry Grossman's Frontier Medical Institute
<http://www.fmiclinic.com/>

Transcend: Nine Steps to Living Forever by Ray Kurzweil and Terry Grossman
http://www.amazon.com/Transcend-Nine-Steps-Living-Forever/dp/1605299561/ref=sr_1_1?ie=UTF8&s=books&id=1246312233&sr=8-1

“Human term placenta a new abundant source of hematopoietic cells”
http://www.eurekalert.org/pub_releases/2009-06/sfeb-htp062409.php



THE PERILS OF FDS: Fun Deficiency Syndrome

JAMES KENT

Modern cosmetic pharmacology focuses so heavily on eliminating depression that it entirely misses one essential point: depressed people are suffering from a lack of fun. Nobody ever describes depression as a “Fun Deficiency Syndrome,” but lack of fun is clearly the root cause of all depression. It is impossible to be depressed when you are having fun, yet modern therapies for depression seek only to minimize depressive symptoms while doing nothing to maximize the daily intake of fun. This backwards approach to treating fun deficiency syndrome — or FDS — is not only dangerously ineffective, it will be viewed by future generations as one of the greatest failures of medicine.

While depression has been studied under a microscope, science has barely scratched the surface on fun. The scientific study of fun is considered to be a frivolous exercise, and this assumption would be correct because fun is frivolous. The mistake made by science and academia is in underestimating the value of fun, treating fun as a non-serious diversion instead of a rational goal worthy of scientific examination. This

easily found in childhood. The onset of FDS in adolescence leads teenagers to naturally seek extremes of fun behavior to counteract their social anxiety. These extremes include partying, fighting, competitive sports and mating behaviors where risk is maximized to produce the most fun. Most people do not consider this adolescent fun-seeking activity to be a neurologically-wired behavior

The onset of FDS in adolescence leads teenagers to seek extremes of fun behavior to counteract their social anxiety... partying, fighting... ” ”

oversight is unfortunate because fun is arguably the greatest thing a human can have. Everyone likes to have fun... no, we love to have fun. When we are having fun we forget ourselves and become one with our actions in a moment of pure playful enjoyment. Having fun goes beyond being happy. Happiness implies a baseline level of contentment and good feelings but it does not include the amusement, exhilaration, laughter and joy associated with fun. If depression is the illness of our age, fun is the cure.

The roots of FDS can be traced through human developmental stages. Most people have plenty of fun as children, but the onset of adolescence and high school creates a perfect storm of jaded anxiety that dampens the levels of fun

to cope with developmental anxiety and depression, but it obviously is. This fun-seeking stage lasts well into early-adulthood when chronic FDS becomes more problematic. By middle age, most people are chronically low on fun and this is when depression becomes

most acute. If lack of fun is constant and goes untreated it can lead directly to mid-life crisis and, eventually, grumpy-old-fart syndrome.

Fun can be scientifically reduced to two distinct variables: risk and reward. It is easy to understand why reward is fun, but risk is the key to maximizing the impact of reward to produce fun. The most extreme examples of this dynamic can be found in compulsive behaviors that can become highly addictive, like sex and gambling. Sex and gambling are both fun and risky, and the higher the risk the more satisfying and more fun the reward. Also, consider horror movies or amusement park rides where a constant level of fear and anxiety is sustained throughout the experience until the resolution brings a safe

Courtesy of Renato Morbach

and satisfying reward. Fun is thus the science of using risk to build tension, and then strategically releasing that tension with a pleasurable reward to maximize enjoyment. Fun is therapeutic because it reduces anxiety and produces neurochemicals that combat depression. Fun is one of nature's best and most powerful medicines. If you could put fun in a pill it would almost certainly be illegal.

The major pharmacological variables of the risk/reward fun dynamic are adrenaline and dopamine, the key catecholamines produced in response to stress. By now we should all be familiar with the manic exhilaration of an adrenaline rush and the self-satisfied clarity of a dopamine high. Of all the drugs in the world, amphetamines may be the best at stimulating this specific chemical cocktail. It is no mystery why amphetamines lead to risky behaviors. Risky behaviors are even more rewarding under the influence of amphetamines and thus more fun. One side of the dopamine cycle leads the subject to seek out new and fun activities; the other side stimulates the satisfying feeling of reward in response to new experiences. Increasing the levels of risk in these fun-seeking behaviors increases the adrenaline rush and thus increases the sensual intensity of the reward and emotional impact of the resulting memory. The experience of intense fun is therefore more than a trivial diversion: it is a pivotal psychological landmark in the lifetime of an individual which can create long-term changes in self-image, mood, and behavior.

If we follow a simple clinical spectrum for FDS, it can be assumed that the longer individuals go without fun, the more depressed they will become. Chronic lack of fun over time will always result in low self-esteem and the inability to enjoy activities that were once fun when they were new but have now become mundane. People suffering from chronic FDS will claim to lack the time or motivation to seek out new activities, and at the extreme end of the disorder, subjects will claim that seeking fun is a complete waste of time. This is a chronic lack of dopamine talking, and the only cure for people with FDS is to force them to go out and have fun. Unfortunately subjects with undiagnosed FDS may actually think they don't deserve to have fun, and that they don't even deserve to have friends, so snapping someone with chronic FDS out of their cycle is

not always easy. In extreme cases the only solution may be dancing, a surprise party, or a spontaneous and poorly-planned road trip. Bring beer.

People are the final component in fun... other people. Fun is always more fun when it is shared with other people. This is why partying is an essential human behavior for regulating feelings of self-esteem and social worth. Having fun with other humans in a social setting stimulates serotonin and oxytocin, two neurochemicals essential to feelings of security and

THE PERILS OF CFSS (Compulsive Fun-Seeking Syndrome)

On the flip-side of FDS, we find people who suffer from Compulsive Fun-Seeking syndrome (CFSS). People with CFSS are commonly referred to as adrenaline junkies, thrill seekers, compulsive risk takers and teenagers. While this syndrome is viewed as valuable by the gambling, prostitution, dope, and extreme sports industries, it should be noted that CFSS is a legitimate pathology with a distinct pharmacological profile. CFSS can be artificially simulated by dopamine agonists, including amphetamines, pot, caffeine and alcohol. More oddly, dopamine agonists used to treat Parkinson's Disease or Restless Leg Syndrome (RLS), which selectively stimulate

motor pathways and selectively avoid the reward pathways, can also cause compulsive behaviors such as gambling or financial risk-taking (See Resource). As the result of CFSS, we find people who chronically seek risky behaviors in the hopes of finding fun, but who fail to feel any long-term satisfaction from the rewards they receive. This syndrome is also called attention-deficit disorder (ADD), or it may be categorized by particular compulsions or addictions, but in actuality these are all symptoms of an underlying CFSS disorder. People with CFSS will become depressed in the absence of fun faster than people who do not have this syndrome.

RESOURCES

Medical therapy for restless legs syndrome may trigger compulsive gambling
http://www.eurekalert.org/pub_releases/2007-02/mc-mtf020807.php

being loved. So if you're feeling depressed and nothing seems to be working, the only solution is to call some friends and go out and have some fun. It is clinically proven to make you feel better. ☺

James Kent is the former publisher of Psychedelic Illuminations and Trip Magazine. He currently edits DoseNation.com, a drug blog featuring news, humor and commentary.



NANOPEOPLE

JOSH HALL

a nanoperson might get away with only a 100-times

On a strange and inhospitable waterworld circling Tau Ceti, a spaceship crash-lands, wrecked beyond repair. Its crew, doomed to die within a month from their rapidly dwindling stores and the planet's poisonous atmosphere, work feverishly to leave a legacy and in some sense complete their mission.

They re-engineer their cells into microscopic humans who can live in the puddles of the planet's rare islands, safe from the ferocious denizens of the deeps, and die in the hopes they have founded a new race of people.

Thus begins one of the classic science-fiction stories of the 1950s, "Surface Tension" by James Blish. It's one of the most memorable settings for an SF story (we'll pass lightly over characters and subsequent plot). Since it was written, the idea has entered the zeitgeist and, according to my uncertain memory, appeared in places as far removed as a Li'l Abner cartoon of the '60s and Disney's *Honey, I Shrunk the Kids*.

Blish's people were 250 microns tall, but for simplicity of calculation, let's talk about humans 1.7 millimeters tall, 1000 times shorter than the average wild-type human. Such people would have just one billionth the mass and volume of humans: nanopeople.

Is such a nanoperson possible? As far as the body goes, almost certainly yes. There are insects and other forms of life in that size range, so the possibility of an articulated, powered body with limbs is well established, even without resorting to diamondoid bones and Drexler-style

So we have the brain and the body. The thing is physically possible. The question remains: how close can the nanoperson come to having the authentic human experience? Suppose I decided to have myself reincarnated as a nanoperson? Would the world be comprehensible or too weird to cope with? Could I expect to live a happy, fulfilling life, assuming enough of my friends and relatives came with me?

Of course, I don't mean to ask whether life at that scale (let's call it the milliscale) would be just like life at the macroscale, but whether it would be close enough to be comparable to other adjustments humans have made over the millennia — from the sun-scorched plains of Africa to the glaciated fjords of Scandinavia; from the close, homey familiarity of tiny English villages to the vast concrete wastelands of LA.

First, the senses. Touch, taste and smell would be little affected. You'd hear in a different range of sound, but it would be mostly appropriate to the phenomena of the environment. Vision would be getting close to the edge of the diffraction limit — really small (to you) things might look fuzzy not because you needed bifocals, but because of optical laws.

estimate of available processing power closer to the edge but still seems well within the range of reasonable possibility.

To a nanoperson then, a millimeter would be like a meter and a centisecond like a second. If our nanoperson held an object and let it fall the length of his foot, it would take nearly a centisecond to fall the distance. And that would be in a vacuum — any object of a given density would have a thousand times the air resistance per weight as at macroscale. So you'd essentially live in a world where gravity was a long-term tendency, and things pretty much stayed wherever you let go of them.

This would be magnified by two more phenomena. First, there's surface adhesion. We don't notice this too much at the macroscale, but any animal smaller than a gecko uses it to great effect. In the natural world, everything is covered with sticky glue, which we call moisture.

Secondly, inertia wouldn't count for very much. On the other hand, remember the quip that to a close approximation, every animal can fly: to a close approximation, every animal is an insect, and to a close approximation, every insect can fly. Given very tiny wings to wave by

speedup of timesense compared to a macro-person.

electrostatic motors. With them, we can make a body of that size with such a large margin for error that we have wide latitude in varying the existing evolutionary designs (e.g. mites) to match human forms and capabilities.

The brain is a somewhat greater concern. In a biological implementation, the human brain doesn't have anywhere near the margin to shrink that our bodies do. We have to resort to a more efficient substrate, so that the nanoperson is in some sense an upload to a dedicated processor in a dedicated body. "Nanosystems" gives us a fairly sturdy lower bound of a gigaops (a billion calculations per second) per cubic micron for nanoprocessors, so that in the roughly one nanoliter of brain volume of the human-proportioned nanoperson, there'd be room for a petaops (a quadrillion calculations per second), comfortably high in the range of estimates of computation required for human-level thought.

But that's a limitation well within the typical range of the human condition. Probably the oddest change would be that people would probably need proportionately larger eyes to help with the acuity. A large part of the human experience is looking at people's faces.

One of the differences that might not be adequately appreciated today would be the effect of scaling laws (ponder the title of "Surface Tension"). Most physical laws scale so that the pace of motion, reaction time, typical frequencies, etc. at the milliscale would be 1,000 times faster than at the macroscale. On the other hand, if that were completely true, ants would run as fast as you do, and mosquitoes would fly as fast as falcons. There are factors mitigating the full-fledged scaling speedup, including the apparent increase of viscosity and disappearance of gravity with scale. So a nanoperson might get away with only a 100-times speedup of timesense compared to a macro-person. This pushes our

hand, our nanopeople — noticeably smaller than mosquitoes — would have no trouble flying. We may as well build them in.

The overall effect might be something like the world experienced by a scuba diver.

The bottom line is that things would be different, but not that much more different than many of the lifestyle changes people have made in our history. You'd have a whole new world to conquer, filled with fearsome beasts (insects) and grand adventure. We'd have picked up a factor of a billion slack in usable resources on the Earth (maybe only 10 million given the faster metabolisms). You could comfortably house the entire (current) human race in a building the size of a typical suburban house — or give each person a 5 million acre estate. ☺

J. Storrs («Josh») Hall, PhD., is president of the Foresight Institute, founding Chief Scientist of Nanorex, and author of Beyond AI and Nanofuture

Wake from Cryonics

Wealthy from Your Own Life Insurance

STEPHEN EUIN COBB

You can too take it with you – and enjoy it when you get back



The laws are complicated, and not stacked in your favor, but if done carefully it's possible to leave a huge death benefit payoff from your life insurance policy to your cryonically-preserved self. And since life insurance can also be used to finance your cryopreservation, you need not wait until you are rich to sign up. Most in the middle class, if they seriously want it, can afford it now. So by taking the right steps, you can look forward to waking up one bright future morning from cryopreservation the proud owner of a bank account brimming with money.

Don't get me wrong. Leaving money to your future self is complicated. The courts have decided that cryopreserved people are not suspended or preserved. Rather, they are irrevocably dead, and by being dead have no legal right of ownership or inheritance. These laws may change if the first cryopreserved people are resuscitated and sue for some new kind of civil rights, but that could be decades away. In the meantime, those who are not yet being preserved have spent years pondering and discussing possible methods of self-inheritance. They call it *Cryonics Estate Planning* and there are now at least three ways to achieve the goal.

One method requires individuals to join a foundation based in Europe that has no website and generally avoids publicity (like the piece you are reading now). It was created by wealthy cryonicists for the purpose of wealth preservation, as well as to fund both their cryopreservation and their eventual resuscitation. Meanwhile, Alcor — a more inclusive organization and one of the two main cryopreservation facilities in the United States — is in the process of developing a trust. And finally — for the use of his clients — Rudi Hoffman has created a trust.

Having written cryopreservation insurance policies for nearly a thousand people, Rudi Hoffman is well established as the world's leading cryonics insurance provider. As a certified financial planner, he also has a longstanding record of helping people leave money to their future selves, and thus avoid the worry of being revived from cryopreservation to discover that they are penniless in wonderland.

A cryonics activist, volunteer, speaker and writer, Rudi teaches cryonic preservation to the uninitiated. "I signed up for cryopreservation back in 1994," he said, "But being a transhumanist, it's my hope that medical science will advance fast

enough and soon enough that I never need to be cryopreserved. I look at cryonics itself as a form of insurance. If I need it, I've got it. It's always good to have a backup plan."

"The Hoffman Prototype Cryonics Trust," he explained, "is a method of sidestepping the problem that cryopreserved people have no legal rights by using a dynasty trust." Dynasty trusts have been used for a century or more in estate planning to make sure future inheritances are awarded only to specific people under specific circumstances — such as paying the tuition of a grandchild when they go to college but only if they maintain a B average. This separates the money from personal ownership, and yet allows the money to be awarded to the cryopreserved person after they are resuscitated.

"I just emailed a student graduating from high school who is signing up for cryonics," Rudi said. "This points up the egalitarian nature of cryonics; and how the leverage of life insurance can mean a kid with minimal resources can fund both his suspension and a cryonics trust for under a dollar a day." (Age, health, lifestyle choices like smoking, as well as the size of the desired death benefit payoff cause rates to vary widely from one person to the next.)

The courts have decided that cryopreserved people are not suspended or preserved... they are irrevocably dead and have no legal right of ownership or inheritance.

Do You Need Money in the Future?

Money, some insist, will have no meaning in a future dominated by advanced molecular manufacturing or other engines of mega-abundance. In this case waking from cryonics rich or poor would be exactly the same.

Ben Goertzel, Director of Research at SIAI, and CEO of Novamente LLC and Biomin LLC — both of which produce AI products for corporate clients — described it this way: "Most probably there will always be some issues regarding resource limitations, even in post-Singularity societies. But the reality we take for granted now, in which an individual needs to expend significant effort to acquire the resources to fulfill his basic physical, emotional or intellectual needs, is unlikely to survive after the invention of molecular nanotech, virtual reality and other advanced methods."

He added, "What seems most likely, if the future takes a positive path in which advanced tech is used in a generally benevolent way, is that a huge and rich variety of resources will be available for all sentient beings ... and negotiation for those resources that are still scarce will occur according to methods much more sophisticated than our current 'money economy'; methods which we have no current means to predict or understand."

While Rudi Hoffman is aware that advanced nanotechnologies may well produce a post-scarcity era of unlimited bounty for all — and is eager for such a day — he also knows that the cryonically preserved have no guarantee of waking into such a world. "Having a personal abundance of money," he said, "will preserve your options. And creating a pleasant and fulfilling future for yourself and those you treasure is all about choosing the best options." ☺

Stephen Euin Cobb is an author, columnist, futurist, game designer, artist, transhumanist and host of the award-winning podcast about the future called: The Future and You.

RESOURCES

Rudi Hoffman
www.rudihoffman.com

Alcor
www.alcor.org

The Cryonics Institute
<http://www.cryonics.org/>

Ben Goertzel
www.goertzel.org

PLAYING games

RAY HULING

Bionic Commando

Publisher: Capcom

Developer: GRIN

PlayStation 3, Microsoft Windows, Xbox360

\$59.99

inFAMOUS

Publisher: Sony

Developer: Sucker Punch Productions

PlayStation 3

\$59.99

Bionic Commando is surprising: it asks, “what could ’80s-era stupidity actually mean?” A reboot of a series launched in 1987, the new Bionic Commando retains the macho posturing and goofball premise of its forebears, but instead of merely riffing ironically on its retro weirdness, it tries to consider their implications. What would it mean to run around with a bionic hook-shot instead of an arm? Twenty years ago, this question was half-mechanical and half-whimsical.

Bionic Commando belongs to the platformer genre. It’s like *Donkey Kong* in that the core challenge of the game is merely moving through the landscape. Different from most

such games, *Bionic Commando* doesn’t rely principally on jumping to get from platform to platform, but rather on shooting a bionic grappling hook into walls and swinging around. That’s eighties innovation for you.

The legacy of this mode of locomotion weighs heavily on the new game. What worked for the 2-D side-scrolling games of years ago becomes tricky, confusing, and occasionally nauseating in today’s 3-D environments. Zipping across *Bionic Commando*’s post-nuclear cityscape is clumsy and frustrating, and even hooking terrorists and robots with your super arm is a drag.

The new iteration’s adherence to Rambo-esque hero conventions likewise falls flat. The main character’s name is still “Rad,” because that’s what having a bionic hook-arm totally is. Unfortunately, the game doesn’t play this stuff for laughs. Rad charmlessly sneers through his dialogue, which could have been sourced from a Mad Lib based on *Escape from New York*.

Bionic Commando does make a couple of advances over the days of Reagan, however. Instead of fighting Nazis and a resurrected Hitler, Rad



squares off against bionic terrorists, who are fighting a government crackdown on bionically-enhanced humans. Rad works for the government in exchange for his release from prison and information about his missing wife. The ultimate complication of *Bionic Commando* (which I don't mind spoiling because I recommend against playing it) comes with the revelation that Rad never actually lost his wife. Not all of her, anyway. Bits of her form part of the tech in his fantastic arm — a stroke of craziness that only the transhumanist milieu of the '00s could have inspired. As much as Rad's repulsively over-muscled physique and bad attitude belong to days gone by, so his existential — and risible — crisis of bio-enhancement belongs to the spirit of now.

inFAMOUS, by contrast, is a thoroughly modern game. You play as Cole, a gravelly-voiced bike messenger whose last package for delivery turned out to be the Ray Sphere, a bomb-like MacGuffin that sucks up “bio-energy” only to release it explosively. Caught at ground zero when the Sphere blows up, Cole not only survives,

Rad's repulsively over-muscled physique and bad attitude belong to days gone by, so his existential — and risible — crisis of bio-enhancement belongs to the spirit of now.

but gains electricity-themed superpowers. The rest of “Empire City” doesn't fare as well — thousands die, and a strange plague infects many of the survivors. Cole's story traces the Ray Sphere back to its source, with plenty of sidetracking along the way.

The game embraces three media: open-world video games, superhero comic books, and role-playing games. Cole can travel widely in Empire City, following side missions as he likes, but he moves the narrative ahead by restoring power to the city's grid. Turning the lights back on also adds to Cole's repertoire of abilities, a neat way of bonding the character to his environment. His movements express the setting, too. He performs parkour tricks with real weight to them, and, as he becomes more potent, he zips along power lines and cables and railroad tracks as if surfing lightning.

On the whole, however, his powers are unimaginative, mainly guns and grenades dressed up as crackling arcs and blobs of current. These special effects, dull as they are, do complement the rest of the game's visual style, which borrows heavily from contemporary comics. Much of the game's cut-scenes consist of still, stylized, painterly images with voice-overs, and, even in play, the characters have a hand-drawn look.

inFAMOUS also attempts to deliver some of the moral complexity of modern comics. Along with a system that allows players to buy powers in the manner of a role-playing game, *inFAMOUS* boasts a childish morality mechanic. Player choices determine where Cole falls on the scale of good and evil. “Infamous” is the farthest one can advance on the Evil meter — a feat accomplished through “Evil Missions” and evil acts. Worse, most of the enemies in the game are “junkie drug dealers” and homeless people who have taken up arms against the good citizens of Empire City. The moral quandary you may experience is likely not the one that the game makers intended.

But *inFAMOUS* does have something to say about superpowers — in this game, you don't get them without taking from other people. Cole's strength flows from both the city and its populace. He can recharge himself by draining an electrical transformer or a person's life force, the latter being an evil act that tends one toward infamy. Or he can take power from the grid and use it to heal the sick and wounded. Either way, he remains a parasite. As with *Bionic Commando* and the current big hit *Prototype*, *inFAMOUS* both reflects the transhumanist zeitgeist for its technobabble and articulates fears of the direct, human cost of even a single person's enhancement. ☹

Ray Huling is a freelance journalist living in Boston. He is working on a book about shellfishing in Rhode Island.



Courtesy of Sony

RESOURCES ↴

Bionic Commando
<http://www.bioniccommando.com>

inFAMOUS
<http://www.infamousthegame.com/>

8 RECOMMENDED BOOKS



THE BURNING SKIES DAVID WILLIAMS

SPECTRA

The Burning Skies is the second book in David Williams' "Autumn Rain" trilogy, a political-military science fiction story set early in the next century.

Imminent singularities and dreams of post-scarcity utopias long ago gave way to a global ecosystem in full collapse, a global economy close behind, and once-democratic nation-states now run by high-tech warlords. Into the simmering conflict between Eastern and Western superpowers comes the terrorist Autumn Rain movement, nightmarish post-human global guerillas. In the first book in the trilogy, *The Mirrored Heavens*, Autumn Rain brings down Earth's space elevator. In *The Burning Skies*, the

group attempts to decapitate Eastern and Western superpower leadership.

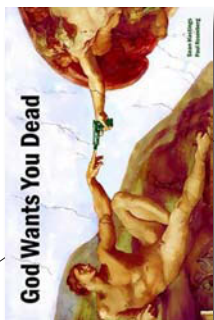
Our protagonist in this mess, Claire Haskell, is so deeply wired into digital networks that she may no longer be truly human. She's a complicated figure, and her true allegiances remain muddled, even to her. Few of the characters are precisely who they seem, in fact. Williams has a gift for paranoid storytelling.

As relatively near-future hard science fiction, *The Burning Skies* (and its predecessor) offer up abundant conflict, well-grounded in both technological and political possibility. Moreover, the underlying story — of the politics of post-humanism and power — is well worth reflection. This isn't to say that the Autumn Rain stories are meandering philosophical debates; nearly all of *The Burning Skies* takes place over the course of one very long battle, and military SF aficionados will delight in the details.

It's a depressing future, to be sure, but Williams has a knack for making it seem perversely attractive, and filled with the potential for something greater to emerge from it. — Jamais Cascio

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<http://www.amazon.com/gp/product/0553385429?ie=UTF8&tag=betterhuman01-20&linkCode=as2&camp=1789&creative=9325&creativeASIN=0553385429>



GOD WANTS YOU DEAD

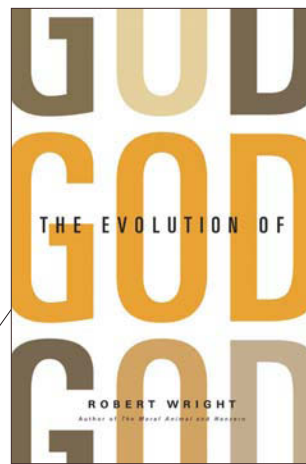
SEAN HASTINGS
AND PAUL
ROSENBERG

VERA VERBA

Sean Hastings, an original cypherpunk and one of the major shakers behind the Seasteading Institute (floating communities outside the law) calls bullshit on most of our society's treasured beliefs from a radically anarchistic perspective. You have to buy this book just for the title! — RU Sirius

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THE EVOLUTION OF GOD ROBERT WRIGHT

LITTLE, BROWN AND COMPANY

How has our notion of god evolved... and why? Incorporating game theory and evolutionary psychology, Wright takes us through the ages and shows us positive change as the "circle of consideration" (those who we do not treat as others) continuously expands. — RU Sirius

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THE PLAYFUL BRAIN: VENTURING TO THE LIMITS OF NEUROSCIENCE

VIVIEN PELLIS AND SERGIO PELLIS

ONE WORLD PRODUCTIONS

This is a rather scholarly treatise on play in complex mammals (mostly rats, but including us). But by the end of the book, the authors support the notion that some play simply escapes any functionality (in evolution or development) we might ascribe to it. Sometimes monkeys just leap crazily, for the hell of it. — Pat Kane

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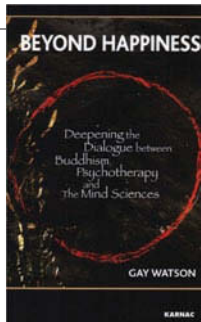
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No surprises here, but a very elegant and useful overview of how a no-self philosophy is backed up by latest neuroscience. Helpful and trans-humane. – Pat Kane

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EXULT
JOE QUIRK

VOX NOVUS (PAPERBACK)
SCRIBD (ELECTRONIC)

Our very own humor columnist Joe Quirk takes on risk and hang gliding. This book soars through the clouds (Kite Runner author Khaled Hosseini has praised the book to the skies... twin spirits there — Joe and Khaled). Quirk doesn't skimp on his humor. And if you're looking for dude-lit with vision (and a hint of evolutionary psych), this one's for you. – RU Sirius



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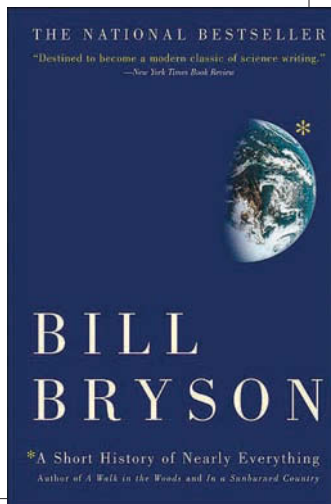
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A SHORT HISTORY OF NEARLY EVERYTHING
BILL BRYSON

BROADWAY

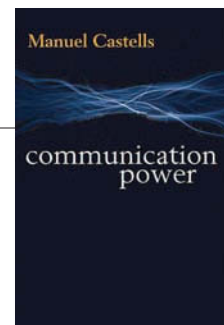
A fascinating and delightful tour-de-force of a book. Bryson summarizes what we know about the world, especially through the history of science. If you like reality, and appreciate those who bring us closer to a clear description of what is really going on with life, you will enjoy this book.

Radical technology advocates need to have a grounding in the history of science. And Bryson lets us take this trip with him, as we discover the broad brushstrokes and the human anecdotes of the scientific discoveries that impact our lives everyday. – Rudi Hoffman



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THE PURSUIT OF CRAPPINESS

JOE QUIRK

Did you enjoy reading your little transnerdulist magazine about pleasure, prancing and sustained orgasm? Now you expect a little humor, don't you? Well, guess what? I'm not in the mood.

I was in a yoga class this morning, listening to the soothing sounds of the instructor telling me to lean backwards until I stick my nose up my own ass, and if I feel snapping and popping to just go with the flow. The gentle croon of the flute made me grind my teeth, the trickle of the fake waterfall made me have to urinate, and performing the "twisting willow" maneuver made me have to fart. Seeing a mirror everywhere I looked – that was the final sadism in this crap my wife makes me do to lower my stress. At six goddamn AM.

If you're not from California, you will need me to explain. Yoga is an ancient spiritual practice designed to clear the body of gas. By contorting your joints into exquisitely painful positions, it helps you appreciate life when you're not contorted into exquisitely painful positions. I'm built like a fire hydrant — and I'm about as flexible, so I distracted myself from my seething rage by contemplating this issue's general theme of human happiness.

Try this test. Read some Kahlil Gibran poetry while having your hemorrhoids removed. See if you are profound enough to appreciate the miracle of your moment-by-moment existence. I was audited last year. To sooth myself, I read *Chicken Soup for the Soul*. Didn't help.

Profound people can see the miracle of each moment. Good for them. What about us shallow people? We pay gurus to teach us how to stop being miserable.

Now I'm listening to yoga twerp tell me and a group of huffing, puffing sweaty women that stress does not come from the "world without" but from the "world within." Interesting theory contortionist boy. My personal theory is that stress is caused by everybody constantly pissing me off, and not shutting the hell up while I'm trying to stick my elbow into my armpit because it's good for my health. Hey ladies, how about instead of the "twisting willow" maneuver, we twist the head off yoga boy? That would relieve some stress. Instead, yoga twerp recommends meditation.

Meditation? Guess what that's about? Acknowledging that our default state of mind is a torment. Why do we have to put *effort* into stopping our thoughts from torturing us? Does my dog need to twist his body into contortions to stop himself from neurotic thinking?

No, and it ain't because he's spiritual. It's because his species hasn't evolved our style of bloated frontal lobe. That's the part of the human brain that's in charge of imagining long-term future scenarios and choosing among them. Hominids with a deep sense of well-being didn't pass on as many genes as hominids whose anxiety drove them to worry about their children, stress about the next draught, and complain that their hand axes need to

be redesigned to prevent calluses. Thus I inherit a brain specialized for bitching. My meditation guru tells me to "observe" my thoughts and "go with the flow," but you don't go with the flow when you're on shit creek.

Are there any legitimate methods for sustaining happiness in the bitching brain? Nancy Etcoff, Harvard psychologist and author of *Survival of the Prettiest*, typed "happiness" into Amazon and found over 2,000 titles that promise to deliver it through the 7 habits, 9 choices, 10 steps, 12 secrets, and 14,000 thoughts of deliriously happy people. This pisses me off. Suppose I read all 2,000 books. Will I be any happier? If anybody had any clue, why would we need 2,000 books?

Tens of millions of us are clinically nuts. How do I know this? There are 120 million medications for anti-depression at large night now.

What do we need to keep our civilization running? Economists will tell you: gas, oil and illegal drugs. Each represents about 8% of the world trade. That's about the right ratio for my personal economy too. I need to drive, buy crap and medicate myself.

Otherwise, I'd have to shoot some of you. We Americans have one of the highest homicide rates among developed countries. This sounds like a big problem until you realize our suicide rate is higher than homicide rate. Most Americans, when given the opportunity to kill the person they hate say, "Oh, to hell with it. It's easier to kill myself."

Satisfaction sustained. Empathy mutual. Trust utter. Love permanent. Energy infinite. Violence extinct. Suffering banished. Everything that nature isn't. ”

It's a species-wide behavior. Each year, some 800,000 people across the planet off themselves.

What's our problem? I'll tell you what our problem is. We humans are smart enough to figure out what a raw deal existence is.

One of my favorite beach reads is Schopenhauer, who, as far as I'm concerned, made a pretty airtight argument that life is neither good nor indifferent. Life is evil. Life has exquisitely designed every living thing to hurt and kill other living things.

Think about it. Each of us must kill to feed. Nothing that gets fed upon wants to be killed. You will not survive without participating in this evil. There is no way out but death.

Laughing yet? If you refuse to kill to feed, the universe punishes you with a slow torturous death of starvation. The only thing life demands is that you kill. The only sin life punishes is not killing. The only commandment: Thou shalt not kill.

As The Schopster put it in his chapter, "On the Vanity and Suffering of Life": *This world is the battle-ground of tormented and agonized beings who continue to exist only by each devouring the other. Therefore, every beast*

of prey in it is the living grave of thousands of others, and its self-maintenance is a chain of torturing deaths.

If Satan wanted to create the perfect gladiator arena of evil, it would look exactly like the natural world we are in. Schopenhauer says the Secret of Life is: Hell is all that exists, and it requires evil from me if I am to survive. The only way to escape Hell is death. The only way to escape death is to keep killing. And every one of us is doomed to lose.

Bwa! Ha! Ha! Ha! This humor column is on a roll now! When our species became self-conscious and future-thinking, the first thing we noticed is that life is too horrible to live. But death is too terrifying to embrace. Yet there is no third alternative. So we make up a bunch of lies to distract ourselves from the horrible reality of existence.

Go on. Click on another link. Flick another switch on a screen. Stick an earPod into your skull. Twist yourself into a contortion. Go find a god and pray. Anything to distract yourself from the existential hole at the core of your being that drives your ambitions, the acid of self-consciousness that eats away a gaping cavity of boredom that waits for you in the next moment and will continue in an endless march of moments until you die.

Schopenhauer goes further. He says that if empathy really existed, there would be no enjoyment. After all, suffering is everywhere. If we really cared, we'd be perpetually empathizing. But we don't. Why? Because you can't simultaneously be compassionate and content. The existence of enjoyment proves empathy is a fleeting self-indulgence.

So why do we keep struggling to increase the suffering of other sentient beings in order to survive? The illusion of hope. If I keep chasing my next desire, maybe I will finally catch the carrot of sustained happiness that will not wither as I grasp it. That's the hedonistic treadmill.

The only way to end your participation in an evil universe designed to create suffering is to end your mindless Will to survive. If you were truly a being of pure compassion, you would kill yourself right now.

I don't know if this is because I went off my Celexa this week, but it seems to me that Schopenhauer's gift was that he divested himself of the delusions required to survive with a human brain. You want to talk about a guy who stared into the abyss and did not relent until he had used flawless logical steps to march all the way to the bottom. Reading a chapter of Schopenhauer is like listening to a Nirvana album start to finish.

Was he crazy? Psychologists have established that healthy people radically over-estimate the amount of control they have over their lives. The only people who accurately assess how much control they have over experimental situations are the clinically depressed. That's right, depressed people are the most uniquely skilled at accurately predicting their control over outcomes. Re-instilling their delusion of control is called curing them. Damn, did those results ever depress me.

So here we are, a self-conscious self-lacerating species whose



Illustration by Joel Watson

perpetual sense of dissatisfaction drove us to develop genetic engineering, mood-altering drugs, biotechnology, nanotechnology, artificial intelligence and plastic surgery. We can change the whole ball game. We're all Michael Jackson now. The general response from critics? "Shouldn't we leave well enough alone, trust in the wisdom of nature?"

We may not have the collective wisdom to tinker with nature. But then again, neither does nature. Wisdom teeth don't speak well for the wisdom of nature. I don't think it was very wise to create inside-out retinas that give us blind spots. The pointless bursting appendix, spine and knees incompletely designed for upright tottering, tubes for breathing and swallowing so close we choke, babies who kill their mothers breaching their thick skulls. And whose idea was it for the urethra to pass through the prostate gland? Nature, that's who.

Bad news. Our brains were designed by natural and sexual selection. Our sublime state of complexity and beauty has resulted from a few billion years of struggle which has had no regard for optimizing human happiness. Happiness, as Arthur "Sunshine" Schopenhauer elucidated, is the carrot on the end of the stick that keeps us moving for nature's ends. Rare fleeting nibbles keep us running on the treadmill. Suppose we could rig the stick so we could munch the carrot?

Satisfaction sustained. Empathy mutual. Trust utter. Love permanent. Energy infinite. Violence extinct. Suffering banished. Everything that nature isn't. ☺

Stretch. Blank your mind. Be.

Joe Quirk is the author of humorous science books and philosophical novels, most recently, EXULT, a story about hang gliders who live out the Icarus myth.

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* See: Rose, Michael R., *Methuselah Flies: A Case Study in the Evolution of Aging*.
London: World Scientific Company, 2004.



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