# THE EXTREMOPHILE CHOICE: A QUICK TOUR

A pictorial introduction to the key concepts in the e-book: Darwin, Dogen, and the Extremophile Choice (Fifty Short Essays on what it means to be Human in the Natural World)

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**Extremophile**, an organism that is tolerant to environmental extremes and that has evolved to grow optimally under one or more of these extreme conditions, hence the suffix *phile*, meaning "one who loves." - Encyclopaedia Britannica

Hydrothermal vents are 400-deg C radioactive pressure cookers located in the total blackness of the ocean floor, but ancient bacteria thrive here, drawing energy from sulphur instead of oxygen and supporting a community of other extremophile organisms.





**Polyextremophile** *Tardigrades*, also known as water bears, can survive in multiple environments that we would consider unliveable, Tardigrades are generally less than half a millimeter long, and they can live without water or food for 120 years; withstand pressures six times higher than those found in oceans; survive temperatures just above absolute zero and above boiling point; withstand radiation levels hundreds of times higher than humans can handle; and they can even survive the vacuum of space.

*Lichens* are a symbiotic relationship between a species of fungus and a species of photosynthetic bacterium or alga. They have the ability to bounce back from prolonged periods of desiccation, withering into a dormant state when water isn't available, then coming back to life once they're moistened again. Lichens possess hair-like strands called *rhizines* that penetrate, and anchor them, to rock, eventually creating soil. It's possible they could even be transplanted to carefully selected places on the surface of Mars.





According to the *panspermia* hypothesis, life on Earth may well have evolved from extremophile *Archaebacteria* that arrived here from interstellar space. If this is the case, then life on Earth has now come full circle, except that the latest extremophile to arrive (evolve) on this planet no longer needs to wait for slow genetic evolution to diversify as separate species adapted for various conditions. In principle, this **adaptive extremophile** can use technology to survive, or even thrive, on any frontier. Is it fair then that we should use this advantage to compete for the habitats of species that are not extremophiles?

# Page 2 of 12 - THE EXTREMOPHILE ATTITUDE

The Extremophile Choice is not just about tools, architecture, and infrastructure. It's **also about attitude**. It's about what makes our minds different from other animal minds that are confined by ecological imperatives that don't change on a technological timescale. A species takes many thousands of years to change. We on the other hand evolve day to day. And when I say evolve, I now mean not just our minds, but our *forms*. This is what makes us different physically, and it's *why* we're always pushing the envelope mentally.

Humans are **adaptive extremophiles**. My brother Terry is shown here, but his extremophile nature can't be fully captured in this frame. If the camera were to zoom out, and take in the full height of the cliff, his image would be only a speck against the ice. (See his story below to learn more about how his attitude and understanding of the technology he and Valerie Ng develop at *Esprit Ropes* "evolved" during this climb.)

A little speck on a precipice is a good image of what it means to be wild, and recapturing the vulnerability of a lost wildness is a big challenge to an inventive animal who has, as a direct result of living in a technological 'niche', also invented 'tameness'. But all is not lost, for **our special kind of 'innovative wildness' is not found among other species**, and herein lies our hope.



#### Terry's Story:

They say the Inuit have twenty six words for ice and snow. The ice in the picture you're looking at is actually tubular (hollow). It was my second season of ice climbing and because I was living in an area where there wasn't a climbing community, there was no possibility of getting what's known as a belay (a catch if I fall). Because the only style I was into at the time was, 'from the ground up', I was rope soloing with a rescue sender (a camming devise), anchoring the dull end of the rope to a large tree at the base of the climb. I had 30 meters of 8.5mm climbing rope stacked in a rope bag and attached to my lower left leg. The rope came out of the bag, up through the camming device, and on down to the tree below, and as long as I put in protection (various passive and non-passive devices into the rock or ice), and I was clipped into it with a carabiner, I would be caught by the system if I fell.

In the picture you can actually see my last pro, a small TCU (triple camming unit) well below me to the right of the large icicle. At this point in the ascent I was trying to get an ice screw in, but it wasn't to be. The ice had too much air passage in it, and in the event of a fall the screw would rip out. Every good climber knows how to reverse the moves and down-climb to safety, but in this case the icicle below me was too shaky, and the base was still 30 meters above the frozen lake.

Even today, years later, I remember the fear welling up in me as I contemplated my situation. For the past two seasons I had thought about soloing without rope many times, but now it was the only option. It had been a sunny afternoon in late March, and water was dripping everywhere, but suddenly the temperature started dropping as the sun disappeared over the forest. By the time I reached the summit the rescue sender was freezing to the rope and not allowing it to pass. To this day I remember how it felt to release my protection and watch as it plummeted to the lake below. Only a few more moves to safety and... I had survived.

That was in fact the last time I rope soloed. From then on I climbed pure, with no distractions. Now whenever I'm with young aspiring climbers I tell them some things appear to be very dangerous and are actually not. Just as some things can appear to be really safe and aren't. Eventually we learn. Cheers.

Postscript: I named the route 'Air Head'

# Page 3 of 12 - TECHNOLOGICAL INTELLIGENCE



Of course the human brain has had to rise above its animal foundations in order to accommodate this accelerated adaptation, but in some ways **we have paid for this "ascent"**. My daughter Jessica here, with technology such as this purple dynamic rope developed by her uncle and aunt at *Esprit Ropes*, will eventually be able to go where no mountain goat has gone before. But for now, her thinking mind keeps conjuring up fearful images unknown to the goat. Luckily, part of her high tech gear is a zafu meditation cushion that helps her rediscover that "original mind".

This is important for both Man and Nature it turns out, for understanding the systems of nature is *not* the full solution to the damage we've caused. In fact it seems the more we 'manage' Nature the more the damage. But as we **see deep into our own intelligence, we naturally aspire to help other Intelligences fulfill themselves**.



## Page 4 of 12 - NATURAL AND UNNATURAL



Our extremophile natures want to rise above it all. Above the animal need to follow the rules that Nature has imprinted on our genomes. Above the limits that Nature has sculpted into our bodies even.

Especially this! For other animal minds must stay true to their bodies, and only humans can extend bodies. Which means we are not subject to *competitive exclusion*, the organizing principle of evo-ecology.

Thus we are un-Natural, for if we choose to compete with *any* other species, that species will lose. One could even argue that such a choice itself is "unnatural".





The picture above reminds us that reaching for the heights doesn't always have to be so physical.

的自由意思



We are still confused when we try to make this seemingly urgent distinction between what's "natural" and what's "unnatural". It's a definitively human distinction, so we are torn between two "natures" when our minds, driven by animal impulses, fear the hubris of technology even while our human spirit embraces technology to make its escape.

It's not really "Natural" to enter the wilderness and not get caught up in the inter-feeding: the give and take of body-stuff according to one's place in a food web. And in this sense it does seem we are becoming less Natural lately. Inattentively at first, as guns replaced spears, and more consciously now as cameras replace guns.

People will always have problems with being unnatural, in the sense of being in conflict with our human (and especially cultural) natures, but it's becoming more and more apparent that being un-Natural is not the problem; it's the solution.



I grew up on this river. It's fed by 3 lakes, and its 30-mile course is flanked by beaver ponds, cattail marshes, sedge meadows, shrub swamps, open bogs, grassy and shrub-sapling openings, mixed needle-leaf and broad-leaf forests, and lowland forests. These many habitats would make it one of the most diverse Natural Systems in the world, if not for the recent human history of logging, trapping, farming, and transporting invasive species.

The magnificent elm trees that once overhung the lower reaches where I still live, were lost to a disease hosted by a beetle that we inadvertently transported from Europe. The fungal disease itself came from an unrelated ecosystem on the far side of the planet. But this was just the latest example of our human impact. Many species were already disappearing as first rifles, then snowmobiles, chased away the timber wolves that kept populations in balance. Contrary to what we once thought, species become more diverse, not less diverse, when ecosystems are consistently cropped by these 'apex predators'.

If it is indeed human nature to be always pushing the envelope, then consistency is not an option for us. Thus, neither is inter-dependency. Human 'harvesting' can't be relied upon from one government to the next, let alone for the lifetime of a species. And, unlike the wolf, we have nothing to give in return.

#### Page 6 of 12 - KEYSTONE SPECIES AND COMPETITIVE EXCLUSION



The beaver is a keystone species that modifies its environment in a way that creates habitat for many other species. And because, like the elephant, the bison, and the Bolson tortoise (now endangered or extinct in their former ranges), it actually restructures the physical environment, it is sometimes called an 'ecosystem engineer'. But we must not let this reference to human *applied science* confuse the reality of Natural Creativity.



**The organizing principal of species association itself is** *competitive exclusion:* Once an ecosystem is fully diversified and stable, any organism born with traits outside its species norm will experience greater competition from other species that have optimized those traits already, thus the 'misfit' organism is less likely to contribute to a next generation of its gene pool. This is how an Intelligent Nature 'partitions its resources'. [Notice that, in the wild, even learned behaviours must conform to the greater biological system of optimized bodies. So when we human beings accessorize our bodies with technology, we necessarily defeat Nature's System.]

# Page 7 of 12 - ECO-EVOLUTIONARY INTELLIGENCE





[Note: This page has extremely high pixel density, to allow you to zoom in on all those little dots. It's this one page that makes the entire file so huge.]

## Page 9 of 12 - ECOLOGICAL GHOSTS



Over two thirds of American megafauna went extinct 13,000 years ago after the arrival of humans.

too high up for any current species to eat and disperse the seeds naturally?

The pronghorn has no natural enemies. Only extinct cheetahs that once hunted the plains of North America could catch a running pronghorn. Large or dangerous species go extinct whenever tool-making humans show up. This is a consistent feature of the fossil record. (The process in Africa has been much more gradual, for it started with Homo erectus two million years ago, allowing time for

a small fraction of megafauna to adapt.

Until now.



name to the Great found just woot of y

orange

These features speak of ecological ghosts.



Can this trend be changed by appealing to Love of Nature, or to Fear of Lost Resources? So far the prospects don't look good.

#### The Extremophile Choice is about unsentimentally

examining the relationship between technological intelligence, which seems to be accelerating in power, and the much slower intelligence of gene-regulated evo-ecology. The question then becomes: What is technology for? Our answer to this question will surely have profound consequences for both Man and Nature.

# Page 10 of 12 - WHAT DOES IT HURT?



Easter Island is often cited as a poster child for environmental short-sightedness, but the really alarming thing about the Easter Island story for me is this: when Europeans first arrived there, they did not find a miserable human population. (The hardship of subsequent years was largely a result of that contact.) The Rapa Nui descendants of those early Polynesian tree-killers were quite content, and heartily feeding on the roasted rats and chickens they introduced, and the produce from rock gardens cleverly designed to protect young plants from the harsh weather of a treeless island.



So, if it turned out they didn't need the trees, what did it hurt to cut them down?

If the Rapa Nui miss the species they supplanted, it doesn't show any more than such things show for the rest of us. A shadow on the collective memory perhaps. A hardly perceptible, one might even say a ghostly, veil we've drawn over our self-awareness.

## Page 11 of 12 - A TALE OF TWO NATURES

Over 80% of the population of Canada and the US live in the city. Most wouldn't have it any other way. Nature is not served by our bemoaning this, but by our embracing it as a sign of an extremophile nature that has yet to be fully realized.

Realizing it might give some relief to both natures.





We have been using the prolific, but self-contained, intelligence of evolving bioassociations as if it were our slave; and a taker, with nothing to give in return, will surely adopt the warped mentality of a slave-master.

**Technology is meant to free us and Nature too** from an 'interdependency' that is the vast illusion of not just a pre-Darwinian mindset, but of a simplistic interpretation of the evo-ecological message: there is **no such thing as sustainability** when you take from an already balanced system in which you no longer have any part. The good news is that what we do now on a small scale we can do on a larger scale. Is it naive to suppose that much of the unease we do find here is caused ultimately by **the ghosts of species displaced** from one of the richest Natural systems in the world? The city of Toronto was plunked down where the Humber River enters Lake Ontario only 300 years ago, and it's been sprawling outward ever since.



For instance: 80% of all office space and 35% of commercial space in downtown Montreal is underground already. In winter, 500,000 people use this underground city. What can we do in another 300 years?

Young Street Toronto

Just look at this. Arrrgh! I get angry when I see what human beings are doing to one another, and to the

gifts entrusted to us by our ancestors in their sporadic wisdom. Just as I get angry at what we, in our original ignorance, are doing to Nature's original intelligence.

But then when I take the trouble to look into my own nature, I can see where all this fear and anger is coming from: an **out-dated animal territoriality**, and an incomplete understanding of our place in an intelligent universe. (Syria's civil war was originally motivated by limited access to receding groundwater, not religion.)





And so I have hope that change is already happening, as a new generation, transfixed by an unprecedented surge in the disparity between the timescales of **two sovereign intelligences**, is compelled to see this too. And, though we are born in the shape of animals, we must finally come to know our proper nature.

# Page 12 of 12 - PEOPLE MATTER



The problematic 'Green Revolution' can be improved in the digital age, with targeted irrigation, and higher diversity of micro-managed crops. The habitat we do displace must at least be used non-destructively.





And it seems, despite this massive footprint, our food supply will still have to increase 50-70% by the year 2050 to adequately feed a world population of 9-billion.

Of course *supply* is not the whole story when 30% of food produced now is being *wasted*!



By 2050, 70% of the world's population is projected to be living in urban areas. But right now almost 50% is still rural, and many of these people depend on subsistence farming with primitive methods that produce poor yields, and contribute to desertification. In some cases, just by providing these people with some basic technologies and health services, yields might be increased by as much as 300%!





If our future is seen only in terms of developing the best land and 'natural resources', territoriality and isolationism easily become excuses for letting 'other' people starve, or worse. But if the future is seen as a continuing effort to *free up* Natural habitat, only then

do we become highly motivated to find ways of sharing leftover food, and the means of food production. Money, which is too often treated as a commitment to 'progress for the sake of progress', is really just an imperfect measure of our share in a larger human effort. **This effort itself, with a clear view of our place in an intelligent universe, is the gold standard of Extremophile economics.** 



These numbers are necessarily approximate. But my 'back of the envelope' calculations show no reason we should be overwhelmed by the Extremophile Choice. The real problem has always been **lack of clear direction** for an animal that doesn't know what its 'gadgets' are for. When we finally see where we're going, we should be happy with every little step we take.

