# The NuNaturalists, or: Biology as Capitalism's Technological Solution to the Environmental Crisis

**Oran Goral**
IDC Herzliya, Israel
oran.goral@gmail.com

**Shira Shvadron**
IDC Herzliya, Israel
biwashiwa@gmail.com

## ABSTRACT

As the climate crisis breaks new records, humans understand a change is necessary. In recent decades humans have become more aware of the exploitation of nature and its consequences. This exploitation is ingrained in the human psyche as we see machines, tools, and animals as an executive extension of ourselves. In the meantime, new technologies are created, inspired by biology, and integrated into it. These technologies may take part in solving the environmental problems without reducing human living standards or threatening the economic system. To discuss those issues, we designed the NuNaturalists society. This society developed an ecosystem based on natural-biotechnology that aspired to minimize their polluting footprint. They do that by utilizing animals and other living beings, and without compromising their lifestyle. This society perceives itself as harmonious with nature, but in fact, they exploit it in a way that was never seen before.

### Authors Keywords

Speculative Design; Climate Change; Biotechnology; Genetic Engineering.

### CSS Concepts

• Human-Nature-Machine~Interaction~Biology-Technology

## INTRODUCTION

*"At the end of the technological path is the biological solution"*

The slogan of the Israeli Police Dog Unit

Is a biological solution, like police dogs, can be thought of as a technological solution? When do the intervention and the cultivation of nature are considered a technology, and when do they cross the lines, becoming exploitation? Those questions are relevant to every period since the agricultural revolution, but in recent years their subject regained a new meaning, as the border between technology and biology was blurred. In the meanwhile, the necessity to deal with those questions became emergent due to the ongoing climate crisis.

### Back to Nature

The environmental crisis has led to different consequences on human society. First, it demands the creation of green technologies. While these technologies are seemingly meant to lower humans' environmental impact, they have another role: keeping humans' living standards, and preserving manufacture and consumption. Second, the crisis raised a debate. This debate, and the standpoints taken toward it, became powerful enough to divide and define social groups, shaping individual identities. Third, this debate has led to new social values - good technology is green technology, good politics is green politics. As those values became more essential to society, they were commercialized, being manifested again as marketing values. A good product is natural, a good manufacture is organic, a good brand is green.

The environmental movement could easily be thought of as an anti-capitalist movement; the green movement directed its cross against the problems created by capitalism and consumer culture. But like other counter-movements [6], capitalism was quick to reconstruct it into marketing values and brand identities. This is a dialectic process: while environmentalism is integrated into capitalism, both ideas gain some and lose some.

Green technology is a key factor in allowing the successful integration between environmentalism and the market economy. The new shape of this technology could be developed on the basis of biology when the least underlies the first.

### The Biotech Shift

Until the last decades of the 20th century, technology was distinctly far from its natural resources. The higher and advanced technology was, the farther it got from nature. The basin irrigation of Ancient Egypt or the herding dog feels like a slight redirection of nature compared to the steam engine, "Little Boy", "Fat Man", or the personal computer.

But recently, this process has started to change its direction. First, new technologies are designed especially to be embedded in living bodies, augment and extend them. From smartwatches to Neuralink, *technology is increasingly embedded in biology.* Second, new technologies have always been inspired by the biological world, but in recent years this approach expands to new areas, like neural networks or artificial photosynthesis. At the finish line of these processes stands the complete reconstruction of technology as a biological entity, with technologies like bio-computers or DNA storage. In other words, *biology is increasingly embedded in technology.* CRISPR indicated the friction point of these new processes, dissolving the final line between biology and technology. The use of animals is no longer limited to training or to slow artificial evolution. The natural environment could become the substrate of new technologies. On this theoretical basis, we designed the NuNaturalist society.

### The NuNaturalists

As a backlash to the environmental crisis, this society started a dialectic process in which it went back to nature, without neglecting the comfort of technology. In this process, humans started using animals and biological beings as technology - using animals as technological means instead of industrial polluting products. This approach became possible by new developments that allowed a deep intervention in living beings' genetics, hacking them into human needs.

## RESEARCH OBJECTIVES

The increasing integration between biology and technology raises several questions. How will those new technologies be used and for which purposes? How far could technology and biology be embedded? What will be the consequences of this process on living beings? What social values would be preserved, and what new values will evolve?

The answer to those questions will be determined according to the human condition. A rapid change in this condition occurred in recent years, when the environmental crisis became one of the strongest forces to set the direction of new technologies. Can new technologies supply a solution? Could green technology replace traditional technology? And if the solution is technological, what does it say about this society?

Our approach was to look at current solutions that offer real, tangible integration with nature. Since our society holds the roots to the NuNaturalists, we designed this society as an advanced incarnation of us – of our technology, economy, and beliefs. Thus, this work investigates the interaction between environmentalism, capitalism, biology, and technology. It is designed to explore the friction point of these forces through their extreme expression and the final settlement of the conflicts between them.

## RELATED WORK

The industrial revolution has influenced the way we perceive the future: in the 20th century, we used to imagine that future humans will become integrated with machines. An example of that could be seen in classical works from this period, like Metropolis, Marinetti's Manifesto of Futurism, soviet sculptures, or The Matrix. Imagining out of different circumstances, we wanted to think of a different future. Current imagination is not lighten up by the power of technology, but by the power of its environmental consequences. Instead of describing the movement through industrialized machinery disotopy, we described the movement toward industrialized nature.

In the same manner, we examined the way humankind has cultivated living beings and is still exploiting them in infinite ways. Critical Design works such as "Life Support" by Revital Cohen & Van Balen, described transforming animals into medical devices. "UmK", by Dunne and Ruby, presents different fictional futuristic societies. One of thoe societies is the "Bioliberals"who chose to pass technology, and to go back to uncomfortable natural life [1]. These works directed us to design a new ecosystem.

In designing and expanding our proposed ecosystem, we took inspiration from various sources of Design, Art, and Popular Culture. Sofia Crespo, a Visual Artist working with biology-inspired technologies, focused on the way organic life uses artificial mechanisms to simulate itself and evolve. The 15th-century triptych oil painting, "The Garden of Earthly Delights", by the Early Netherlandish master Hieronymus Bosch has inspired us to imagine how this unique society will look like in its natural habitat. The logic of fantastic movies such as Harry Potter, Avatar, and The Hitchhiker's Guide to the Galaxy was somewhat of a blueprint towards the attitude of developing a world with a believable rationale as well as looking into the relationship of the characters with the animals in their own imagined worlds.

## SPECULATIVE RESEARCH

### Exploration through Collage

In the first collage (Fig.1), we raise questions on the societal values that arise from the exploitation of living animals and machines. We review societies from the past that allowed themselves to reach new extremes through science, and we reflect upon the state they reached their peak.

Fig. 1 - The first collage

In the second collage (Fig. 2), we raise questions on the intimate relationship between humans, machines, and animals. We reflect upon the point of contact between these different tissues, surfaces, and bodies.


Fig. 2 - The second collage


Fig. 3 - political axis

**Political Spectrume**

The NuNaturalists society is neo-neo-liberal, neo-technological, and post-natural (Fig.3). They are highly utilitarian, and they think of their environment in a hierarchy according to its functions (Fig.4). Their society was developed when neoliberalism met its environmental consequences. They solved it through the mass production of new technologies. However, the products of this society are not produced by human hands, but mostly by other living beings. This aspect, when integrated into a society already divided into different classes, may deepen the social gaps. When money can no longer be accumulated by labor, the capital belongs to those who possess the technologies, copyrights, and other means of production.

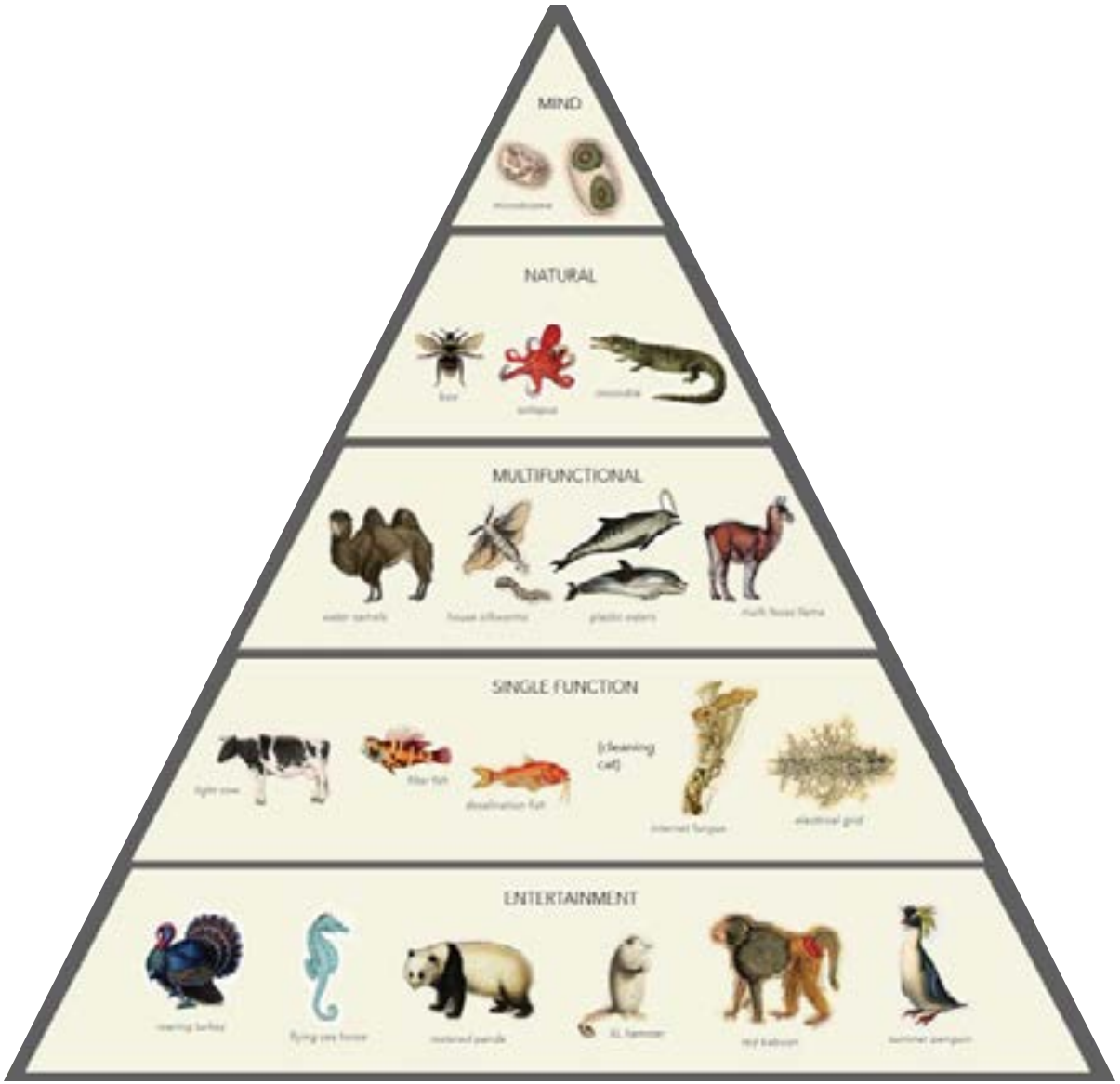


Fig.4 - the natural hierarchy

**The NuNaturalist Ecosystem**

In accordance with the NuNaturalist understanding of their world and their cultural products, we chose to present the design of an ecosystem, in which the different parts are designed to replace current technology. An underground vegetal network, called “The Power Plant”, conducts and transmits electricity. It collects some of it from The Zinc-Grass: a grass with a high content of zinc, producing energy through photosynthesis. The Zinc-Cows walk on this grass, the underground network converts this movement into electricity (Fig. 5).

A huge Internet Mushroom grows over this network, transmitting binary pulses around the planet. This infrastructure spreads from the open fields to human houses. It is used, among other things, to light up a Zinc Light Crystal (Fig. 8). These crystals are produced naturally: the zinc cows were genetically designed to eat the zinc grass and concentrate it in their digestive tract. Then, the concentrated mineral can be found in their feces as crystals (Fig. 6). This is one application of a technology called Digestive Manufacturing: the functions that animals perform are designed to produce outcomes that fit human needs, by redesigning their metabolic process.

Another example of this technology is the Concrete-Silkworms, that weave the walls of human houses (Fig. 7). A unique form of digestive technology is presented by The Cleaning Cat, that lick and swipe the floors and the walls of the house (instead of itself). This cat produces a special saliva composition, that helps to keep the house shiny (Fig. 8). One last piece of this ecosystem is The Augmenting Microbiome. The NuNaturalist attribute high spiritual qualities to it. They Genetically edited it to augment their capabilities, and now they consume it in their food. To enrich it with microbiome, this food itself is a form of digestive manufacturing, and it is produced in the digestive tract of a llama.

Fig. 5- Zinc Cows, Zinc Grass, and the Power Plant

Fig. 6 - Zinc crystal in cow’s feces

Fig. 7 - A human house, waved by Concrete Silkworms

Most of the ecosystem parts are rooted in existing technologies and phenomenon. The Augmenting Microbiome is a radicalization of the idea of microbiome as related to high mental functions [7]. The radical genetic engineering is heavily inspired by the wide range of possibilities that CRISPR unfolded [11]. Zinc is a common mineral, that lights up when electric current flows through its pure form [3]. The house walls weaved by Concrete-Silkworms were inspired by Neri Oxmans' work "The Silk Pavilion", in which silkworms were used to weave an architectural structure [9,2]. We derived the idea of utilizing photosynthesis from real studies that did exactly that [5,10]. The vegetal underground infrastructure was inspired by three natural phenomenon: First - Pando, a forest in Utah made out of a single organism [4]; Second, the Armillaria mushroom, the largest organism in the world [8]; and third, underground mushroom networks that connect plants with other plants, filling basic communication functions [12].

Fig. 8 - the Cleaning Cat cleans the Zinc Light Crystal

### “Our Nature” Video

The designed ecosystem was demonstrated in the video “Our Nature”, in which the NuNaturalists present themselves in their own words. We took inspiration from nature movies to highlight their values: living in nature and utilizing every aspect of it as a celebration of life. The narrator’s voice was picked by his Californian accent, a state that was heavily influenced by the nature-striving movements of the 1960s. We chose to contrast his voice through the content itself, demonstrating the distorted technology of this society. This contrast indicates the contrasting values of this society.

## DISCUSSION

Even though the NuNaturalist society takes the exploitation of nature to the extreme, the moral value of their actions remains ambiguous. While they leave no piece of nature unutilized, it is hard to determine whether their actions are worse than the outcomes of current industrialized society. Is the digesting manufacturing technology essentially wrong, even if the animals don’t suffer? Is it a utopia or dystopia?

However we choose to judge the NuNaturalist, there is an obvious gap between their beliefs and their actions. While they this they are living harmoniously with nature, they deeply interfere it. To keep their living standards, they chose to feed their technology into the natural life cycle. But in fact, they don’t live in nature, but in its synthetic, clean, heavily designed form. In this sense, we think of the NuNaturalist as a “post-natural” society.

Another interesting part of the NuNaturalist beliefs is their understanding of the relation between different entities of their reality. In a world where biology and technology are not differentiated, objects, machines, and living bodies are all part of the same unified sequence. While the NuNaturalist exploits other beings, they find the natural surroundings as an embodiment of themselves or their abilities; they perceive others as their executive extension. This idea is demonstrated in the concept of the life cycle: every part is perceived as the organic continuation of the other.

We designed the NuNaturalist as a capitalistic society, but this is not the neoliberalism we know. Capitalism was originally built on human labor and its value. In the NuNaturalist society, human labor exists only in the margins: most of the labor is done by nature. This is an advanced incarnation of neoliberalism. The capitalistic aspects here are mainly the abundance and consumer culture, utilitarianism, individualism, and the social division to classes.

The NuNaturalist society is similar to the capitalism we know in one more aspect. By creating a productive society that minimizes the differences between nature and technology, by blurring this boundary, the NuNaturalists take the process of cultivation to the next step, perceiving the world out of their modern, cultivating point of view. In other words, when the NuNaturalist looks at nature, they don’t see it as nature, but as potential.

## CONCLUSION

A straight line can be drawn between today’s western society to the NuNaturalist. We asked what values will be preserved in a society that produces a deep merging of technology and biology. The answer was shaped according to the developmental circumstance of this society: the environmental crisis and the capitalistic incarnation of the movement to reduce it. Those circumstances are familiar to anyone who lives today. In this sense, even though the NuNaturalist might seem far from us, we share an essential part of the circumstances, the values, the technological basis, and the cultivating perspective. The economical structure is familiar too, even though it is not exactly the neoliberalism we know today - it is its developed form. In this sense, the NuNaturalists show how capitalism does not contradict environmentalism, but the friction comes at an essential price from both. Capitalism loses one of its cornerstones - the reliance on human labor - while environmentalism reconstructs itself as a deeper form of nature exploitation.

## REFERENCES


1. Anthony Dunne and Fiona Raby. 2014. Speculative Everything. In *Speculative Everything: Design, Fiction, and Social Dreaming*. MIT Press, Cambridge, MA, 159–189.
2. Ayça Tokuç, Onur Kırdök, Deniz Dokgöz, and Tutku Didem Altun. 2019. Biodesign as an innovative tool to decrease construction induced carbon emissions in the environment. *International Journal of Global Warming* 19, 1/2 (2019), 127. DOI:http://dx.doi.org/10.1504/ijgw.2019.10023357
3. He-Ping Zeng, Guang-Rong Wang, Gong-Chang Zeng, and Jing Li. 2009. The synthesis, characterization and electroluminescent properties of zinc(II) complexes for single-layer organic light-emitting diodes. *Dyes and Pigments* 83, 2 (2009), 155–161. DOI:http://dx.doi.org/10.1016/j.dyepig.2009.03.003
4. Jennifer DeWoody, Carol A. Rowe, Valerie D. Hipkins, and Karen E. Mock. 2008. "Pando" Lives: Molecular Genetic Evidence of a Giant Aspen Clone in Central Utah. *Western North American Naturalist* 68, 4 (2008), 493–497. DOI:http://dx.doi.org/10.3398/1527-0904-68.4.493
5. Jessica O. Calkins, Yogeswaran Umasankar, Hugh O'Neill, and Ramaraja P. Ramasamy. 2013. High photo-electrochemical activity of thylakoid–carbon nanotube composites for photosynthetic energy conversion. *Energy & Environmental Science* 6, 6 (2013), 1891. DOI:http://dx.doi.org/10.1039/c3ee40634b
6. Mark Fisher. 2009. What if You Held a Protest and Everyone Came? In *Capitalist Realism: is There No Alternative?* Zero Books, Winchester, UK, 12–16.
7. Megan Clapp, Nadia Aurora, Lindsey Herrera, Manisha Bhatia, Emily Wilen, and Sarah Wakefield. 2017. Gut Microbiota's Effect on Mental Health: The Gut-Brain Axis. *Clinics and Practice* 7, 4 (2017), 131–136. DOI:http://dx.doi.org/10.4081/cp.2017.987
8. Myron L. Smith, Johann N. Bruhn, and James B. Anderson. 1992. The fungus Armillaria bulbosa is among the largest and oldest living organisms. *Nature* 356, 6368 (1992), 428–431. DOI:http://dx.doi.org/10.1038/356428a0
9. Neri Oxman. 2015. Templating Design for Biology and Biology for Design. *Architectural Design* 85, 5 (2015), 100–107. DOI:http://dx.doi.org/10.1002/ad.1961
10. Victoria Flexer and Nicolas Mano. 2010. From Dynamic Measurements of Photosynthesis in a Living Plant to Sunlight Transformation into Electricity. *Analytical Chemistry* 82, 4 (2010), 1444–1449. DOI:http://dx.doi.org/10.1021/ac902537h
11. Vijai Singh, Darren Braddick, and Pawan Kumar Dhar. 2017. Exploring the potential of genome editing CRISPR-Cas9 technology. *Gene* 599 (2017), 1–18. DOI:http://dx.doi.org/10.1016/j.gene.2016.11.008
12. Yuan Yuan Song, Ren Sen Zeng, Jian Feng Xu, Jun Li, Xiang Shen, and Woldemariam Gebrehiwot Yihdego. 2010. Interplant Communication of Tomato Plants through Underground Common Mycorrhizal Networks. *PLoS ONE* 5, 10 (2010). DOI:http://dx.doi.org/10.1371/journal.pone.0013324