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Philosophy and Education for the Future

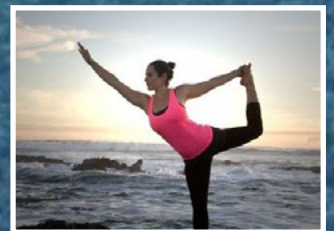
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EDITORIAL

I recently read a review of the book "Eden 2.0: Climate Change and the Search for a 21st Century Myth". The central argument of the book is that humanity needs to find - rather fast - a myth that would enable us to transcend our differences and inspire us to follow a radically new course. Dry facts and policies won't be enough. We need to be inspired by a shared vision in order to bring about the change which is so urgently needed.

This does not only make complete sense in our current 'post-factual' climate where people seem to prefer a good story to facts. It also highlights the profound lack of vision of the future of both campaigners and politicians around the world.



A good example of this lack of vision is the Occupy Movement, which started in September 2011, and protested against social inequality and the lack of real democracy. Irreconcilable disagreements between its various sub-groups and endless meetings that were going nowhere stalled the movement although it had initially spread to 951 cities in 82 countries. The experience showed that new societies do not automatically emerge when people just get together to voice their shared discontent.

Another example that revolutions alone don't bring about a better society is the 2011 Egyptian Revolution. Facebook and Twitter brought hundreds of thousands of people to Tahrir Square to voice their discontent, which caused Mubarak to stand down as a president. But there was a total lack of vision of 'what next' and the Muslim Brotherhood, who did have a

clear idea of what they wanted, moved in quickly to fill the vacuum. Within a year Egypt was governed by someone acting in an increasingly authoritarian way and trying to push through an Islamist agenda. As a result, millions went onto the streets and the same liberals who had started the movement for change were now asking the military to 'save the revolution'. In July 2013, the military staged a coup d'état and Egypt ended up again with another ex-military man as president.

Social media nowadays have the power to start revolutions and to lead to the removal of dictatorial leaders. But social media are unable to tell us how to build new societies and institutions.

It will be incredibly difficult to create a shared vision that would be able to inspire the majority. We have become so 'individualized' that we are no longer able to subscribe to something collective. We are totally used to a 'tailor-made' and 'personalized' way of life. We wouldn't even be able to agree on a shared vision of a great holiday, let alone a shared vision of the future. One person's utopia would be another's dystopia. Probably only the brutal force of sheer necessity to survive would be able to join us all together, much like the experience of the Blitz in Second World War London. But unlike the time after the Blitz in London, when people were united in their effort to re-build the nation, the future cannot be just a rebuilding of what was before. Our current systems and paradigms have reached a dead end. The future will have to be radically different, based on a completely new way of understanding society and ourselves.

It took several generations of builders to build the Gothic cathedrals. Societies and institutions are much more complex than cathedrals and to renew them will also require generations of committed people to work towards the realization of a clear vision. Yes, we do need a vision for the 21st century, but one that includes the higher potential of human beings and their real needs and not one that is based on yet another outdated economic worldview.

Sabine Leitner

About Us

NEW ACROPOLIS is an international organization working in the fields of philosophy, culture and volunteering. Our aim is to revive philosophy as a means of renewal and transformation and to offer a holistic education that can develop both our human potential as well as the practical skills needed in order to meet the challenges of today and to create a better society for the next generation.

For further details please visit : WWW.NEWACROPOLISUK.ORG

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Morality, Philosophy and Spirituality

This article is based on a class given by the International Director of New Acropolis, Delia Steinberg Guzmán, in November 2015. In it she explained that there are three levels through which human consciousness develops, by which we can come to understand ourselves and others better. These three concepts are not unfamiliar to most of us, but there is a need to clarify their meanings and how they relate to one another.

Morality is about discerning between what is good and what is not good and about choosing between them. Its aim is to bring us closer into harmony with the laws of nature. However, throughout time moral values change, so how can we define anything as “good” and “not good” or “evil”? They are both subjective and can change depending on time, geography, etc. On the other hand, as we can see if we do a comparative study of philosophies, there are timeless values, such as “treat others as you would like to be treated yourself,” that have always existed, even if they have been violated a million times. These timeless values are part of our higher nature. So the purpose of morality is to come closer to our higher nature through the practice of timeless values.

How can we practise the timeless values? By developing our virtues. Etymologically the roots of the word “virtue” come from “vir”, which means vigorous, strong; it refers to strength of character, inner power.

The second level is philosophy, which allows us to distinguish between truth and illusion. Its aim is to lead us to truth, to wisdom.

First of all, we have to recognize that in any form of life there is truth. In order to investigate the meaning of things, we need reflection, a state of tranquillity, a certain serenity that enables us to see into the interior of things. If we have a calm mind, if we manage to connect with the essence of an object or a situation, then it is possible that we may find the truth. One of the obstacles that we are facing today is that we want everything quickly, so we want to find the truth quickly. But this impatience doesn't help us to find the truth.

Truth comes from looking within, at the inner nature of things. In order to have access to this inner nature, we have to develop our intuition. Intuition grasps the truth

quickly and serenely, in a way that doesn't require any further explanations.

The third level is spirituality, which is to search for the lasting, for reality, for the infinite. In principle, spirituality is a higher state of consciousness, but it is not something static. Consciousness is like a lift which constantly moves up and down through different levels.



The world we currently live in doesn't support achieving this higher state of consciousness, which is required in order to be stable at a higher level. Although we all have the potential of this higher level of consciousness, it is up to us to make the effort for our consciousness to rise.

Spirituality isn't about believing, it is to know. This is why it is not an emotional faith; in order to reach the state of spirituality we first have to go through the steps of morality and philosophy. Spirituality is to see things as they are and not how we would like them to be. A spiritual person sees things as they are, accepts them and works with them.

If someone were to ask how to live spirituality, in its meaning as described above, or what values to develop if one wants to make progress on the spiritual path, then I would suggest following these three steps without trying to jump any of them. Working on morality, philosophy and spirituality is a work of renewal, of a rebirth within ourselves, which will enable our potentials to manifest.

Pinar Akhan

Best of the Human Potential through Sports

The Olympics have produced some memorable moments of great sportsmanship and fraternity, illustrating the victory of the human spirit. As summarised by the Olympic motto, "*Citius, Altius, Fortius*," which translates as "Faster, Higher, Stronger," every athlete aspires to the best of the human potential.

When a sportsman wins, the victory is not just owing to a particular skill that has been practised for many years; the victory also celebrates the hardships and the breaking of barriers that enabled the athlete to reach the podium. It is a victory of the mind over the body when a marathon runner crosses the finish line. The victory of a boxer lies in his determination, as he gets up again every time he is knocked down. It is a victory of team spirit when a crew team rows in unison towards victory. And it is a victory of harmony when synchronised swimmers execute a routine with grace and poise. Sport is thus a medium through which to manifest the inner strength of character; virtues that we aspire to collectively as human beings, but perhaps find it difficult to express in our day-to-day lives.

Plato suggests that beyond the prize and glory, the true celebration of spirit is the motivation towards excellence that emerges from the will (internal) rather than from competition (external). Many tournaments traditionally end with the ceremonial handshake, signifying the basic respect for opponents as competitors, fellow human beings, each sharing the

aspiration for perfection. And respectful admiration of this mutual aspiration is honoured as more valuable than personal victory.

Another essential aspect of the spirit of sport is the importance attributed to ethics. But as the sports industry has grown massively and 'big money' is now involved in most sports around the world, we see a sharp fall in ethics, with cases of substance abuse, 'doping', and match fixing scandals surfacing. The motivation in sport has sadly fallen to personal victory, driven by monetary rewards and superficial fame, making what once used to be a ceremonial celebration of the human spirit into just another materially driven business.

Greece, considered the mother of classical philosophy, attached great significance to the relationship between sports and philosophy. Plato held that a good education must develop virtue in the human being; gymnastics and sports are essential components of education, which, beyond physical fitness, develop the value of fortitude. It is also evident that, through sports, one develops self-confidence and morality.

Apart from sportsmanship, sport ingrains values that go beyond the development of physical excellence: discipline, perseverance, hard work and acceptance. For this reason, many organisations today rely on sports-based activities when conducting workshops to develop leadership and teamwork. Such exercises highlight the value of working together to extract the power of the collective. In order to



do so, each team is led by a captain who possesses special skills and is therefore best suited to lead. And yet, in spite of stellar individual feats, only a collective team effort enables a win or loss. Each individual within the team has a specific role to play; each strives for excellence in this role, which affects the entire team's performance.

Today in the age of multi-million dollar sponsorships, politics in sport, sport for money and for glory, perhaps the true value of sport continues to lie in its ability to foster harmony and the expression of the human spirit. Long after the music of the national anthems ends after the presentation ceremony, what lingers is the sentiment of the best of the human potential; always Faster, Higher, and Stronger.

Kurush Dordi

John Dee – Magician, Mathematician and Angelologist

Earlier this year a remarkable exhibition was shown at the Royal College of Physicians in Regent’s Park, London: *Scholar, courtier, magician: the lost library of John Dee*.

Born in 1527, of Welsh ancestry, John Dee was one of Tudor England’s most extraordinary and enigmatic figures. A brilliant mathematician, he was offered the chair of mathematics at the University of Paris at the age of 23, but turned it down. Back in England he became astrologer to Queen Mary, but found himself accused of plotting to destroy the queen by sorcery. Though acquitted, throughout his life he found himself having to defend himself against this charge, which was punishable by death. After Mary’s death he became astrologer and physician to Queen Elizabeth I. For many years he was a favourite of the Queen, who called him ‘my philosopher’.

At Elizabeth’s court, he was the guiding figure of a network of Neoplatonist and Hermetic thinkers, as well as a sought after authority in the field of navigation in those days of transatlantic exploration and adventure. This network included the Sidney Circle, headed by Sir Philip Sidney, a soldier, courtier and poet, who viewed poetry as a kind of chanted magic, preferably accompanied by music, in order to elevate the psyche to the heavenly regions. This circle also included the poet Edmund Spenser (author of *An Hymn of Heavenly Beauty*) and Robert Dudley, Earl of Leicester, a lifelong friend of the Queen. Another circle was that led by the Earl of Northumberland (the “Wizard Earl”) and known as the *School of Night*. It included the adventurer Sir Walter Raleigh (founder of Virginia) and the poet George Chapman (author of *The Shadow of Night*). Even Shakespeare seems to have been deeply influenced by John Dee: the figure of Prospero in *The Tempest* is believed to be a vindication of John Dee as a ‘good’ magician (as opposed to wicked sorcerer) and *King Lear* may be a portrayal of John Dee as an old man, rejected by all.

Dee’s view of mathematics was a mystical one: he saw numbers as the key to all knowledge. He believed that music, originating from mathematical harmonies, puts man in tune with the universal structure; it permeates his inner being and lifts him to new heights of perfection; hence Dee’s aphorism: “the world is like a lyre”. He was also an alchemist,

an astrologer and, perhaps most famously, an “angelologist”. Working with a spirit medium, Edward Kelley, he wrote a diary detailing his conversations with angels. Among the exhibition’s artefacts were a crystal ball and a “scrying mirror” used for this work. But he was also a philosopher: his lengthy preface to the first translation of Euclid begins with the words “Divine Plato...”.



Dee claimed to have owned around 3,000 books and 1,000 manuscripts – a phenomenal number for those days when the University of Cambridge had only 451! He showed himself to be several centuries ahead of his time when he submitted a petition to Queen Mary to found a Royal Library as a repository for the most important books from around the world, and to protect ancient monuments as reminders of our past and an inspiration for the present. At the time, his petition was rejected, but his dreams are now realities.

The exhibition focused mainly on Dee’s books, about 100 of which came into the possession of the Royal College of Physicians by a bequest in the 17th century. We see in them the eclectic range of his interests, from philosophy to navigation, and also something of the tragedy of his life: while he was abroad, his house in Mortlake, Surrey, was ransacked by a mob and most of his library was lost. When he returned to England, he fell from Elizabeth’s favour and died in near poverty in 1608, in the reign of King James I. His achievements, however, had been very great: the inspiring genius behind the Elizabethan Renaissance.

Julian Scott

Sacred Dance and Classical Indian Dance

All dance started with the yearning of the human spirit to move, but with the development of consciousness, expressed in civilisation, an additional element emerged: the idea that the purpose of human life is to grow, to evolve the consciousness, to transcend. But the makers of Indian civilisation realised that it is very difficult to develop consciousness, so they created supports and ladders that could lead to growth if they were followed in a disciplined way. All classical Indian arts are these ladders: dance, music, painting, sculpture, architecture and so on.

Classical Indian dance is one of these forms. By the practice of and engagement with this form there is a possibility that transcendence will reveal itself. That doesn't mean that everyone who practises classical Indian dance is at a higher level of consciousness. It depends on the practitioner.

What does classical mean? What makes something classical? That which has a value to it, that which has a vision. All the classical arts have as their starting point one principle: from the formless comes form and then the form takes you back to the formless. In classical Indian dance there are three aspects that lend themselves to a possibility of transcendence:

First of all there is an abundance of beauty: beauty in the costume, in the make-up, in the jewellery, in the movements. Why beauty? Because beauty makes the heart melt and when the heart melts it dissolves the ego, even if it is only for a moment. That moment when you

look at fully bloomed flower and you smile, the ego has dissolved... then it comes back.

Secondly there is the form, the movements, which consist of a highly stylised geometry. By stylised I mean that which is not mundane. So if I want to show a flower in bloom, what am I doing? I am not miming the flower. I am somewhere becoming the flower. So I am becoming one with that which is represented. But the movements are also stylised because they are very well thought out and scientific. They are "yogic", in the sense of that which integrates or unifies. These movements are designed in such a way that when I sit in a certain geometric posture the energy circuits all link up. As a result, things will be aligned inside me and this will also have an effect on the viewer.

Thirdly, there is storytelling, which is mostly about gods and goddesses. The gods and goddesses are symbolic of certain living principles, so I have to assimilate the principle which the deity represents in my own consciousness and in my own day-to-day life. The principle itself is formless. From the form I access the formless principle and bring it into form. Thus the form of classical Indian dance is designed to express a certain content, which is the essence of these principles.

Summing up, in classical Indian dance we have beauty, we have stylised movement and we have content. All these levels contribute to the living experience of the concept that from the formless comes the form and the form is meant to take us back to the formless. This is the crux of classicism in India.

Compiled by Julian Scott from a recent talk given by Miti Desai at New Acropolis London.

Miti Desai is the founder and creative head at Miti Design Lab and Executive Trustee at Shaktiyogasrama Gurukulam. She is a disciple of danseuse Mandakini Trivedi



The Various Faces of the Divine Feminine

The universe is a place of balance...*Yin* and *Yang*, night and day, summer and winter, masculine and feminine. *Yin* is as essential as *Yang*, just as night is as essential as day. So too, the feminine is as essential as the masculine. While they may appear to be diametrically opposed in nature, they are equally important in maintaining the wholeness of life by complementing each other. The drive to seek truth, to honour justice, to be inspired by beauty and to do good in the world applies to everyone, whether they are young or old, men or women. These are everybody's privilege and, in fact everybody's duty. But perhaps there are different paths of reaching them, depending on the energy that is dominant within each one – masculine or feminine. And instead of trying to be more 'like the other', what if we concentrated on tapping more into that infinite power that each one inherently has, as the seed of potential within?

Her Various Faces

From the gentle, graceful and seemingly docile Mary to the fiery, tempestuous goddess Durga, the Divine Feminine encompasses various shades: beauty, courage, justice, love, goodness, purity, compassion and hope – all of these presented in various hues and symbolized in multiple forms across cultures.

What strikes me as the most beautiful insight about the divine feminine is that no matter what form she takes, the underlying sentiment is that of love in all its myriad forms. This is perhaps best expressed by the goddess of love herself, Venus or Aphrodite, who represents not only sexuality and fertility but also the qualities of motherly love, love between friends and spiritual love.

Athena, on the other hand, is the multifaceted goddess of wisdom, courage, inspiration, civilization, law and justice, mathematics, strength, war strategy, the arts and crafts. She is portrayed as a shrewd companion and patron goddess of heroic endeavour.

Life Force

The feminine principle sustains *life*; brings beauty, love, gentleness and caring to a situation. But let's not forget the other aspect: *force*. An energy. A power. A driving momentum that makes things happen, charging them with life and energizing them.

Again, perhaps the one word that begins to define this force is love. Not the personal, individual kind that we feel for a person, but the life-creating, life-nurturing kind that we could feel for all humanity if we expand ourselves. And like the harmony between opposites that maintains balance in life, love too, has two aspects: compassion and courage. Perhaps the former is linked more closely to 'life' and the latter to 'force'.

Sangeeta Iyer

Editor's note: this is an abridged version of the full article, which can be found at <http://library.acropolis.org/>



Yoga and Pop Culture

'Caveat emptor' (from the Latin: 'let the buyer beware')

You can choose your yoga from the following: Acro, Ashtanga, Jivamukti, Vinyasa flow, Iyengar, Dharma, Yin, Anusara, Kundalini, Hatha, Nidra, Naad, Pregnancy, Pre&post natal, Mysore, Siddha, Bikram, Restorative, Hot, Power, Tantra, Kripalu, Shivananda, Forrest, Rocket, Satyananda, Scaravelli, ... and there are more to come.

Everyone knows yoga today; it is like a brand, like Nike or Apple. Free tasters, trial memberships and special discounts are available. The benefits are well known: it works well for the physical body, calms the mind and generally increases well-being. It has been scientifically proven and is also recommended by the NHS. No need to be cynical, as it does the job and has been tested for thousands of years. The only consideration we would like to bring is where is the fine line between gym and yoga. It might be that today those words can be interchangeable, while yoga in the past had some other objectives as well.

Physical exercises as one can encounter them today were considered to be a secondary part of the techniques. The main goal of the physical disciplines and practices were to integrate the higher spiritual goals of Raja Yoga (the highest form of yoga related to mind or will). Hatha Yoga as a postural yoga is a preliminary practice for Raja Yoga. Obtaining self-control and self-discipline is much easier when we start with the physical and energetic body, rather than trying to directly control the mind as in Raja Yoga.

Modern systems of yoga bear little resemblance to what was considered to be yoga in the past. This is because today we live in a different social context, a different culture. Yoga techniques were believed to cultivate mystical states of consciousness with a link to the ultimate reality, which would eventually lead to cessation of suffering. Not much salvation is offered today, it's enough to have a feel-good effect and this is what is most sought after. Health and well-being is hip, found in the hubs of hipsters' paradises in refurbished warehouses, or in the studios across the city, where spirituality and guruism is kept at a minimum. And this is also probably what makes it so popular. Yoga as a practice is a response to the mindset which rejects religion, gurus and commitments, unless they are to one's own benefit. It is a product of consumer culture that has emerged out of global market capitalism, with consumers motivated by self-interest rather than by ethical norms or social justice. Yoga adepts come in all shapes and sizes, as Georg Feuerstein coined in the phrase, "one person's guru is another person's "uru", the Sanskrit word *uru* meaning "empty space."

Andrea R. Jain in her book *Selling Yoga* argues how yoga has always been context-sensitive, which means there is

no 'legitimate', 'authentic', 'true', or 'original' tradition, only contextualized ideas and practices organized around the term yoga. As such yoga is not very clearly defined as it is a very complex, heterogeneous cultural product, which is



understood and practised differently in different times and places, including contemporary consumer culture.

Chögyam Trungpa coined the term 'Spiritual Materialism', which so well describes the climate of our time. Individuals strive for spirituality by building up the ego, not recognizing that ego development is counter to spiritual progress. Even if there is an increase of 'Body, Mind, Spirit' ideology, the attitude hasn't changed, the shopping mentality of picking up offers from the shelves.

But let's not throw the baby out with the bathwater, as it is important to keep oneself healthy. It is not a problem of yoga, but the consuming of it. And for those who would like to follow the 'Body, Mind, Spirit' path, it obviously starts with the body, but then the path continues with morality. Not moralizing, but striving to orient oneself towards the good and just within, and project what we find towards the world around us. Then comes a philosophy, which is based on morality and its reflection, and only after that can we start talking about the spiritual dimensions. And then we find that yoga is everywhere.

Om Namah Shivaya

Biomimicry: Human Creation Inspired By Nature



Leonardo Design for a Flying Machine, c. 1488

“Those who side with any flag other than nature – the master of all masters – labour in vain.” – Leonardo da Vinci

“The genius of man may make various inventions, encompassing with various instruments one and the same end; but it will never discover a more beautiful, more economical, or a more direct one than nature’s, since in her inventions nothing is wanting and nothing is superfluous.” – Leonardo da Vinci

Introduction

Nature is a source of inspiration for humanity and has always been a mirror to humankind. In it the finest works of art and architecture are inspired. The ability of nature to combine beauty, economy and functionality is incomparable and it is not a coincidence that the great inventions throughout history have their origins in analogous natural elements. The concept of Biomimicry, widely utilized by contemporary science, consists of analyzing natural systems and reproducing their principles in solutions that become outstanding contributions to society.

The solutions offered by nature can contribute to the creative process, both in the form of an analogy, and through its geometric/mathematical patterns. It is possible to observe, for example, constant mathematical proportions in human, animal and

plant constitutions. These natural geometries are often associated with concepts of aesthetics, harmony and balance, constituting true aspects of beauty.

What Is Biomimicry?

In areas such as industrial design, architecture, engineering and others, it is possible to observe the constant use of analogies and direct applications of principles of nature in the search for conceptual and innovative solutions. Biomimicry is a technologically oriented approach to apply the lessons of natural design that seek to solve the problems of human beings. Biomimetic studies are grounded in natural design solutions, decoding geometries and performance, in search of better utilization and lower energy expenditure.

After her research through a large number of investigations, Janine Benyus documented her findings in her book *Biomimicry – Innovation Inspired by Nature*. This new term – Biomimicry – is characterized as being broader than the earlier concept of Bionics. In addition, in order to consider the imitation of biological form, Biomimicry also includes the concept of replicating the behaviour of biological organisms. Benyus’s definition of Biomimicry is reproduced below^[2]:

Nature as a model: Study models of nature and imitate them or use them as inspiration, in order to solve human problems.

Nature as a measure: Using ecological standards to judge the relevance and validity of our innovations. After billions of years of evolution, nature has learned what works, what is appropriate and what endures.

Nature as a mentor: A new way to observe and evaluate nature. Do not worry about what we can extract from the natural world, but what we

can learn from it.

According to Benyus^[1], for a society that is used to dominating or ‘improving’ nature, imitating her in a respectful way is a radically new approach, a true revolution. Unlike the Industrial Revolution, the Biomimicry Revolution introduces an era based not on what we can extract from nature, but on what it is possible to learn from it. By doing things the way nature does them, it is possible to change the way we cultivate food, produce materials, create energy, heal illnesses, store information and conduct business. After 3.8 billion years of research and development, failures are fossilized, and what surrounds us is the secret to survival.

By looking deeply into nature, we realize that all human inventions are already present in it, albeit in more elegant formats, with a much lower cost to the planet. Even one of the most intelligent systems of construction – using columns and beams – is already featured in the internal structure of lilies and in bamboo stalks. Central heating and air conditioning are accomplished by termite towers. The best manmade sonar is difficult to hear in comparison to the transmissions of the multi-frequency bat. Even the wheel, which has always seemed to be a uniquely human creation, was found in the small rotary motor that drives the flagella of the oldest bacteria in the world^[1].

Living organisms, together, maintain a dynamic stability, like dancers in an arabesque, continuously manipulating resources without wasting them. After decades of study, ecologists have begun to understand many hidden similarities between interconnected systems. From their notes we can extract some principles^[1]:

- Nature works in the sunlight.
- Nature uses only the energy it needs.

- Nature fits form to function.
- Nature recycles everything.
- Nature thrives on cooperation.
- Nature rests in diversity.
- Nature requires accurate knowledge.
- Nature stops waste from the beginning.
- Nature touches the power of limits.

According to the biologist John Todd (2000)^[6], the Earth's ecology has a set of instructions that we urgently need to decode and employ in the conceptualization of human systems. After forty years of research in biology, ecology and design, Todd emphasizes that it is possible to design with nature. Through eco-design a more advanced civilization can exist, using only a tenth of the planet's resources that industrial society uses today.

Todd and his wife Nancy Jack-Todd (1993)^[6], were the first researchers to offer a list of principles of ecological design. The original proposal had 9 precepts, which were later complemented by a tenth point, aiming to highlight the centrality of design as an expression of intentionality in all human interactions:

The living world is a matrix for all design.

- Design should follow, not oppose the laws of life.
- Biological equity should determine design.
- Design should reflect the bioregion.
- Design should be based on renewable energy sources.
- Design must be sustainable in the integration of living systems.
- Design should be co-evolutionary with the natural world.
- Construction and design should help heal the planet.
- Design should follow a sacred ecology.

We are all designers.

Nature's Solutions as Models

According to Isenmann^[3], economists

and engineers often use biological analogies, specifically from organisms (analogy with evolution, with fractal growth, with the brain, etc.) in order to solve socio-economic phenomena. However, without an associated conceptual framework and in the absence of philosophical enlightenment, the prospect of industrial ecology as a means to understand nature as a model probably remains speculative. It is worth questioning whether the work related to biological analogies results in something new, or if it is just a reordering based in common sense. Strengthening the basis of industrial ecology is useful for protecting the powerful idea that nature serves as a model, rather than just using it as a simple rhetoric or a note in the literature of environmental management, as a beautiful accessory. The root cause of the total unsustainability of modern civilization lies in the dualistic separation of nature and culture. It is in nature that all people and all species are united in a community of life. However, culture is usually conceived of as something independent and separate from nature. Despite this reversal of cultural values, since the industrial revolution, reductionist science has allowed man to design a series of powerful and manipulative technologies, which are transforming the planet in a devastating way^[6].

The great biomimetic innovations of mankind raise the question: What will the Biomimicry Revolution do differently to the Industrial Revolution? Who can assure that the thunder of nature will not be stolen and used in a campaign against life? This is not an infantile concern; one of the most important biomimetic inventions was the airplane, inspired by the flight of birds. Men flew for the first time in 1903, but in 1914, were already dropping bombs from the sky. Maybe what is really necessary is not a technological change, but an internal change of mentality that allows for sensitivity to nature's lessons^[1].

Examples and Applications

Some examples of design, art, engineering and architecture are direct applications of solutions based on principles of nature. These principles can be expressed in mathematical patterns, geometric shapes or functional propositions that resemble, or seek inspiration in, natural references.

Leonardo da Vinci, an exponent of the field of engineering, said that despite its great genius, mankind will never find a more beautiful, economical and objective invention than nature. The observations and experiments described in his journals, among which it is possible to find the first idea of submarines, hang gliding, war tanks, bridges and dozens of mechanical pieces, are clear examples of the inspiration he derived from natural models^[6].

In the field of architecture, there are two examples, both built in China, for the Olympic Games of 2008: the Water Cube and the Bird's Nest – inspired by elements of nature, and named after them. The basic structure of the first building is based on bubbles and, although none look the same, they all follow the same general pattern (Fig. 7). The second building is based on the plots and tresses of a nest, replacing the traditional straw with steel (Fig. 2).

Turning to industry and mechanical engineering, one cannot overlook the invention of the airplane based on the analogy of birds, which also respects the golden ratio. Another smart creation that simultaneously solves the problem of high resistance and lightness of mechanical parts is the honeycomb, developed from the geometry of the honeycomb of beehives (Fig. 5). Also within the industry, it is interesting to highlight the creation of Velcro (Fig. 4), based on the structure of the burrs of the Burdock plant (Fig. 3).

Robert Le Ricolais (1894-1977), a French architect and engineer, used the reticulated pattern of Radiolaria (Fig. 8) – marine protozoa – as

inspiration. Through his research, he developed structural principles that resulted in strong, light weight and durable structures. The goal was to build “infinite strength and zero weight” structures. The same researcher studied the corrugated shells – Pecten (Fig. 1) – producing rigid plans and corrugated surface tubes^[4].

Frei Otto, from the Lightweight Structures Institute, University of Stuttgart, organized a program with biologists, architects and engineers (also mathematicians, ecologists, philosophers and sociologists) with the objective of extracting useful ideas from biology. These can be found in the tensioned structures that he used to cover the Olympic Stadium in Munich (Fig. 6), among other structures. These membranes were inspired by the horizontal webs built under water by the aquatic spider, *Argyroneta*, known to retain air for the sub aquatic development of their eggs. This concept was also used by Jacques Rougerie in the design of an underwater village to accommodate 250 divers^[4].

Another interesting natural structure to be studied is that of the sea urchin. The foam-like structure that connects the thorns to the main

body of the sea urchin (Fig. 9) gives support to the thin outer wall, resists buckling up, and allows it to bend without breaking. In their research, Lorna Gibson and GN Karam distinguished different internal structures of the tubes, which were analyzed as cylindrical cartridges. The theory of cellular material shows that the rigidity of the cell structure is a result of the densities achieved, which can vary according to the geometry of the cell structure. The recent development of the process that allows the production of metal cylindrical tanks, having a foam or honeycomb core, demonstrates the importance and applicability of the research carried out.

The knowledge that was concealed in nature can now be extended to lightweight tubular supports, such as the ones found in the suspensions of race cars.

The examples discussed above demonstrate the existence of intelligence in nature, responsible for the constitution of every little particle. In nature, nothing seems random and everything has its place and shape needed to better serve the whole. The wisdom of nature has still much to unveil to humanity, but this will only be possible, as the

philosophical traditions say, when humans actually feel committed to their surroundings and responsible for the proper application of the teachings.

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Fig 1 – Corrugated shell Pecten



Fig 2 – Birds nest stadium



Fig 3 – Bur inspires Velcro



Fig 4 – Velcro



Fig 5 – Honeycomb Geometry



Fig 6 – Olympic Stadium Munich



Fig 7 – Water Cube Aquatic Centre

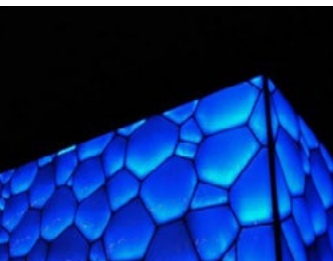


Fig 8 – Radiolaria

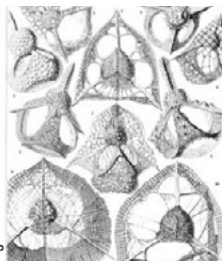


Fig 9 – Sea Urchin

