

BIOPHILIA

By Michael W. Mehaffy and Nikos A. Salingaros

METROPOLIS (METROPOLISMAG.COM), NOVEMBER 2011

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In 1984, the environmental psychologist Roger Ulrich made a startling discovery. In studying hospital patients recovering from surgery, he found that one factor alone accounted for significant differences in post-operative complications, recovery times, and need for painkillers. It was the view from their windows!

Half the patients had a view out to beautiful nature scenes. The other half saw a blank wall. This was an astonishing result — the mere quality of aesthetic experience had a measurable impact on the patients' health and wellbeing. Moreover — and this certainly caught the attention of hard-nosed economists — because the patients stayed less time, used fewer drugs and had fewer complications, their stay in the hospital actually *cost* less.



Figure 1. Experiments by Roger Ulrich showed that a simple view out to a natural scene conveyed a range of measurable health benefits to recovering patients.

Ulrich's study began a wave of research into an area known as *biophilia* — the apparent instinctive preference we have for certain natural geometries, forms, and characteristics

within our environments. Over time, many more studies have been done showing that when the characteristics of natural environments are present, human beings tend to feel calmer, more at ease, more comfortable, less stressed — and, most astounding, their health can actually improve.

Most of us know the feeling of oppression that comes from a windowless room with ugly blank walls. We all know the delight of entering a sun-filled space, perhaps with green plants and water. We surely have experienced special places that rejuvenated us, made us feel that we were healing just by being there. Yet what these studies showed was that such experiences are not merely more or less pleasurable, as had been thought. They play a fundamental role in our wellbeing, even if it's below the level of our conscious awareness. They can actually improve our health — or their negative counterpart can damage our health.

The implications are potentially earth-shattering: aesthetic design choices are not just a matter of the designer's artistic expression, for users to enjoy or not enjoy — together with other factors, *they can improve, or damage, the health of users*. If this is true, it means that designers have a level of responsibility for the health of users that is much greater than is commonly realized.

What mechanism could explain such an effect? One of the main proponents of the term biophilia, the noted biologist Edward O. Wilson, hypothesizes that we human beings have spent most of our evolutionary history in natural environments, and we have evolved to find good (i.e. healthy) environments pleasurable. Aesthetics, in this view that is increasingly accepted by scientists, is not some arbitrary experience, but our sophisticated biological ability to detect what is likely to be good for us. There's a sound reason why the ripe tomato, glistening with dewdrops, looks beautiful to us, and the rotten meat looks ugly and disgusting.

We are drawn biologically to certain environments: the aesthetic characteristics of those places tend to reinforce our health, by reducing our stress, and in the case of outdoor spaces, by encouraging us to be more active. A number of studies have shown that biophilic characteristics tend to encourage more walking and other outdoor activity. The health benefits of a walk in the countryside are part of almost every human culture, so there must be something to it.

There are other surprising benefits. For example, researcher Koen Steemers and colleagues at Cambridge University found that the presence of vegetation increases thermal comfort. In principle, that means that simply by adding plants, it could be possible to raise or lower the thermostat and still maintain perceived comfort, while significantly reducing energy loads. This could be a big boost for sustainable building design.

Another way of understanding the importance of biophilia is as a transfer of comprehensible environmental information through a neurological process. Our neural system evolved in response to external stimuli such as the information fields present in the natural environment. We instinctively crave physical and biological connection to the world, and we do so through the mental processes that have evolved over hundreds of thousands of years of life within nature.



Figure 2. Christopher Alexander's Fresno Market, California — a place of people, foods, vegetation, and natural tile and wood frameworks.

As organisms, we need to make sense of our environment and its beneficial qualities, and so we are equipped with neurological systems that are extraordinarily good at doing precisely that. These systems are capable of detecting extremely subtle symmetries, variations in color, and states of order or decay. When we perceive this complex order, we often find it intensely pleasurable. But when we encounter disorder, monotony, or confusion, we can actually become queasy and very ill at ease. For example, when we are unable to detect the horizon in a way that agrees with the balance systems in our inner ears, we get motion sickness, and we can become physically ill.

Leaders of the field have begun to identify and classify the various biophilic factors, spanning a comprehensive range. Stephen Kellert has worked with Wilson to lay out a detailed range of the varied biophilic influences in design. The book [Biophilic Design](#) edited by Kellert, J. Heerwagen, and M. Mador (2008) collects various results coming from different directions, all of which support the Biophilia hypothesis in the specific context of designing buildings and environments. In our own chapter of that book (written with Kenneth Masden) we argue for a biophilic basis for traditional art, architecture, and urbanism. We postulate that humankind has built throughout the ages just as much to give ourselves — the users — nourishment from the built geometry, as for any other more practical reason (such as shelter or a place to accomplish some specific task).



Figure 3. The British Museum with its fractal hierarchies and sculptured pediment is just as biophilic as the garden in front. The two elements — built structure and natural structure — reinforce each other to create a coherent, complex, and healing environment.

The Biophilia hypothesis, then, turns architecture and urban design on its head — construction is not fundamentally driven by utilitarianism but is instead a contributing factor for our continued health. We must continue to receive the positive, nourishing feedback from the natural environment that our distant ancestors enjoyed, now using materials to build an artificial environment. Yet this is possible only if the structures themselves have an essential complex geometry that provides positive biophilic nourishment.

Note that this “nourishment” is not simply a drape of green aesthetics, or, say, fake windows made of photographs. Research shows that those tricks quickly cease to have any biophilic effect. Rather, it seems we crave a deep and *genuine* aesthetic/biological connection to the natural context of our world. To be effective, the structures of our designs have to elucidate this *real* structure — not put on a kind of aesthetic costume.



Figure 4. Many of the best-loved and well-used public spaces, like this one in Oslo, contain splendid examples of biophilia, including vegetation, water, and natural forms and materials.

People's instinctive craving for environmental nourishment coming from information drives them to shape their living spaces, paint their walls in lively colors and cover them with visual patterns and representational scenes, and ornament their utensils. These artificial structures complement, and do not replace, the biophilic nourishment derived from close contact with plants, animals, sunlight, and the texture of natural materials.

But when we conduct research into the evidence for biophilic properties in our environment, we find something striking: much of post World-War II design is of two types — either (i) explicitly anti-biophilic (e.g. brutalist concrete surfaces with the grayness of death and devoid of fractal structure, glass curtain walls, shiny metal surfaces, etc.); or (ii) it has a weakly biophilic aesthetic veneer, merely draped over mechanical production buildings (think of fake wood grain, “cultured” stone, etc.). Where the aesthetics tries to be more genuine, expressing its true mechanical roots, it typically becomes anti-biophilic. In fact, disturbing evidence is now emerging that many designs are subtly degrading the quality of life of their users at best, and actually making them ill at worst. What is going on?

Those designs often emphasize the conscious experience of dramatic, attention-getting characteristics, at the expense of the intense and geometrically complex “background” characteristics that shape the important daily experiences of residents and users. The attention-getting features are those of industrial technology and tectonics, which up until recently has been geometrically primitive: simple lines, planes, cubes, and cylinders, structured into dramatic, attention-getting compositions. These geometries are generally very different from the complex organic forms of nature, and of biophilia.

In fact, many iconic buildings misuse biophilic surfaces such as marble and travertine limestone to compensate for their lack of spatial coherence, scaling hierarchy, and enclosure. But biophilia doesn't seem to work that way — while the photos may look attractive, the emotional experience is at best mixed, or negative. A truly biophilic building, on the other hand, can employ modest, inexpensive materials in a way so as to create beneficial ordered complexity, as we consistently find throughout vernacular buildings worldwide.

Biophilic environments succeed only to the extent that they contain a sense of intimacy and communion. “It's nice to see but even better to touch” — as lovers well know. For this reason, the vast monotonous lawns of suburbia are only minimally effective: better than concrete, yes, but again, only pieces of inaccessible visual green at a distance. They may just as well be outdoor green carpets.

Let us not underestimate the radical but unnoticed societal shift, from experiencing our environment intimately yet subconsciously, to requiring a constant conscious effort to navigate it while keeping an intellectual and physical distance. It now appears this is carrying a tremendous if unrecognized cost to the quality of life. Almost everything we built and used in traditional societies and in our own past just “felt good”. And it made us wish to touch it.



Figure 5. Monotonous repetition is anti-biophilic. Nature never produces empty repeating modules on a macroscopic scale. Boston City Hall. Image: Kjetil Ree.

Nature almost never repeats identical modules that have a mechanical geometry. Although [monotonous repetition](#) is a basic typology of post World-War II design (Salingaros, 2011), it is anti-biophilic. We instantly recognize this feature as defining an unnatural, hence anti-biophilic environment. Is that why it is used so extensively?

More recently, architects have sought to integrate biophilic character into urban design again. This is surely welcome. But are the new designs truly seamless integrations of the most instinctive human geometries with natural ones? Or is this one more attempt at a kind of “green cloaking” over the same failed urban models of the modernist era — just another “branding” by artists, of another dubious vision of the sustainable future? These debates go on, and in our minds, they are much-needed ones. We cannot stumble onward on the same unsustainable industrial path.

One thing is certain. Biophilia reminds us that, whatever our acts of culture and humanity, we are in the end living creatures too, and an evolutionary part of the biosphere — and we had better start acting like it.

BIBLIOGRAPHY:

Roger S. Ulrich (1984) “View Through Window May Influence Recovery From Surgery”, *Science*, 224: 420-421.

Stephen R. Kellert, Judith Heerwagen & Martin Mador, editors (2008) *Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life* (John Wiley, New York).
<<http://www.amazon.com/Biophilic-Design-Practice-Bringing-Buildings/dp/0470163348>>

Nikos A. Salingaros (2011) “Why Monotonous Repetition is Unsatisfying”, *Meandering Through Mathematics*, September, reprinted in the Cornell University Library Arxiv, Research Institute, 4 January 2012. Available online at:
<http://arxiv.org/pdf/1109.1461v1.pdf>