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PAN ODDZIAŁ W KRAKOWIE

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THE SCIENCE OF INTELLIGENT ARCHITECTURE

NAUKA O INTELIGENTNEJ ARCHITEKTURZE

ABSTRACT

This paper introduces a compelling new way to think about the education and practice of architecture. "Intelligent architecture" is founded on the basis of how the human mind perceives and interacts with the material world. Perhaps surprisingly, this scientifically-conceived process for architectural design and building leads to a more human architecture, one with a renewed respect for traditional systems of architectural design. Scientific insight into architecture's origins and manner of conception gives us a profound appreciation of useful solutions embedded in our architectural heritage. This development reverses a century-old practice in industrial-modernist architecture, which advocated erasing the past rather than learning from it. By understanding essential human engagement with the built environment, architects are able to foster greater human wellbeing in the material structures they build.

Key words: intelligent architecture

STRESZCZENIE

Niniejszy artykuł przedstawia nowy, atrakcyjny sposób myślenia o edukacji i praktyce architektonicznej. „Inteligentna architektura" opiera się na tym, jak ludzki umysł postrzega i współdziała z materialnym światem. Być może zaskakujące jest, że ten naukowo pomyślany proces projektowania architektonicznego i budowania prowadzi do bardziej ludzkiej architektury, z odnowionym szacunkiem dla tradycyjnych systemów architektonicznych. Wgląd naukowy w pochodzenie architektury i sposób jej pojmowania daje nam głębokie uznanie dla użytecznych rozwiązań osadzonych w naszym dziedzictwie architektonicznym. Rozwój ten odwraca stuletnią praktykę w architekturze industrialno-modernistycznej, która opowiadała się za usuwaniem przeszłości, a nie uczeniem się od niej. Rozumiejąc zasadnicze zaangażowanie ludzi w budowane środowisko, architekci mogą przyczynić się do większego dobrobytu ludzi w budowanych przez nich materialnych strukturach.

Słowa kluczowe: inteligentna architektura

1. INTRODUCTION

The global economy directs intellectual and cultural exchange throughout the world. Skewed by the influence of media-driven societies, the architectural stage has become rigidly set by concepts and imagery. Iconic buildings are disconnected not only from their immediate users, but also equally from other cultures. It is becoming more and more evident that architects today are not the masters of their own profession. Architecture has become the near exclusive domain of the so-called "Star Architect" (*starchitect* in common usage). As such, today's architecture no longer conveys the collective richness of culture or

regional identity, but instead propagates the singular ideals of power and influence.

These *starchitects* pretend to know more about the architecture of a given place than the very people who were born and raised there. Championed by powerful extractive global financial interests, they decide what is best for the rest of the world. More importantly, how do we combat the aesthetic hegemony that such individuals exert over our personal place in the world?

In the hands of today's *starchitects* the built environment has been aestheticized towards abstract ideals and idiosyncratic expressions. Yet what the world needs is a concrete process for developing regionally-specific built environments conceived through sustainable human practices. Our intimate knowledge of culturally-specific values and beliefs needs to blend with a 21st-Century understanding of how human intelligence affects the buildings and places we create. Uncovering the scientific foundations of the architectural experience leads us to understanding the world through science.

Human intelligence is a unifying principle for the architectural design process: it can fundamentally restructure architectural education and practice in a manner that negates idiosyncratic or ideological expressions. Efforts by Christopher Alexander (Alexander *et al.*, 1977) and by Ashraf Salama (Salama, 2015) unfortunately aroused opposition from the architectural community. Even after trenchant criticism that the present system of architectural education is mostly irrelevant (Bothwell *et al.*, 2004; Boyer & Mitgang, 1996), no reforms were ever successfully implemented.

Meaning extracted from raw information found in our immediate environment tells us whether a place is either healthy and nourishing, or deleterious and dangerous. Intelligence processes this information to make it meaningful, and links humans to the physical reality that our eye-brain system perceives. This is a crucial aspect of our sense of wellbeing. As sentient beings, we are neurologically driven to look for certain kinds of structure in the informational fields that surround us. Information processing is the key element in making decisions such as fight-or-flight, to more complex synaptic engagements, which render a greater quality to our life.

Traditional architecture carries with it the same intrinsic structural order that underlies all physical and biological entities (Alexander, 2001–2005). The mind's innate need to establish a connection with our environment relies upon natural and human-made patterns, which serve as the principal conveyance of meaning about the world around us. The symbiotic relationship between ideas, images, texts, and biological forms helps to explain how human culture, consisting of created objects as information, essentially extends our biological bodies into our environment. Architects can employ this process to create built environments that utilize patterns, spaces, and textures that nourish human existence.

A METHODOLOGY FOR ARCHITECTURAL DESIGN

Intelligent architecture is not prescriptive: it does not tell you to build transparent glass boxes; nor opaque white cubes with horizontal slit windows; nor buildings with curved shiny titanium surfaces, etc. Those formal prescriptions are visual expressions of an ideology propagated by the architectural mantras of modernity as a pseudo-religious belief (Masden & Salingaros, 2014; Salingaros, 2004). Intelligent architecture represents evidence-based results substantiated by science and found throughout the work of several individuals and groups (Alexander, 2001–2005; Kellert *et al.*, 2008; Krier, 1998; Mehaffy & Salingaros, 2015; Salingaros, 2005; 2006; 2015).

An in-depth summary of several decades of scientific research behind intelligent architecture is impossible in the space of this article, but the following provides a basic idea of how these techniques apply to the design process. Note the sequence of design steps: the overall form of the building arises out of basic human concerns and becomes clear only towards the end of the design process. Starting with a pre-conceived form, by contrast, is working from a conditioned response, not an intelligent response.

1. *VISION*. We start with no preconceptions of form, but instead generate a physiologically-nourishing design of the building from the viewpoint of the user. Whereas modern studio courses teach architects to set what the building looks like in its expressed form, we design from the most immediate dimension of engagement. An intelligence-based process of design seeks to incrementally conceive an organized whole whose interior and exterior are derived congruently. This envisioning is achieved through material color, texture, scale, and/or pattern, etc., and should include portions of the building at different scales, including very small details. We sketch (on paper and on a computer) different aspects of this vision, growing out of the question: "*What's the most satisfying and authentic space that can be imagined to house this activity?*"

2. *TRADITION*. Thoughtful architects should build up a treasure-store of mental references of the

most significantly satisfying buildings from their culture's traditional (pre-modernist) practice. Such buildings are striking since common people appreciate them (but not architects). Traditional structures provide an innate level of detail and ornament necessary to effectively engage humans, and must be allowed to exert their enriching cognitive influence. As a design works its way through the mind of the architect, *it becomes inevitable that the final design, if it is adaptive, will assume some characteristics of traditional buildings specific to that locality!*

3. *ORNAMENT*. Architecture and ornament (as ordered detail) is one and the same thing; ornament being simply architecture on the smaller human scales. The appropriate ordered detail supports the forms on the larger scales. Ornament that is coherent with the larger form makes a unique contribution to scaling symmetry, which is missing from industrial-modernist environments. Numerous sketches of the project must be made on all different scales, from the size of the entire building, to intermediate scales, down to details on the human scales. Full-size mock-ups of different portions of the building should be constructed to judge key scaling relationships among the components.

4. *TRANSITIONS*. The design (i.e. structured form) arises out of individual elements from the user's optical perspective and physical movement. We design entry-points, circulation, transitions, path-connectivity, and working spaces from the user's immediate viewpoint. Every decision comes from a mental extrapolation of the visceral experience of inhabiting those material spaces, not from abstraction. This approach subordinates formal spatial concerns to privilege the connectivity of lived spaces. It is essential that structures built primarily to make connections are just as accommodating to human sensibilities as the spatial nodes themselves.

5. *PARTICIPATION*. We devote energy and time to conducting in-depth collaborative design sessions with the eventual users of the building, from the people who will be using it full-time, to occasional future users. Ask them: "*What is your VISION of the most satisfying and appropriate building to achieve this task? Please describe your sense of the approach, entry, working area, light, trees, recreation area, etc. of this building as you would ideally like to experience.*" Give the users priority in the design process over and above any formal concerns, and even the architect's initial ideas. Make sure especially to include the viewpoints and spatial experience of children and the elderly.

6. *MATERIALS*. We explicitly encourage the use of indigenous materials. Not only for reasons of sustainability but equally because these materials help to extend the mental parameters of the structure into its immediate setting. Whereas modernist buildings seek to isolate a building to create an intellectual distance between building and user, intelligent architectural design works to situate a structure. Creating a cognitive congruency feeds our sense of wellbeing. Structural decisions with local materials arise out of adaptivity to local climate and social customs. Contemporary technology can contribute to (but not replace) this age-old practice. There is no need to exclude high-tech materials, just as there is no need to exclude local materials. But technology alone should not dictate the form or expression of a building, since the industrial-modernist conception establishes a perceptual distance between humans and the world.

7. *URBAN*. Connect the building design to the existing urban fabric as intricately as possible. This goal is not to be confused with contextual design that aligns itself with the formal aspects of adjacent buildings. Give priority to human scale and nature, not cars and vehicular streets. Consider approach and transportation that will reinforce adjoining spatial and circulation patterns. The new building should blend seamlessly into the existing complexity of nature, built form, and human activity in the immediate region. Try to the adaptive form language of adjacent buildings, but only if that is congruent with the specificity of place. The urban fabric should encourage maximal pedestrian connectivity around the building. Blend indigenous plants, natural forms, and water as much as possible to be used intimately, not as decoration or formal *appliqué*.

8. *FORM*. A final decision must be made as to the overall form of the building. We usually leave the large-scale form unspecified as long as possible, though it may have occurred in the architect's initial vision. Even if the architect had some clear vision of the building's form, all the above design considerations should have invariably adapted that form to accommodate human needs, as outlined here. Thus, in intelligent architecture, no initial form can survive unchanged during an adaptive design process. If a building is built as originally conceived on the computer screen, then it negates the complexity of human dimensions, and the architect (and the users) must recognize this failure.

While this series of design considerations might seem, at first glance, to outline methods familiar to practicing architects, the sequence redirects the design process away from any preconceived or prematurely-fixed expression. The human mind establishes

the needed neurological connections that provide innate levels of design, effectively responding to human engagement. Designers will begin to see these dimensions revealed in their work and will, with practice, come to manage connective elements with great effect.

The above method is akin to how buildings used to be designed and constructed in all traditional cultures. Those buildings are the most valued today by common people the world over. It is through intelligent awareness that such structures speak to us and seem to touch our soul. We don't however advocate a gratuitous return to traditional design methods, since the values, beliefs, and physical context for the underlying elements of design are always changing. Our method relies on recent scientific results, yet remarkably, these investigations have led to an increased understanding of the intrinsic value of religious and traditional practices for humankind's development.

During the second part of the twentieth century, people were told that creativity depended upon throwing off any preconceptions one might have. This is a false and misleading concept. Creativity is intelligent only when we have general working principles to build upon. Unguided design only leads to frustration, which in turn forces designers to copy something already realized, or make something up arbitrarily. Today's architects are psychologically conditioned to turn away from traditional-looking solutions, yet are not given the design tools to create purposeful human environments. What is left, for most, is to copy what the currently fashionable *starchitects* are designing. With such a frustrated mind, you inevitably copy, or unintelligibly emulate, what is assumed to be originality in others. In so doing, the quest for originality turns either into mindless conformity or pure flight of fancy.

There is more at stake here than architecture alone. The very fabric of culture and society depends on how human beings conceive the built environment. Critics who dismiss intelligence-based architecture do so out of ignorance or as a mindless defensive gesture. Our effort to help construct/conceive a better world exposes the vested power and interests of an élite: the culture of the *starchitect*. It is unfortunate that those unscrupulous individuals participate in a process that has been slowly eroding humankind's architectural conscience (Masden & Salingaros, 2014). Worst of all, generations of architects the world over have been misled to do the same thing. Students from the traditional world have returned to their countries as unwitting agents of a destructive Western form of aesthetic hegemony.

GENERAL CRITERIA FOR AN INTELLIGENT ARCHITECTURE

Intelligent architecture is responsive to human needs and sensibilities through adaptation to existing buildings and nature. This is a new way of viewing the world – a way of connecting to it, and to ourselves – yet it is very much the same as the most ancient ways of connecting (Alexander, 2001–2005). Intelligent criteria provide a way of judging whether a building, or piece of urban environment, is good or bad for our emotional health. Yes, a building can be either good or bad to different degrees (Salingaros, 2006). People don't need experts to tell them whether a building is good or bad; they are fully capable of judging for themselves [Alexander's "Mirror of the Self" Test]. Here's the method – just ask yourself this question:

"*Does this building make me feel more alive, or less alive?*"

Note the specific nature of the question. It does not ask: "Do you like this building?" or "Does this building make you feel excited?" since those answers lead to ambiguous conclusions. Likes and dislikes are due to individual preferences overlaid with educational conditioning (exploited by the media and those with an agenda). Exposure to propaganda influences our decision. Similarly, emotional excitement could be due to either pleasure or alarm, and again, it is often difficult to distinguish between these two physiologically opposite responses. The above question instead digs deep into the subconscious networks that constitute human intelligence, and identifies a building with our own living structure. Intelligent architecture uses our evolved neural circuits to connect us to our environment.

A second question examines the coherence of a building. This is a very easy method for judging the coherence of highly complex visual structures. Pick any identifiable sub-unit of the building, some obvious component (such as a wall, column, doorway, window, cornice, etc.), and ask yourself:

"*Does the overall life of the building diminish if I could move this piece or change it in any way; or even remove it altogether?*"

In a good building the answer would be *yes* for each piece, regardless of size. Every piece belongs exactly in its place, and its shape and materials reinforce the overall coherence of the whole. This is system-based coherence, which contributes to unity and adaptivity and is not to be confused with a compositional/formal model. In a lesser building, pieces are seen as irrelevant and hardly belonging to the whole. They have become decoration (i.e. structure that has no meaning or purpose, and is added solely

for fashion). Removing them or drastically changing them does not alter the overall coherence, since that is nonexistent. Why, then, are those components included? Style is not an honest justification; it is so superficial and trivial a reason as to be meaningless. If you as the user can envision a portion of a building improved – making it more adaptive in its use and in its direct positive physiological impact on you – then the architect has not done his/her job of seeking coherence, but has instead imposed arbitrary forms or a formal compositional bias.

The brain, being capable of highly-sophisticated computations, instantly evaluates the geometrical coherence of any structure. Neurologically-derived sensations are linked to a physiological state, to degrees of alarm or calm. To profit from this physiological mechanism we need to cast off the industrial-modernist paradigm and the myopic/idiosyncratic vision of others. Contrary to what *starchitects* claim, our technology does not dictate any particular architectural style. We discover an informational content in traditional architectures that speaks to us on a human level. Empirically, through its materiality and design, traditional architecture provides appropriate scaling, structural patterning, complex textural information, and a sensibility towards construction, proportion, and human nature.

CLUES FROM BIOLOGY, AND THE IMPORTANCE OF EXTERNAL MEMORY

Consider the basic building blocks of how humans interface with the material world (and by extension, the built environment). We find genetic algorithms, Darwinian processes, emergence, capillarity, fractal structure, membrane interfaces, information compression, small-world networks, inverse power-law scaling, etc. playing a central role in how the built environment functions. We now offer these concepts in an architectural language that practitioners might use to improve their work (Alexander, 2001–2005; Salingaros, 2005; 2006).

Knowledge from biology, robotics, and artificial intelligence applied to architectural design extends human experience (Salingaros & Masden, 2006; 2008). At the top of the evolutionary ladder lies the brain's complex neuronal system that makes intelligence possible. In addition to storing knowledge in our brains' neural circuits, human beings also habitually use their built environment as an extension of biological memory. Books, artifacts, song, ornament, and socio-geometric patterns represent the "collective memory" of a particular culture. Represented memory encoded in traditional buildings, in turn, has been guiding architecture for millennia. This powerful repository of what we know about our responses to environmental structure can be as trivial as a particular ornament, a color, a space of certain proportions, or the texture of a wall.

Socio-geometrical patterns embedded in traditional architecture and urbanism complement the inherited knowledge encoded in texts and oral literary traditions throughout the world. These externalizations of brain functions encode information derived from experience over the entire course of human evolution (Salingaros, 2005; 2006). Collective memory thus provides the foundation of culture and civilization. It is only recently that the patterns observed in traditional cultures, coming from innate human preferences, were found to have a genetic basis (Kellert *et al.*, 2008; Salingaros, 2015).

Built knowledge (represented in the built environment) is both complex and irreducible, making it very difficult to simplify and transfer into written text. Christopher Alexander attempted to do that in his *Pattern Language* (Alexander *et al.*, 1977). Maligned by the architectural establishment, Alexander's classification has nevertheless gained support and high regard from the computer science community, and his visionary results are now used to organize software complexity. When we begin to see the traditional built environment as an extension (an external repository) of human memory, we realize just how intricately biology is linked with architecture. This explains why humanist architects are sensitive to feedback from their design and respect traditions from which they can benefit.

The clearest, most useful statements of architectural theory have always drawn upon epistemology, being concerned with language and logic (although much of contemporary theory wanders off into meaningless directions). Even so, the enterprise of epistemology is generally detached from human emotion and physiological processes. Sensations and visceral states are essential to knowledge, however, and pattern recognition helps to generate our identity. Truth and reality both have biological and social origins. A state of mental understanding is inseparable from the neurobiology of emotions and complex bodily responses. Brain-based reality is thus emotional; a marked difference from its impersonal philosophically-based counterpart.

CULTURE AS A MANIFESTATION OF HUMAN INTELLIGENCE

Organisms merge their physical and psychological needs. Human beings are unique in that they accom-

plish this through culturally-conceived expressions, making complex objects ranging from hand-held artifacts and ornament, to buildings and cities. Traditionally, those created forms stem from innate urges. More than just seeking to provide basic shelter, architecture throughout the ages has expressed this life-affirming practice. Human intelligence produces all cultural elements: dance, music, song, sculpture, and painting. Trying to separate artifacts from the greater context of culture – defined by religion, mythology, and social patterns – goes against the nature of humanity.

Nevertheless, the fragmentation and loss of intelligence stored in the artifacts of a culture does occur. This is exactly what happened during the past several decades, with the propagation of 20th-Century Western architectural forms around the world. The problem is that any cultural element separated from its human connection loses meaning and relevance. In this condition of "not belonging", the anchor points of human culture seem out-of-place, and are replaced by meaningless images of industrial consumption. Once removed from its cultural context, the real reason for an object's survival as an isolated entity is strictly ideological (that is, not obviously practical).

Creativity driven by human intelligence has been the source of the incredible richness of cultures throughout history. Human beings ceaselessly strive to give form to their advancing intelligence in the complexity and organization of their greatest cultural expressions. Unfortunately, in the last century of human development, social, political, and economic dynamics eroded both culture and identity. Direct engagement has been supplanted by ego and avarice (Masden & Salingaros, 2014). While industrialization may lead to technical advancement in a society, it does not advance culture. Objects that are mass-produced to universal standards cast off deep inner needs (biological, physical, and mental) in humans. Yet, in the rush to clear away what were seen as useless relics of the past, the significance and purpose of genuine cultural expressions was overlooked. To this day people continue to mindlessly throw away some of humankind's most valuable artifacts, buildings, and traditions as if they were cleaning out accumulated junk.

Equally troubling is the modern practice of twisting human intelligence into a negation of itself and of humanity. Some people reject the natural, the adaptively simple, and the unaffected as belonging to the past (and thus, to a certain way of thinking, inappropriate for modern times). They reject traditional sources of basic human pleasures upon which many cultural traditions grew. And yet, those simple pleasures are the result of an incredibly complex set of interactions. Turning away from nature and humanity's relation to the physical world is a regression to an overly simplistic and unintelligent conception of the world.

Cynics observe destruction of the built environment (coupled with a breakdown of human values) with detachment, by not getting emotionally involved. They accept a turning away from complex inherited values as an inevitable simplification of contemporary humanity. The more intellectual among them come up with arguments involving "novelty", "progress", and "expressiveness", which serve only to justify their own insensitivity (Salingaros, 2004). Those among us who see a tragic loss for civilization, and try to reverse it, are branded as conservative, nostalgic, and romantics. Yet people who value human qualities embedded in cultural artifacts are in fact exhibiting a greater sense of intelligent awareness.

Circumventing the illogical but self-reinforcing nature of anti-humanist practices requires a complete restructuring of architecture, its education, and application (Alexander, 2001–2005; Salama, 2015). So pervasive are the expressions of this inhuman contemporary condition that no logical argument can redirect its maddening forms. To date, architecture students and practicing architects throughout the world have to submit to the dictates of a seductive globalized diktat. Despite the efforts of a growing minority, the confusing proposals of 20th-Century architectural theory continue to lead us down the wrong road (Salingaros, 2004; 2006).

MULTIPLE SOLUTIONS AND ADAPTIVE DESIGN

An intelligent system is one that is able to solve problems. It finds different relationships that lead to solutions, each solution being a network of connections. There is no SINGLE solution to a complex problem, but instead a set of related solutions. Systems usually have available many alternative pathways, leading to alternative but equally valid configurations. Biology is marked not by rigid conformity, but by adapting a complex template to changing conditions. Consider the genetic coding for an organism. Siblings of more complex animals, which share genetic information, turn out to have somewhat different characteristics. It is only in the lowest levels of design complexity that we find genuine organismic modularity: for example, the same virus in a billion identical copies.

This variability is an important component of adaptive architecture. A building designed in an intelligent manner can replace some of its own components without reducing the effectiveness of the whole. It is not "unique". It can change itself, just as an organism continually replaces most of its cells as they age, wear out, or die. It can evolve to adapt to changing circumstances without mutating into a totally distinct (identifiably different) typological entity. A similar intelligent solution is certainly possible, so that parts of the building could be changed to shift the overall design to one of its many close equivalents. Historical buildings have been adapted to changing needs over the centuries, and yet they retain a high level of intelligence (Brand, 1995).

A reader might get the wrong impression of a "perfect" building in which nothing can be changed. In an intelligently-designed building, each component supports overall coherence by making an observable contribution to the whole. The building can be modified by replacing components, as long as those continue to support the overall coherence (analogous to the wholeness of an organism). It is the systemic continuity that is important – the end result of an intelligent process of solution. Any successful adaptation to changing circumstances and uses preserves a high degree of internal relationships that characterize coherence.

Adaptivity is impossible without intelligence, however. The system has to respond to a multitude of forces in the environment (for buildings these are human needs and sensibilities, surrounding buildings, natural features and forces, etc.). The design process must compute a set of valid solutions, which satisfy those forces, otherwise a coherent whole will never emerge. The extra-adaptive constraints imposed on the problem (such as budget, availability of materials, building regulations, etc.) choose from among the possible good solutions. All of these decisions are based upon interactivity and reasoned choice from among many alternatives, each of which has to be evaluated using criteria of adaptivity.

Formal design, by contrast, is restrictive. The opposite of an intelligent design imposes a preconceived scheme based on some formal criteria (such as a fixed compositional method of simplistic or arbitrary geometries). Formality and adaptivity are incompatible. In a formal, iconic building, each component has to conform to a singular fixed (intellectualized) abstraction, so it may be impossible to change or substitute a single new piece. An iconic building usually cannot adapt to changing circumstances. It was non-adaptive to existing forces when it was conceived and built, and remains non-adaptive to all new forces developing in the future.

INTELLIGENCE AS A MODEL FOR GOOD ARCHITECTURE

Nature has evolved an enormously complex neuronal system in our body that enables the formation of thoughts, which execute the results of the intelligence mechanism. Input to the human intelligence system comes both from our sensory system (connecting us to the external world) and from internal memory. When the neuronal system is active (which is all of the time, even in sleep), connections are made, patterns formed, and new links and conclusions emerge. This system has enabled us to successfully lead our lives over millions of years, adjusting remarkably to changing circumstances and habitats. Human adaptability linked to intelligence is one of the marvels of nature.

People build traditionally according to what their mind tells them consciously and subconsciously, unless they are copying an explicit image. The brain guides the hand and eye in an intelligent, self-correcting process. Emergent forms, spaces, structural elements, ornamentation, etc. are just as much a reflection of the human mind as they are products of utilitarian functions. That, at least, was the case until the twentieth century, when iconic formalism was forcibly substituted for physical and emotional needs. By dismissing the expression of innate patterns in the mind, industrial-modernist architecture effectively detaches itself from human intelligence.

Let's not confuse intelligence with intellectualization. Intelligent architecture gives unaffected form to what the human mind needs to allow it to engage with the material world. Once constructed in these terms, the mind transfers ordered information to a mental extrapolation of this experience. If instead this becomes an intellectualized conception, then the experience is illusory (fictitious). In the latter case our mind simply does not engage on a human level. Unfortunately, architects pride themselves on creating some of the most intellectual and thus inhuman spaces ever conceived – but to what avail? Since those places are so unsettling that no one wishes to occupy them, they have become nothing more than symbols of this intellectualized condition.

Industrial-modernist architecture remains a mystery to most people, just the way magical thought was a powerful mystery during the Dark Ages of human existence. This lack of an intelligent relationship between people and architecture is the preferred terrain of *starchitects* (Masden & Salingaros, 2014). Human beings today are smarter than our species has ever been; therefore, it is unacceptable that architecture continues to be rendered in a semi-mystical

fashion. Architects may still be necessary to guide and mediate the design process to help the client, but non-architects need to re-assert their right to access the body of architectural knowledge. When they do, they will demand a far greater clarity of understanding than architects accept today.

Thus far, the powers that lead society have not been very intelligent about creating the contemporary built environment. By willfully sticking to a narrow set of images, they perpetuate the same "dumb" typologies that architects have been following ever since the 1920s. Even more astonishing is how vast technological power is now applied to continue producing these "dumb" typologies in an ever-narrowing spectrum of variations. Here, certainly, is a misapplication of technology to support an obsolete stylistic "machine look" instead of generating an infinite variety of new adaptive possibilities. Technology is susceptible to such misuse because it lacks an innate mechanism for selection. Whoever applies the technology can either use it for progress or to arrest progress.

Extremely expensive high-tech buildings are erected, which turn out to be perfectly "dumb" as far as providing an intelligent and sensual treat to the user. Their form and surface offer no complex organized information, no anticipation of discovery, and no variation from certain expected stereotypes. Recent industrial-modernist buildings even falsely claim to be biophilic by design. But these are just more examples where science is intellectually appropriated, without understanding, to support modernist imagery. These contemporary buildings still follow the minimalist typology in some way or another. They are either unrepentantly and intentionally boring or they try to distinguish themselves with an initial shock. Observers may receive a thrill (a surge of adrenaline) from an unexpected, shiny, exaggerated, or unbalanced form. After this initial exchange there is nothing further for these designs to communicate.

ICONIC VERSUS HUMAN ARCHITECTURE

Building in a way that utilizes scientific ideas and knowledge can once again make architecture a great HUMAN achievement. A new building constructed according to an intelligent methodology benefits all its users in a direct, nourishing, and visceral manner. If they wish, architects can now utilize this knowledge to align their designs positively to human physiology. The public loves a great building (be it a historic building, or a new building that exhibits this visible intelligence) when they feel in harmony with it, and when it reinforces their place in the world. It is a joy to look at, and everyone engages with it as an equal participant, since it establishes a fundamental parity between user and architect.

By contrast, an architect seeking only to garner public attention hopes that everyone will revere his/her building for iconic reasons, as spectacle, with the user subjugated to the self-important architect. The "star" system of design makes a building the achievement of a single individual based on his/her personal whim (Masden & Salingaros, 2014). The public might still seem to admire such a building, but only because some so-called "expert" declares it to be a great work of architecture. This manufactured admiration does not arise naturally. Personal whims and stylized expressions only distance the everyday user from architecture, because they negate innate neurological connections.

Science has been co-opted by this industrial-modernist process, utilized in a superficial manner to generate non-adaptive iconic expressions (Salingaros, 2004; 2006). Young architects today are constantly frustrated, finding themselves in a career that places a greater value on imageability than upon inherent human qualities. While pretending to uncover new architectural principles, charismatic *starchitects* instead cultivate media attention and political connections, court the influential critics, and assume an aura of aesthetic refinement. This is how they continue to reap the most significant architectural commissions of our time, not from any real concern for civilization (Masden & Salingaros, 2014).

The global business-industrial complex has identified itself with a narrow architectural style. Ensnared in the western paradigm where the perception of architectural novelty is mistaken for progress, many countries have fallen victims to this image-based architecture, further encouraging the commodification of form. The official media imply that this is somehow better than what is deemed non-modern. As each new architectural frenzy fades, its imprints continue to oppress those who must live and work in the shadow of its products. Contrary to "signature" architecture's claims of giving greater significance to "place", it actually subverts a true sense of place through a loss of identity. Cities with "signature" buildings are made of images, not the people and places that constitute the real culture of these localities.

An extractive global economy is undoing the magnificent expressions of 5,000-year-old cultures in the rest of the world. Western interventions negate the identity and values of people, in effect cutting them from their sense of belonging in the world.

Human architecture is informed by its material presence, not by image, yet our technological resources are focused on replacing civilization with superficial imagery. Larger economic interests are using *starchitects* as part of their drive to colonize and exploit the rest of the world, displacing cultural and religious values in the process. Rather than helping civilization toward the ultimate expression of our own time and place, this application of advanced technology serves only the global élite's interests (Masden & Salingaros, 2014).

Everyday people intuitively perceive contemporary architecture and urbanism to be disconnected from, and opposed to, traditional human values that they hold sacred. Many see the destructive process of 20th-Century architecture as a combative gesture towards all traditional cultures, values, and beliefs (Salingaros, 2006). Such practices present an affront to religions and cultures, by negating the forms of their architectural expressions. Industrial-modernist forms counteract the basic principle of connecting an individual to the universe – hence to God – by denying the traditional incorporation of color, sculpture, and calligraphy. Temples, mosques, and churches conveying meaning via polychrome sculptures, tile work, reliefs, frescoes, and mosaics are deemed by modernist designers to have no place in the "industrial" world order.

Governments that seek international recognition by hiring *starchitects* are complicit in negating the inherent values and knowledge of their own citizens. Architecture as a "*will to form*" was never concerned with engaging the user in a positive manner. It is an architecture of spectacle, purged of meaning and context, which has been allowed to construct its own reality. Its existence erases other forms of sensory perception necessary for the human dimension of a lived experience. Developing countries, in an effort to maintain their place in this era of globalization, will instead find the source of their new architecture within arm's reach: in the materials and practices of their region. Hopefully, they will come to recognize the capacity of intelligence–based design, and its generative devices, which evolve with an uncanny similarity to the rich vernaculars of their local traditions.

EXPECTATIONS OF PERPETUAL NOVELTY

How does one distinguish between contemporary architects who will likely have a positive or negative effect on the environment? Who is egotistical/iconic, and who is humanistic/adaptive? All architects claim to be genuinely interested in humanity, so what they say cannot be used to judge either their intentions or their products. Ashraf Salama made a perceptive comment about this: "*I wish I could see famous architects able to solve a housing problem in a village or in a dense urban region, or able to introduce change in a poor community, or a squatter settlement. While famous architects are immersing themselves in exploring new innovations to foster their fame, two-thirds of the world's population lacks shelter or lives in substandard houses.*" (Salama, 2003). Champions of adaptive architecture are actively involved in designing urban settlements and social housing, whereas *starchitects* have been conspicuously absent.

Since early European modernism, the Western expression of architecture has been on a roller coaster. Minimalist modernism reduced expressions to a single typology, severely reducing freedom of architectural expression – a statement that can be mathematically proven (Salingaros, 2006). The point where we find ourselves today is different, but not much better. Everyone is caught up by the Western phenomenon wherein *starchitects* promise a fashionable architecture hyped by the global media.

The legitimization of form over content, seen in pedagogical positions going back to the Bauhaus, serves only to validate an architecture of appearances. Detached from the world of lived experience, architecture as image reveals itself as nothing more than a fashionable commodity. As such, it is subject to the rules of constant change characteristic of the fashion marketplace. This type of architecture cannot respect the physiological needs of human beings. Looking around us verifies that architectural culture has effectively erased the design and building traditions of the past, and with them the vital web of urban culture in society. Introducing such abstractions during the twentieth century had catastrophic consequences for our cities' urban fabrics, and for the human qualities of individual buildings (Salingaros, 2005). With each vernacular structure removed to make way for the modern world, intelligence embedded in the built environment is lost.

Left unchallenged, this phenomenon continues to perpetuate itself by way of its global imageability. Following closely in its wake is the endless and empty rhetoric of contemporary architectural theorists. Desperately looking outside architecture as a means to garner greater validity, their speculations have run the full gamut from misunderstood mathematics, to the poorly-conceived postulates of French philosophers, to the loosely-construed intimation of linguistics into the domain of architectural design.

Each new "theory" offers yet another invented way to conceptualize architecture in the absence of an intelligent basis, thus failing to provide everyday architects with any intelligent tools for architectural innovation.

In a market driven by the architectural media, *starchitects* have set unattainable standards (because these rely on unrealistic expectations and/or idiosyncratic posturing). Practicing architects, expecting this work to elevate our profession, are beginning to sense that it only serves to propel the *starchitects*. And in the process, it has made the job of real-world architects working with real budgets and real clients impossible.

It is incredible that teachers of architecture give their students incomprehensible texts written by *starchitects* (and by architectural academics who wish to bask in the light of those *starchitects*) as something useful to study. In a frenzy that idolizes anyone promising "new" forms, students are compelled to read this stuff. One prominent *starchitect* today uses pornography to sell his otherwise nonsensical books. Yet he, and other individuals like him, are continually rewarded by lucrative commissions, choice administrative and faculty appointments at our most prestigious universities, gold medals, and major architectural prizes. The students get the message: copy these dishonest tactics and you too can become a *starchitect*.

Ideas of style have a stranglehold on architecture culture. Pursuing the deceptive "theoretical", which has obsessively driven the architectural world since early modernism, gives us little that strengthens the human lived experience via the built environment. Despite all the rhetoric declaring that this architecture was responding to profound social, political, and scientific discoveries, it in fact was driven by a very narrow agenda. The imposition of an identifiable (signature) style becomes the road to recognition and power. This has nothing to do with human needs and sensibilities, but everything to do with successful marketing. Its phenomenal success is due to the continuous mutation of the original industrial style so as to keep its practitioners comfortably in control of both architectural practice and education.

CONCLUSION

A creative revolution could transform the built environment in wonderfully human ways. A new intelligence-based architecture can impart a greater sense of humanity to the city, and to the world. It is up to world architects to set into motion some of the greatest scientific ideas of our times, and make architecture once again our highest cultural expression. Architecture that emerges out of an intelligent process of interactive thinking naturally develops towards a design adaptive to human beings. The result is better fit for human habitation because, coming from what is human, it nourishes our sensory needs and sensibilities.

To survive rampant globalization, our civilization must be grounded in an intelligent understanding of "place". The powers that shape our countries allow international designers a free hand to make a spectacle of a region's place in the world, thus destroying it. Tremendous knowledge can be gained instead through cross-cultural collaboration with those who have an understanding of intelligence-based architecture. They can help local architects create new adaptive forms that re-establish a vernacular specific to their own culture; i.e., an architectural language that speaks to the citizens of each country. Restructuring architecture to resonate from within the rich history of human societies provides a greater meaning in people's lives and a sense of belonging to their collective spirit.

The main obstacle we see facing us is that of institutions (organizations, governments, councils, etc.) validating anti-humanist architecture. Seduced by the latest fashion, they are eager to commission the current crop of *starchitects*. Whether this choice is due to a misguided conviction about High Art, or clever global marketing that preys upon hidden feelings of cultural insecurity, the result is disastrous. The international press will repay their expense with praise for the "enlightened" country sponsoring the latest "signature" building, as part of the marketing strategy. It's a token reward to the sponsor's ego. The long-term reality is far darker. Many precious (and irreplaceable) commodities are sacrificed for a brief moment of publicity, beginning with the sensibilities of that country's architects, and ending with the country's historic culture.

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