

Building Envelope as Surface

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The building envelope occupies a special position within the strategies of sustainable design. It is not only the primary building element that is exposed directly to weathering, but also a crucial part of architectural design that determines the formal qualities of the building. In the Vitruvian triptych, the building envelope contributes more to the *venustas* or to the delight in the building's beauty than others. The building envelope is also expected to help regulate the climatic, thermal fluctuations of the building. Therefore, the development of building envelopes has focused on the combination of both the climatic appropriateness and the affectation of a given building. The building envelope is expected to shelter and preserve the interior conditions and to express an aesthetic intent at the same time.

This chapter, presented in three parts, will establish a conceptual framework for the design of building envelopes in the context of thoughts on sustainable design. First, we will trace key historical ideas and developments in order to clearly establish what a building envelope is, and how it has been conceived. Within these discussions, we will summarize three main aspects that the building envelope is designed to address: functional, technical and energetic. We will conclude the first part by discussing the pronounced features of three exemplary architectural models as they relate to building envelopes, namely, the modernist, Venturian and biomimetic models.

In the second part of this chapter, we will explore the notion of *surface*. We will speculate on what could be derived from this notion in relation to building envelopes, and in relation to sustainable thinking at large. This discussion will include the notions of surface proposed by Avrum Stroll and James J. Gibson, and drawing from their theories, we will formulate the idea of the building envelope as surface.

In the third part, we will explore *mimesis* – as applied for example to the term *biomimetics* – as one of the key propositions in today's environmental awareness, that is, how we learn from the dynamic conditions of natural, living organisms. Here, the primary intent is to reevaluate and critique the current practice of biomimetic approaches in architecture. We will attempt to construct, by drawing from the theories of Jacques Derrida and Hans-Georg Gadamer, a perspective of mimesis pertaining to architecture as a kind of relationship to nature.

In consideration of the discussions made throughout this chapter, the conclusion will offer a view to a particular conceptual framework, one that contributes to the design of building envelopes in the context of sustainable design. The intent is to move away from a mechanistic view of sustainable design, and to approach it in a manner where sustainability emerges as a condition rather than as an object. We believe that today, the prevailing view of sustainable design consists of various prescriptive components without offering a comprehensive

discourse. Such a discourse should include the very basic, underlying composition of our relationship to the natural and living environments. The building envelope as surface provides a key component of that relationship.

Part I: Making Enclosure – Historical Ideas and Developments

In architecture we can observe two paradigmatic modes of providing shelter. The first one is the condition of a *void* where shelter is found in a cavity, being formed by erosion, excavation and subtraction, be it natural or man-made. Here the enclosure is defined by the hollowed out space in a solid. The second is the so-called *primitive hut*. It is an *assembly* that consists of a distinctive frame structure, reminiscent of vertical tree trunks and an overhead cover of the tree's crown.¹ These two archetypes provide the principles of enclosure: a solid, load-bearing construction analogous to cutting out a cavity in a solid material – the subtractive stereotomy – and the frame structure analogous to constructing a skeleton of vertical and horizontal members on which covering elements are added in order to provide a protected interior – the additive tectonics.

The spread of one model or the other depended on the social and cultural aspects of the local environmental contingencies such as the climate, the available sources for energy and food and the need for protection from natural forces and other animal species. More importantly, the two models can be considered in terms of the nature of each respective enclosure. The cave model is one-sided and reflexive. An example of the reflexive surface can be traced to the murals of the Lascaux cave dating back more than 17,000 years, where the dwellers chronicled their relationship with the outside world. The primitive hut model can be characterized as projective in that the *membrane* consists of two sides, the interior and the exterior. In this case, the membrane stretching over the skeleton is that of duality by which one can conceive of the hut from the outside and suppose its interiority; at the same time, the interior surface informs its dwellers of the conditions outside.

What is important to note here is that, in either model, the notion of enclosure imagines, inscribes and produces habitable solids and voids that are simultaneously cerebral and emotional of one's own necessities and desires in order to *dwell* inside. In these two models, our modes of dwelling have long been those of the *surficial*. The idea of dwelling as surficial is not an idea of demarcation – marking out and occupying geographical territories – but of constructing at once intellectual and emotional relations with one's own environment.

Today, the concept of sustainability underlies an approach to the development of buildings, cities and the broader built environment in a way that can ensure the long-term viability of resources including food, energy, materials and water, now, in the near future and hopefully, for indefinite posterity. The building envelope is closely associated with energy savings in individual buildings: it is the first plane of contact to the outside world where most heat losses or gains occur, and therefore, the building envelope is a predominant factor in the control of energy consumption throughout the entire life cycle of a building. At

the same time, the building envelope has been thought to provide the separation between the conditioned interior and the uncontrollable exterior climate. In both aspects, highly functioning building envelopes are crucial for the building's overall performance and for contributing to sustainability.

Building envelopes can be characterized in terms of three major aspects of design concerns: the functional, the technical and the energetic. In combination, these aspects determine what an observer sees and recognizes as the aesthetics of a building. They form a crucial concern in the design process, if not entirely an overriding one. Also, these aspects of building envelopes are closely related to the local conditions of a site in terms of geographical location, prevailing climate, material availability as well as the kind of intangible, contextual issues that exist such as the tendencies of ideology, politics, economics and thus, the social and cultural practices of the population.

The functional aspects elaborate on the building envelope as a shield, with a primary role of protecting the interior from the detrimental effects of the exterior: they include keeping the interior habitable from the extremes of heat gain and loss by conduction and radiation, keeping water out and controlling airflow. In addition, the overall appearance of the building can be regarded as one of the functional aspects of the building envelope, as historically the appearance and function were intimately linked. On one hand, this stems from the prevailing materials and techniques of the locale, and on the other, from what the dwellers inscribe on the surface in order to express their belief systems, narratives of their life, or simply what they consider beautiful and sublime in and around them. The function of the building envelope as a substrate for expression can be said to be the most primordial and yet also the most analytical of architecture.

The technical aspects arise from the construction point of view, as the building envelope must be assembled with appropriate materials and techniques so that it complies with the functional aspects while maintaining its structural integrity relative to gravity and lateral forces. The technical aspects therefore impart the material and structural qualities in the way the functional aspects are handled. With regard to the measures of durability and sustainability, the technical aspects imply what has been accumulated up to the point of use for the materials that are assembled in the building envelope, including how the material is produced, handled and put in place, whether or not it is safe to use and the extent and severity of the adverse side effects in its production and subsequent use. In addition, the technical aspects indicate how adaptable and accommodating the building envelope is to different uses by incorporating operable openings, devices such as blinds or foils that block or filter sunlight and air, and the degree of material resistance to weathering, wear and tear.

Directly pertaining to energy, the building envelope is expected to perform a key role in regulating the transmission, absorption and containment of energy in a building. Today, the energetic aspects of the building envelope form a key factor of sustainable design: it is through the building's outermost enclosure

that significant energy losses, gains and savings could occur. Therefore, energetic performance often provides a crucial design criterion for a building envelope and in one manner or another, all envelopes and enclosures have evolved to deal with energy flow. For example, in a hot and humid climate, screens and louvers are used in combination with a lightweight timber frame construction that is raised above the ground to facilitate ventilation. In a cold climate, the building volume is enclosed in massive, insulating walls with limited openings in order to contain the heat inside.

The building envelope, as seen through the divisions of its functional, technical and energetic aspects, forms the fulcrum of sustainable thinking and aesthetic considerations. Today, technologically speaking, the building envelope also represents the highest concentration of advanced and so-called high-performance materials and assemblies that function in the consideration of energy production, conservation and efficiency. The building envelope is the most up-to-date part of architecture where the constant pursuit of *doing more with less* defines the architectural cutting-edge. This points directly to the two core strategies of sustainable thinking, conservation and efficiency.

Building envelopes seen in these terms fulfill a role that mediates between the interior and the exterior of the building. In this instance, the primary purpose is for regulating the enclosed space in terms of the thermal range: in summer, in conjunction with the outside geography and vegetation, the envelope should let in cooler air while in winter, relative to the sun, the envelope should contain heat from solar infrared radiation. Instead of isolating the interior from the outside conditions, the building envelope should facilitate and take advantage of the exterior variations in temperature, humidity and airflows. And from the interior, the building envelope is expected to provide a pathway for relating to the outside world in terms of *vista*, for example, or the visual presentation for approach and entry. The provision of a view and a relation to the outside world – through the medium of the building envelope – has prompted as much impetus in locating a building with respect to a given site as the issues of geography, solar orientation and vegetation.

a The Modernist Model Given these considerations in relation to the building envelope, it would be worthwhile first to set the discussion within the context of modernist architecture that has predominantly shaped the face of our buildings and cities over the last century. Since the advent of modernist architecture to the present day, the one persistent dictum by Louis Sullivan has become the defining marker of modernist thinking: the union of form and function. According to this dictum, the building's external form is supposed to reflect its internal structural logic. The aim here is to achieve a union, or at least an agreement, between the interior spatiality and the exterior enclosure; the elevation is seen as the representative of the *venustas* that also expresses the building's *utilitas* and *firmitas*. However, the development of modern steel frame construction has resulted in the separation of façades from their role in carrying the

building's weight, as seen with modern curtain walls. The primary purpose of modernist building envelopes has become increasingly directed at implementing an impervious plane designed to maintain a clear separation of the building's interior from the exterior climate. This stems from the idea that the unpredictable and therefore undesirable conditions of the natural climate must be kept outside, and that the interior must be kept constant in order to achieve comfort.

Irrespective of the kind of architecture they may be present in, all non-load bearing building envelopes have had the same objective with little variation: to provide a barrier that seals the building volume from outside wind and water while providing a medium of exterior visual expression that is freed from the impositions of the structural loads. In stark contrast, the architecture for sustainability, as practical requirements and ideological propositions, calls for the kind of building envelopes that are breathable and permeable. These requirements and propositions of sustainability contrast with the vision of Le Corbusier that the outside is volatile and unclean, and that we should seal ourselves from it inside the building where everything is clean and conditioned in response.²

Under the modernist model, the building envelope is essentially a mechanical device that can be operated in order to regulate and control exchanges between the interior and the exterior environments. The windows are opened or closed depending on exterior conditions or the building can be sealed from the exterior if needed. By means of thermal breaks and insulating layers, one could minimize the thermal exchanges that take place between the interior and the exterior. As it is hung like a *curtain*, the modernist building envelope is thought of as a membrane-barrier rather than as having the solidity and thickness that a wall may indicate. Yet, through the use of large glass panes that have become available with the advent of modern float glass production, the building envelope can be made visually transparent, letting in unobstructed natural light and outside views. In this sense, the modernist model of the building envelope – with its non-load bearing curtain walls – can be characterized as both mechanical and optical; as a plane that separates the interior from the exterior while simultaneously connecting the two in terms of the visual and tactile experience; as a model that allows a very limited form of exposure to the outside world.

The other crucial, conceptual and obvious development of the modernist model is that the building envelope is no longer intrinsic to the logic of the structure, but made to exhibit its own autonomous logic and aesthetics. Even though the building envelope may inform certain clues to the building's structure and programmatic organization, it is no longer directly reflexive of them. Therefore, the role that the building envelope plays in the appearance and expression of a building becomes independent of the structural composition for building design.

Hence, the modernist building envelope becomes a crucial component that is at once a separative device and a connective, optical device, driven to maximize its transparency and minimize its physical presence. Satisfying these conditions

is regarded as the essential design objective for the modernist building envelope. And also, in this view, the history of modern architecture can be seen as a history of shedding material heft by making it lighter, stronger, more insulating and more transparent. While the combination of reduced materiality and heightened performance is by and large consistent with the principles of industrialization – in that one should produce the maximum function-performance assemblies with the minimum expenditure of materials and labor – the design of building envelopes also presents the building's environmental and aesthetic positions in the most direct manner. This is true in terms of how it responds to climatic variations, and in terms of how it expresses form as an aesthetic configuration.

b The Venturian Model Subsequent to the modernist curtain-wall, in Robert Venturi's theory, we find a conceptual construct in which the building envelope provides an *agent* that is expected to represent and transmit *messages* by means of flat and thin façades. Throughout the history of architecture, Venturi argues, building façades have been made to communicate ideas and stories by means of material and tectonic making, such as stone carvings, mosaics and fresco murals.³ This development points to a conceptual articulation of building façades where the substantive separation of the medium and the content takes place. Here the medium is the actual, physical and material presence of the façades themselves, while the content consists of visual effects, messages, signs and other elements that are superficial to the façades.

What the Venturian model offers for the building envelope, primarily in terms of façades, is the notion that it is a communicative device that is expected to signify, symbolize and convey certain narratives, messages and information. In Las Vegas, for instance, Venturi finds building façades that are designed for visual effects that promote fantasy and desire; they are conceived as media that contain information or stories about what the building does, what the building means or what it appears to be.

c The Biomimetic Model Today, active research and experiment toward the architecture of sustainability is grounded in the realms of the *virtual* and the *bionic*. With regard to building design in general and to building envelopes in particular, the virtual provides a convincing means of testing and simulating designs, while the bionic provides the basis on which the algorithms for sustainability, for *doing more with less*, may be modeled. With the rapid development in these two areas of engineering, shorter product life cycles, shorter development times and higher resource efficiency are just a few keywords that appear in the context of sustainable design that is focused on biological models.

Within the discussions of sustainability, the primary purpose of the virtual is to measure, compare and simulate the environmental conditions to which a piece of architecture will be subjected, which in essence codifies many of the important variables of architecture. Virtual software applications with a wide

range of possibilities for simulation and analysis are used to optimize the performance of buildings. These allow for a building's design-performance relationship to be simulated, visualized and analyzed in the framework of the building environment as a part of the design process. For example, the software application for energy analysis can quantify the energy consumption of various cycles of a building along with the resulting CO₂ emissions. The application can also measure and simulate the degree of thermal insulation and heating and cooling loads.

The bionic is characterized by the use of material, functional and structural configurations that are based on the organic solutions found in nature. The features that distinguish bionic architecture can be characterized in three main categories: material creativity, optimized production and adaptability. As a general condition, the work of nature is held to be *beautiful* because each entity, both living and non-living, is thought to be formed in its appropriate place according to the immutable laws of nature. In our view, the rationale behind bionic architecture concurs with this awareness; it regards nature an appropriate template for architecture. Nature provides a key for achieving architectural materials that are beautiful, durable and strong, highly efficient and yet environmentally appropriate, and can be used in a wide range of flexible, adaptable applications. Thus, considering these two threads in combination, the virtual and the bionic are regarded to offer the possibility for building envelopes to achieve a new intensity in technological and morpho-tectonic sophistication, and above all, a coherent ideological construct.

Currently, the virtual and the bionic are drawn together closely within the biomimetic model of architecture, which is based on the processes of natural selection, evolution, adaptation and optimization. The biomimetic model attempts to abstract the principles that lie behind a species' capability to sustain itself by adapting and evolving its physiological composition in relation to the habitat over time. This model proposes that building envelopes are increasingly analogous to biological organs, for example biological skins that respond to environmental conditions and function in specific ways. In this instance, the building façade may be conceived as an assembly of dermal layers, each one corresponding to a particular performance criterion, and each one optimized through a virtual process that is analogous to natural evolution.

The biomimetic model propagates that the process of natural evolution has been refined over millions of years and provides a highly refined approach for the design and engineering of the built environment. Common examples include the physical and behavioral features of various animals and insects that are specific to their particular environments. The primary strategy of this model is to devise a certain degree of sensitivity and automaticity in the operation of the building envelope in regard to the various so-called *parameters* that contribute to the relationship between a building and its environment, both natural and artificial. At the same time, the notion of emergent and generative systems, often codified as virtual models and simulations, points to the kind of self-

stabilizing and self-regulating configuration of building envelopes that are supposed to embody the notions of material and structural efficiency, formal expressiveness and environmental adaptability in one seamless entity.

Part II: Building Envelope As Surface

The three models of building envelopes presented so far can be summarized as: the modernist envelope that informs the logic of the building's program, space and structure, i.e. 'Form *follows* function';⁴ the Venturian façades that signify and communicate, i.e. 'Form *accommodates* function';⁵ and the biomimetic, emergent and/or generative systems that respond and adapt to environmental or parametric conditions, i.e. Form *is* function.

At this point, the three models can be hypothesized in terms of *surface*. The first conception that is relevant to the discussion, what the analytical philosopher Avrum Stroll describes as the 'Leonardo surface'⁶ termed after Leonard Da Vinci's description of surface in his notebooks, posits that a surface is not a material presence but an abstraction. It not only separates but also binds two different entities or states, such as air and water. Surface as an abstraction is also an *inter-face*. It is a shared boundary with no 'divisible bulk' that marks the theoretical differentiation between two substances.⁷ At the same time the surface expresses the manner in which the substances fluctuate relative to certain influences or forces, as observed in the way the surface of a lake may ripple from the wind, for example.

The building envelope can be thought of along this conceptual line as a surface that belongs to both the interior and the exterior of a building, and therefore, as a surface that demarcates a separation, while at the same time joining the building and its exterior environment together in a manner that is *inseparable*. In addition, similar to the example of a lake surface exposed to wind, the building envelope is a dynamic and indexical condition where the interaction of the building and its environment is manifest in the resolution of the surface. In this sense, we can conceive of a building envelope that not only possesses certain materiality but also, and more importantly, embodies the dynamic exchanges that occur between the interior and the exterior.

Based on the conception of the Leonardo surface, we can discuss the environmental as well as the tectonic dimensions of the building envelope and its façade as *mediation*. One historical mediative function is to be reflective of the kind of building and the kind of occupants that reside therein, by means of decorating and inscribing the façade. With images and patterns the façade can become expressive of the underlying narratives or conventions – ideological, political, social or cultural – of a given building, its occupants and its context. Apparent to this mediative function is also the environmental dimension, in terms of the materiality and construction methods that are characterized by the kind of available resources and their extraction and consumption. In this way, the dynamic conditions that surround a building become embodied in the mediated building envelope. Conceived as a surface, the building envelope

not only reflects the external variations through its materiality and use of local resources – again retuning to the idea of ripples on a lake – but also projects its internal conditions through the use of images and patterns; we can conceive of an envelope that in essence promotes a certain kind of equilibrium through mediation and interface.

In parallel to Stroll's conception of the Leonardo surface, according to the psychologist James J. Gibson, we perceive objects directly (or simply *pick them up*) by means of surface. Gibson's view contrasts with the one that problematizes the integrity of visual perception with the idea that we perceive things in steps from retinal, to neural and then to mental.⁸ While it is demonstrable that the appearance of a given object's surface does not always coincide with the actuality of the object – for example, that foreshortening or oblique views may radically alter the appearance of the actual geometry – Gibson posits that what we see when we encounter an object is a material surface. In essence, that our visual perception of an object is direct and achieved through surface. Despite the fact that Gibson's view has been disputed as empirically unprovable, various surface conditions do contribute crucially to our understanding of the world in an *ecological* manner.⁹ In this sense, we can formulate a position applicable to architecture, one that conceives of the building envelope as surface, or more specifically using Gibson's terminology, one that conceives of the building envelope in relation to *media* and *substance*.¹⁰

With Stroll's theory of the Leonardo surface taken in combination with Gibson's theory of surface and visual perception, we can imagine the kind of building envelope that is:

- a Immaterial or of minimum material presence that belongs to *both* the interior *and* the exterior;
- b An interface that mediates between the interior and the exterior, reflecting the relations and flows between the two;
- c A membrane that at once separates and connects media and substance, ephemeral and permanent, dynamic and static;
- d A primary means of understanding the ecological and the built environments, to locate ourselves within the web of relations of which we are a part.

In addition, the French philosopher Gilles Deleuze's notion of *fold* may provide a useful construct that describes the relation between the interior and the exterior, describing the façade as an active agent. Not unlike the Leonardo conception of surface, the fold offers a connection and an interface between matter and affectation. The fold articulates the connective tissue of two states – interior-exterior, object-environment, media-substance – as a process of folding and unfolding. Conceived in this sense, the building envelope is simultaneously connecting and separating, permeable and impervious, constant and fluctuating. A building envelope conceived as a *surface-fold* can be viewed as a condition where two states co-exist in a smooth and continuous relation, where the transition between the two is indivisible. What is crucial here is to establish the

physical manifestation of the building envelope as surface, working from the conception of materiality in an *ecological* sense.

Here we can speculate on what such an ecology may mean in relation to the building envelope as surface. If we extrapolate from Gibson's theory of visual perception, an ecology is characterized by the way we perceive the composition of the world around us. This world would be composed of surfaces that divide and join the media and the substance, surfaces that allow us to find location and meaning through *invariants* and *affordances*. We can conceive of an ecology as being comprised of invariants that constantly locate our place in the physical environment such as the light and heat of the sun, the direction of the wind and the precipitation of rain and snow. At the same time, we can conceive of an ecology as being comprised of affordances that allow us to identify and connect to the more intangible senses of meaning and purpose.

Part III: Surface Aesthetics and Mimesis

Drawing from the discussions of the so-called model of biomimetics or biomimicry in architecture, it would be appropriate to consider *mimesis* further. One of the fundamental problems inherent in the current use of the term *mimetic* is that it often refers to literally mimicking, imitating and emulating certain natural organisms and/or conditions. When applied to the discussions on architectural sustainability, this position, that we can imitate and replicate biological organisms in nature in order to deal with our needs and problems, misleads and distorts the fundamental issues in sustainability. By focusing on what the entity *does* or how it *performs*, the biomimetic, in its prevailing form, ignores *what* and *how* such performance has come to be in relation to our needs. The approach focuses on solving or correcting the problems we have, as well as on providing synaptic excesses by means of developing so-called systems of *interactivity*. However, in the end, there is a lack of critical discourse, resulting from focusing only on how *useful* such biomimetic inventions could be for satisfying our needs and solving our problems in pursuit of a more sustainable built environment.

On all three fronts, the prevailing biomimetic view appears to argue for producing additional tools and implements without attempting to fundamentally tackle the root cause of the unsustainable conditions inherent in our current patterns of development, transportation, energy use and economics. An apt analogy may be that, instead of confronting the underlying causes of symptoms, the failing organs of the body are replaced and the stagnating body is propped up by mechanical devices that perform each discrete function. To address the issue of sustainability, what matters is our relationship to natural organisms and environments, not the usefulness, performance or affectations of such contrived mechanical organs installed in order to satisfy our excessive needs and to reinforce our dysfunctional so-called lifestyle. This is not unlike what Slavoj Žižek describes as 'The ultimate *perverse* vision' of the human body as a collection of organs 'as in those unique utopian moments of hard-core pornography' in

which the (woman's) body is 'thus transformed into a multitude of "organs without a body," machines of *jouissance*...' ¹¹

While it is one thing to learn from what a natural organism does in order to adapt and survive in an environment, it is something entirely different to recognize *if* and *how* such replication is indeed pertinent to deal with our atrophic relationship to nature. In a sense, the foundation of biomimetics should be the question of how we relate ourselves and our built environment to the network of natural relations – including those of plants, animals, water, topography and the prevailing patterns of the weather, for example. However, the current motivation behind biomimetics appears to be intent on how to fix our problems or on how to make our life more convenient and entertaining by fetishizing the organs without a body and by turning them into the machines of *jouissance*. This kind of biomimetics, stemming from our lack of meaningful relationship to nature, will only reinforce the view that biological organisms should serve us to maintain and continue the patterns of our excess and waste. In a sense, many of the so-called biomimetic designs result in nothing but a teleological exercise that ultimately would not contribute to a sustainable condition.

For this discussion we can turn to Jacques Derrida's article, *Economimesis*,¹² to provide a view of mimesis, or of being mimetic, that we consider pertinent to the discussion. In the text – originally written in part as an analysis of Kant's distinction of nature and arts – Derrida posits, 'Mimesis here is not the representation of one thing by another, the relation of resemblance or of identification between two beings, the reproduction of a product of nature by a product of art.'¹³ Derrida continues, 'The artist does not imitate things in nature, or, if you will, in *natura naturata* but the acts of *natura naturans*, the operations of *physis*.'¹⁴ Besides Kant's distinction between liberal or free arts (*die freie Kunst*; freedom, no exchange value) and applied or paid arts (*die Lohnkunst*; necessity, exchanged for money) that Derrida mentions in the text, the question is what it means to participate in 'the operations of *physis*.' If we were to consider Derrida's proposition in the context of our discussion, it appears that the work of mimicking is in essence the work of forming an intrinsic relationship with the way that natural phenomena unfold.

In addition to Derrida's *physis*, in *Truth and Method*, Hans-Georg Gadamer provides yet another clue as to how we can approach mimesis. According to Gadamer, mimesis is in fact a celebratory *play*,¹⁵ an enactment or performing of an act that is embedded in the experience and appreciation of the world. And this enactment manifests itself in the *praxis* that consists of participation in an attempt to render the world meaningful in some way.¹⁶ What Derrida mentions as the operations of *physis*, Gadamer characterizes as *Festspiel* that is an enactment and a participation in the emergent patterns of nature. The notion of the dynamic and emergent *Fest* and *Spiel* is crucial in the relationship between art and nature because: first, the so-called conditions of reality are inevitably interconnected and therefore interactive; second, *Festspiel* is an event of becoming and transformation by means of performance; and third, it always includes the

consideration for others besides oneself. This is to say that the world and the works of art in it are characterized by the understanding that we inevitably participate in the unfolding of events in which we are transformed in relation to the dynamics of our environment.

In consideration of Gadamer and Derrida, we can project what being mimetic in architecture may be. The theories of the two philosophers provide a specific and concise view of surface as the mediator of the unfolding of nature, *physis*, and at the same time of enactment in the play between an entity and its environment, *Festspiel*. In this line of thought, it appears that being biomimetic is not about imitating and replicating what a biological organism does in order to adapt to an environment and its changing conditions. Neither is it about imitating the ways of natural organisms in an attempt to cover up the problems that are symptomatic of our conflict with nature. Instead, it is about how we situate ourselves and establish an intimate relationship with the biological environment. Removed from this end, biomimetics will be nothing but a perpetual reiteration and versioning of copies' copies.

Common in the aesthetic evaluation of architecture is the assessment of geometrical harmony, proportion, symmetry and order with respect to the prevailing worldview. Composition based on such an aesthetic order has been applied and practiced for a long time in order to impart properties such as beauty, grandeur and power in everyday objects, buildings and cities, in other words, in built ecologies. The primary component of sustainable design is the building envelope, the surface through which the building is interfaced with the natural environment. In addition, the building envelope is also an agent by which we situate and establish our relationship, mimicking and enacting our presence in relation to the currents of nature. But how important are the aesthetic qualities in the design of building envelopes and in regard to the issues of sustainability? For that matter, in this line of thought, can we really discuss aesthetics as such? In this case, is aesthetics simply a network of relations and of finding the appropriate position for our built environment within such a network?

Conclusion

Persistent demands for efficient and flexible building envelopes will continue to encourage the use of new materials and technologies in order to minimize consumption and to conserve energy. In this process, efforts to maximize the performance of building envelopes will continue along with efforts to reduce their material presence, and at the same time, building envelopes will be expected to express the aesthetic intent of buildings. Indeed, central to building envelope design is the question: how do we conceive of the envelope in relation to both our necessity to create interiority and the ecologies in which such interiority is situated?

In contrast to the conception that the building envelope is primarily a barrier, the concept presented here is based on the perspective that the building

envelope is inherently *both* the interior *and* the exterior. Therefore, it is not only indexical of the building's form and contents but also dynamic and active in the fluctuating relationship between the building and its environment. However, the prevailing notion of responsive, adaptive or mimetic building design appears to simulate the *translated* conditions of the natural world more than the mediative qualities found in the relations between the human elements and the environment. In other words, the building envelope seen as a kind of mimesis should be more reflexive and diagrammatic than representational and mimicking.

If one looks to the natural environment and its organisms without being exclusively formal, it is possible to find unique approaches that deal with similar problems that are currently facing architects in their consideration of designing for sustainability. The current approach, centered on emulating natural conditions in terms of mechanistic affectation, seems to fall short of the potentials of surface to both mediate and embody. The concept of the building envelope as surface, as seen in both an abstract and physical sense, indicates that it can act both as an agent of equilibrium between the interior and the exterior, and as an apparatus within which certain mediative relations are imbedded.

In most cases, we encounter and approach a building in relation to the façades, in relation to the surfaces of architecture. And in our everyday lives, we are surrounded by architectural surfaces that function in seemingly contradictory manners. They compel us to pay attention and admire their visual qualities, and yet at other times, they emphasize the manufacture of economic value engineering. In this relationship, we can criticize the apparent superficialization of the building envelope, purely in terms of the visual and the optical, in other words, for the purpose of producing a (green) skin without the body that is both hypocritical and dishonest. We can also criticize the fetishization of so-called interactive building envelopes. In this instance, the building envelope serves as an extension of an architecture that is driven by the novelty of effects that soon exhaust their purpose.

Both of these tendencies in the design of building envelopes today are missing the essential point: the superficialization of building envelopes fulfills only the function of a mantle that simply covers up an increasingly excessive, obese body, while the mechanization of buildings and building envelopes fetishizes 'the desubjectivized multitude of partial objects'¹⁷ in the form of misdirected mimesis and interactivity. However, if we return to the construct of surface as mediation between matter and affectation, the building envelope can be seen, in essence, as the unfolding of various relations and forces between the building and its environment. This unfolding provides not only the aesthetic qualities of the building but also an approach to the environmental conditions that ultimately dictate the terms of human habitation. This vantage point suggests the kinds of tapestries that display narrative, structural, material and environmental expressions, while serving the purpose of architectural enclosure as the surfaces of mediation, indivisible in their composition. From this concep-

tual standpoint, buildings are *enveloped* in surfaces – not by skins – that should register and interface the interior and the exterior.

The conception of surface in this sense presents the structure, the building envelope and the façades that are interwoven together, and thus, the role of the building envelope is no longer arbitrary. With this conception, the weaving and pleating that takes place in order to *envelope* is done in the context of a certain technical maturity, where the environmental variables of a given site are addressed, and where the aesthetic qualities are inherently imbedded. From this point of view, the kind of performance and expression that is achieved is not simply superficial and passive. The design of surface is blended with the very essence of architecture in a way that radically departs from the position where the building envelope is seen as an additive, redundant drapery.

Sustainable architecture points to the articulation of surface as a means of subsuming the disparate views of the interior-exterior relationship with the one that helps weave, pleat and mediate a series of environmental forces and phenomena. With today's digital technology and its *virtual* capability, and with new construction techniques and new materials, it is possible for the construct of surface to become synonymous with the building design process itself. The surface, as seen in this light, not only provides the membrane of communication and exchange but also embodies the quintessential qualities of human space that exist in intimate relation to the natural environment.

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