Ecological Form.
Tenets for an Evolving Architecture

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This essay addresses the urgent question of sustainability through developing an approach to generating ecological form. Through concrete examples of contemporary and vernacular architecture, the basic tenets of this approach reorient the objectives of building design from the construction of freestanding objects and abstract formalism to shaping habitats for animals whose flourishing is interdependent with other forms of life. This approach insists that form is always situated and emerges from specific places in all of their varied and multidimensional complexity and that built responses interact and interdepend within a system of mutually reinforcing strategies. And further, that material and form cannot be separated from one another but mutually inform and constrain one another. Aesthetics and performance are not two separate domains but are fused in ecological form, which emerges out of their very constraints and limits.

— ECOLOGY, SUSTAINABILITY
— GENERATIVE FORM
— VERNACULAR ARCHITECTURE
— FORMALISM
— ECOLOGICAL FORM

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The active meaning of form

This essay takes up the urgent question of sustainability: how do we, in the editors' words, «overcome aestheticising practices and purely performance approaches to develop a genuinely ecological design dimension?». And in particular, it questions the notion of form in contemporary design practice: how might a fresh understanding of form contribute to a genuinely ecological dimension of design? The question may best be framed in the contradistinction to how form is generally understood in architecture today. The education and practice of contemporary architecture understands its very work as a play of forms. Students are encouraged to explore form by carving polystyrene solids into various shapes, to model and draw forms for their own sake. The possibilities and constraints of the materials of construction are not tested, or reckoned with, and consequently remain secondary to form. Indeed, form in parametric design has been completely liberated from material, constructive and contextual restraints. Anything that is possible to draw using the new software, is now possible to build with extractive materials. In 3D printing too, form is not a constraint or a tempering force but an end in itself. Form – a word that is both noun and verb – has lost its active meaning.

Built form, like any other object of design, is chosen for its novelty, or justified for its metaphorical significance, but is otherwise devoid of an experiential interior. These striking forms, set as they are apart from their context, are best viewed from a distance, and ingested in a single gulp – which makes them easy to photograph. (GL) They make magazine covers, win awards, are the subjects of blogs, are copied for their coolness, their very lack of depth making them amenable to quick media consumption and serial reproduction. If my analysis seems too harsh, spend five minutes looking at the latest projects on the internet, the pageant of forms seems to clone one another, roofs no longer have overhangs to cast shadows or keep out the rain, cultural centres and sports stadiums tend towards the blob, and solid walls, and sense of refuge they lend, have been all but dissolved into texture-less glass.

A serious consideration of an ecological dimension must have the maturity to resist such temptations: just because something is possible, does not make it worth doing. Contrast this outward, object-oriented formalism to the form we find in nature. In nature, form is never random or arbitrary. Form cannot be severed from materiality, and materials are never cheap: wood demands the lifecycle of a tree, the long geological formation of stone is unrepeatable in the sum total of all human lifetimes, and something as seemingly plastic and benign as concrete requires dredging riverbeds for the fine sand that is the habitat of countless organisms. Biological form is, in D'Arcy Thompson's words, a «diagram of forces» (Thompson 1942, 45). Form is a process that does not end in a shape, it is an ongoing dynamic that is never only outward but inwardly organised, a faithful tracing of vital forces—in the grain of wood, the veins of stone, the motions of water that pulverised the sand. *Form and force*, rather than *form and*

(GL) GEORGIA LINDSAY
And makes them easy for AI to mimic!

SARAH ROBINSON
Yes, good point

function, would be a more accurate portrayal. Which is not to say that form can be summed up according to its physics. Form not only expresses the forces acting upon and within, but constrains and allows what is possible without and around. Form results both from physical forces and also constrains and allows possible behaviors and cultural practices. It was in his meticulous study of natural forms that the zoologist Ernst Haeckel (1866) coined the term ecology, combining the Greek word oikos, which means house, dwelling place, habitation, with logia, meaning to study.

In the spirit of this naming, the first tenet of an ecological design approach must be that, in designing buildings, we are not merely shaping formal objects: we are shaping *habitats* for animals, whose flourishing is interdependent with other forms of life. And, in order to effectively do so, we must understand something about the behavior, physiology, psychology and the evolutionary history of the subjects in question. The founder of Ecological Psychology, James J. Gibson, also had keen insights into the nature of form and its misunderstanding in architectural education. He opened a lecture at a symposium on Perception in Architecture in 1979, proclaiming that, «architecture and design do not have a satisfactory theoretical basis. Can an ecological approach to the psychology of perception and behaviour provide it?» (Gibson 1982, 413). The possibility for a new theory of design, he contended, must be rooted in an active understanding of form. Conventional architectural education teaches form in the way that painters or sculptors understand form, as «aesthetically pleasing forms» or, in Gibson's words, «the forms of Euclid and his geometry, abstracted by Plato to the immaterial level». Instead, he insisted that forms must be, «rooted in the substances, and surfaces, and layouts that constrain our locomotion and permit or prevent our actions». Architectural forms, although they may appear to be static, have the basic power to *afford* certain behaviours and prohibit others.

Abstract formalism versus ecological form

Let us consider the implications of the trend mentioned earlier, to delete overhangs from roofs and seamlessly blend the roof surface with the wall surface. While it looks very sleek and new, it obviates the possibility of placing windows on the downturned sides, meaning that light can only enter from the lateral sides of the building but not from the corners. (GL) This lack of intersecting light is decidedly less dynamic, as the sun's rotation will not be invited into the interior spaces throughout the day, but only at discrete times. Roof overhangs cast shadows and protect the walls

(GL) GEORGIA LINDSAY
I'm not quite sure I agree with this critique – or perhaps I don't understand it. Don't most buildings have windows largely on the sides of the building? And whether or not there is an overhang doesn't necessarily change the placement of the windows (much to the detriment of weather-tightness, at times). I am thinking of the Denver Art Museum's Hamilton Building (among many others) which had windows and skylights and all sorts of window locations.

SARAH ROBINSON
My point here is that the move to delete the overhang doesn't tend to come from a careful confrontation with situational variables and constraints, but is done because it looks cool. The possibilities of window placement are diminished when this is done because the corners are closed off. So, yes you can bring in light from above, below and the sides, but not the diagonal, just one of the many implications of this formal design move, which is often done to make a statement rather than to uniquely respond to the place and occasion of the project.

MATTEO TEMPESTINI
I believe the example of roof overhangs is interesting, but not directly related to the issue of lighting, which depends on many other factors such as window size, their placement relative to the wall line, and especially the orientation of the building. Obviously, for example, in certain climates, roof overhangs can help regulate indoor temperature during hot seasons by providing shade. However, it is not a solution that is generally adopted in all hot climates. In fact, talking about vernacular, Mediterranean and North African architecture rarely features overhanging roofs, instead favouring flat roofs. I also agree with the point about water collection, which can indeed be easily done without overhanging roofs.

beneath them from the elements and rainwater collected along the edge can be stored for future use. (GL) This redirection of the movements of sun and rain change human movements as well – working or playing is more enjoyable while basking in interior light, that same daylight is cueing our hormonal levels to synch up with our position on our spinning planet, whose fluid passage has now been interrupted by two solid walls. The opportunity to collect rainwater from the gutters placed on the overhangs apart from its clear ecological benefit is one-time honoured way to participate in the cycles of the seasons and the moods of weather, to feel part of natural processes of accumulation and flux. These pleasurable necessities

(GL) GEORGIA LINDSAY
Which can also happen without overhangs!

SARAH ROBINSON
Could you provide examples? Perhaps a linear trough on the sides of the building?

GEORGIA LINDSAY
Sure. Or if the roof is a butterfly design, there need not be any overhand, but all water can be collected as it runs down the middle. There are many other possibilities. All roofs where I live are required to have gutters--to direct the rainfall from the roof directly into the storm sewers or into a catchment system. The overhang doesn't matter, they all manage to collect the water.

[FIG. 1] Gilder Center central atrium. Courtesy of Zeete, Creative Commons

are prevented by the formal treatment of roof and wall. Even seemingly insignificant aesthetic decisions always have behavioural and ecological consequences. Yet these consequences are seldom considered, much less reckoned with in their long-term impact. Indeed, the shift from "aesthetically pleasing forms," to the cultural and behavioral possibilities of their substances, surfaces and layouts, is a much-needed corrective, yet by itself is not sufficient to constitute a genuinely ecological approach to design.

Consider how form is approached in the recently opened and widely celebrated Gilder Center in New York by Studio Gang Architects. [FIG. 1] The building is an addition to the Natural Science Museum's cluster of existing buildings, whose central objective was to unify and rationalise the access to the abundant collections, and to resolve dead ends. The addition accomplishes this mundane organizational task with a cave-like atrium that is expressed on the exterior entrance facade. The form was inspired by geological forms, the architects visited the canyons and caverns of the Southwestern United States and even carved ice in their search for their ideal forms. The concept was to create a spectacular space modelled on the natural world, to appeal to the human need for exploration, which fuels the spirit of scientific inquiry, the proclaimed raison d'être of the institution. After ten years of work and 500 million dollars, the mission was accomplished. The building is lauded for its inventive form, its inviting curvatures and for cleverly directing traffic flow (Kimmelman 2023). The fact that the windows are fretted, so that birds do not crash into them, and that the addition has windows to allow in light, are hailed as features of

environmental sensitivity and "care." Yet daylight alone is not remarkable, it is required by building codes. Did anyone ask the more pertinent question of whether this glazing is operable? Does the building breathe or is it yet another container on life support, and if so, at what cost? And should it really be any surprise that people like and even love natural curvatures, since our very bodies follow those same formal dynamics (Tawil *et al.* 2024)? Or that circulation flows better along curves, since human movement is inherently non-linear? In an effort to respect the neighbouring period buildings that are clad in pink granite, the design team proudly advertises that the original quarry from which the stone was taken was re-opened to be gauged out again to provide cladding for the new billowing facade. The problem is that stone, unless it is carved by the slow processes of water and wind, like the canyons that inspired this formal exercise – is brittle, hard and does not curve, but must cut from the earth in flat sheets. To clad the curvatures, the sheets, once exhumed from the earth, were shipped to Germany to be precision shaped and then shipped back again, and fitted onto the new facade, all in the name of "respecting context". The absurdity of this design decision alone should negate any claim of awakening visitors' sense of respect for the living earth. GL

Yet, the project is successful GL as spectacle, and its appeal, like theatre, is its ability to conjure a sense of surprise and suspense. And like theatre too, the spell is broken once one peers backstage. What makes caverns and canyons enticing is their massive solidity, the sudden change in air temperature upon entering inside them, their darkness that disables

GL GEORGIA LINDSAY
Much less the environmental cost of opening up a closed quarry and all the shipping back and forth!

GL GEORGIA LINDSAY
I think this idea of "success" is such an interesting one, and really hard to measure. Is it financial success? Shares on Instagram? Increased revenue for nearby businesses? Newly inspired creativity on the part of the Museum? This question is so important for getting to the heart of meaning in architecture.

SARAH ROBINSON
I agree, one measure of success that would meaningfully support sustainability would be the extent to which a building is beloved. Loved buildings tend to be taken care of and not torn down, and the act of caring is healthy on many levels. It seems that spectacle could get old fast, unless it is changing, like the spectacle of light at sunset or of dappled light on water. It is questionable whether fabricated stasis that cannot be touched would evoke feelings of love, but I suppose it depends on the person.

CARLO DEREGIBUS
This is how architecture can truly change the world – recalling Gio Ponti's claim "love architecture!" (Ponti 1957). Even if this is far easier to understand when speaking of individuals than collective...

our eyes and activates our ears, the echo of our footsteps, these resonances enveloped in their voluminous space. Yet these manufactured shapes adorn standard rectilinear boxes. (MT) And unlike actual stone that has an authoritative visceral presence, these forms are hollow and crumble at the touch. In keeping with the nature of a stage set, this building, like the old dioramas it was intended to reinvigorate, is yet another inert display that was never meant to be touched. Is this really so different from Disneyland, that at least doesn't pretend to enlighten, but only to entertain? The opportunity to be transported to a fantasy world, a quick flight from daily life, would seem a perfectly valid goal. But in an age of climate change and environmental devastation, we have to ask why, and at what cost? If your objective is to kindle people's interest to science, rather than in fake news, wouldn't resources be better spent demonstrating innovative responses to ecological mandates, rather than constructing a fake version of the earth whose delicate balance is so under threat? And in a time of increasingly virtual reality, are not buildings one of the few bastions of resistance that, unlike theatre, film and digital art, can physically touch us, and be touched by us? Is not their unique contribution to ground us in physical presence?

So, despite its fanfare, the addition is yet another example of contemporary architecture's hubristic search for new forms – readily recognisable and infinitely instagrammable. Forms that were conjured from an individual's conceptual idea, rather than form as responses and adaptations to the constraints and possibilities of actual situations and all the myriad beings whose life is interwoven in them. This abstract formalism is a mockery of ecological sustainability. And if the alternative to this sounds drab, recall the source upon which Gang based her spectacle – the natural forms found in nature. To call form natural, biomorphic, or in this case, *geomorphic* does not make it ecological. Ecology is a process of interaction, mutual dependence: a process of negotiation and self-organisation between myriad human, biological and physical forces. Biological form is a diagram of forces, bones, shells, trees grow and move in certain ways depending on the possibilities and constraints of their situations, and larger systems in which they interact. The life-processes of each of these materials must be celebrated, not violated, or made to do what they cannot through the elaborate energetically costly interventions. Ecological form possesses an internal order gained through creatively integrating multiple living processes. Open-ended and capable of dynamic resilience, ecological form is never an end in itself.

(MT) MATTEO TEMPESTINI
I think that the concept of comfort, discussed lately by Daniel Barber in some of his publications as "After Comfort" or "Modern Architecture and Climate", comes fully into play in this reasoning. In fact this detachment between abstract formalism and ecological form is made possible by technologies, air conditioning above all, which allow for a "comfortable" environment - I won't go into the cultural differences in the meanings of comfort - whatever the morphology of the building.

Lessons from vernacular architecture

As a counter to the superficial and consumptive forms that reign in architecture today, a wealth of insight can be gained from a study of vernacular architecture. Such a survey need not be an anachronistic back turning: vernacular architecture is relevant because it most closely resembles the growth, accretion, negotiation, tinkering, and resource conservation of natural processes. And it is crucial to recognise that, in an ecological understanding of form, human and natural forces cannot be neatly separated, so to even use the word "natural" already includes the human. Vernacular is another word for indigenous, like the way we speak of indigenous plants whose form is an adaptation to their local culture. Indeed, the word culture comes from agriculture, and at its root refers to the behaviour and adaptive strategies of plants. Vernacular is also used to refer to the native speech or language of a place. And like a local language, vernacular architecture results from an evolutionary, collective creative process that did not originate from a single mind, but emerged through shared experience in place – language belongs to everyone, and to no one. As the essayist Logan Pearsall Smith reminds us, «for human speech is after all a democratic product, the creation, not of scholars and grammarians, but of unschooled and unlettered people. Scholars and men of education may cultivate and enrich it, and make it flower into the beauty of a literary language; but its rarest blooms are grafted on a wild stock, and its roots are deep-buried in the common soil» (Pearsall Smith 1925, 62).

Vernacular architecture is rooted in and emerges from place, and like the collective wellspring of language, its invention ushers forth from shared embodied knowledge, and its refinement lays in the hands of architects, although this worthy task tends to be sorely undervalued by mainstream architecture. If we want to rethink form in order to respond to the urgent challenges with which we are confronted today, it is crucial to mine the repertoire of situational responses that have worked in the past. And in a time of increasing desertification, it is particularly instructive to learn from the built forms that allowed desert cultures to adapt and even to thrive. Traditional architecture was tested and honed according to the possibilities and constraints of their extreme climate. And as it turns out, this empirically achieved trial and error of tradition is based on what we now know to be scientifically sound principles. This process generated vernacular building strategies in which each element worked in balance with and served to reinforce the others, meaning that altering only one feature has cascading effects throughout the whole system. As the Egyptian architect Hassan Fathy lamented with the advent of air conditioning, changing even one small element can destroy the entire validity of the building as a valid response to local climatic conditions (Fathy 1986, xxi).

A closer study of the elements that evolved for living in extreme climates exemplifies tightly intermeshed complex of behavioural, social and biological adaptations. Like layered veils protecting skin from aridity, dust and heat—dwellings were distributed according to a nested hierarchy of porosity. Their cellular pattern, unlike the gridiron arrangement with wide vistas that allow air to sweep through at a disturbingly high velocity, performs the same function as the courtyards; the narrow meandering streets with closed vistas retain the cool air deposited at night from being swept

away by the first morning wind. The shared outer walls reduced the heat load by minimising the external surface while opening the inner one. The largest opening was the courtyard in the centre – dwellings turned their backs to the street to afford privacy and air circulation. Life was lived in the mutuality of building technology and cultural practices. [FIG. 2] This entire system can be understood as a paragon of ecological forms, distinguished by their inextricability in the sane functioning of the whole (Robinson 2021).

One especially aesthetically pleasing and generative example is the brise-soleil typically used in hot arid climates called the *mashrabiya*, which derives from the Arabic "to drink" and originally referred to a place to have a refreshing drink. As its name suggests, it is a wood-screened cantilevered outcropping where jars of water were placed to cool the passing air through evaporative cooling. And, like the ecological forms we have identified earlier, it served myriad functions, controlling passage of light and airflow, reducing the temperature of air currents and increasing their humidity—and was also carefully configured to provide privacy. Designed with horizontal lines, the lattice was punctuated by balusters which created a silhouette to carry the eye from one baluster to the next across the interstices. The louvers were adjustable so that the contrast between darkness inside and light outside will not dazzle the eye. This design corrects the slashing effect caused by the flat slats while offering the outside view over the whole span of the opening. From the inside, the *mashrabiya* appears as a lighted wall that affords the freedom of a view while allowing

[FIG. 2] Qanat and Badgirs, Vernacular architectural forms, Yazd, Iran. Courtesy of Sarah Robinson

privacy and security. It is a nexus of thermal, psychological, physiological, behavioural and aesthetic dictates finely tuned to local conditions *and* human perceptual limits, perfectly exemplifying the untapped potential of generating form through the process of responding to multiple dimensions of situational factors. Its beauty is not cosmetic, or arrived through carving polystyrene or blocks of ice, but is adaptive, promoting long term life and decency. Ignoring these local possibilities and constraints leads to the all too common, dumbed down instance of copying the form of the brise-soleil, without its underlying sophistication and adaptive beauty. The many lost opportunities of brise-soleil typology are rampant, a quick internet search will turn up dozens of examples. Most sheathe inoperable windows, which means that they cannot interact with local air movement. And though they aspire to play an environmental role, they are largely decorative, isolated curtain walls. They lack what qualifies the *mashrabiya* as an ecological form: it was never intended to be a discrete formal element, but to function within a larger system, it was configured to keep air moving, to cool, to shade, to allow privacy, and a gentle rhythm between visual interest and visual rest. Aesthetics and performance are not two separate domains but are fused in the formal solution.

The situational nature of ecological form

Ecological form is irreducibly situational and must emerge from and be grounded in place. Place is not merely a geographic point but the compound of air, water, earth, movement, mood, atmosphere, multi-species cultural practices, geology, history and their interactions and resonances. Like our brief survey of vernacular building strategies, another possible source of what we could consider ecological form is to study remodels, renovations and additions to existing buildings. Like vernacular architecture, this kind of work is forced to work within limits, to respond to and enhance what already is. Highly situational, this work draws forth creative responses to the qualities of place. It is often forgotten that even newly constructed buildings must be formed according to the constraints and possibilities unequivocally dictated by the processes of place.

One successful example is the San Telmo Museum in San Sebastián, Spain, which integrates a 16th century convent with a plaza and a mountain park. Instead of tearing down or compromising the convent, the architects Nieto Sobejano worked with and around it, creating a new addition that lightly connects to the existing buildings, to create a rational flow. The new building backs up to Mount Urgull, and connects the plaza to the path through the park via its multi-level roof. The perforated facade which is planted with local species was inspired by the rock formations in the park, that through the processes of erosion left openings to harbour plant life. The relationship is poetic, but subtle, one has to walk through the park and discover the geologic features to make the visual and metaphorical connection yourself. The facade opens to the plaza, people use the flaps to park their bikes and strollers, kids play hide and seek and bounce balls around them. [FIG. 3] And from the interior, daylight glows through the openings, and at night shines outward toward the plaza like candlelights. The facade was resource-intensive, made of molten aluminium, but it is limited in surface area. The addition recedes to the side

[FIG. 3] San Telmo Museum, San Sebastian, Spain, children playing around the pivoting panels on the facade. Courtesy of Sarah Robinson

of the plaza, and the dame of the ensemble remains the historic convent. The intervention innovates, connects, inspires, is climbed upon, played around, grown in and touched—performing all of these functions with a quiet dignity, throughly woven into the urban fabric, sewing it together to strengthen and renew it.

This building, completed in 2011 stands in stark contrast to another important cultural center in San Sebastián, the Kursaal cultural and convention center by Rafael Moneo. [FIG. 4] Unlike San Telmo, Kursaal is a stand-alone group of structures that are set on long stretch of a much beloved beach where it connects with the Urumea river. Moneo deliberately chose to disconnect the building from the historic center of the city in an effort to strengthen his concept: the building ensemble was to appear as massive stones that had been washed up on the beach. The architect explicitly stated that he wanted to highlight the abstract, geologic nature of the buildings: in his words, «this refusal to merely extend the urban fabric meant that conventional architecture was to be deliberately ignored» (Moneo 1999). The geologic associations are purely formal, but not material or enactive. The two large tilted masses are made of ribbed opaque glass, allowing light can softly shine in during the day. But only three windows look out at the actual ocean. The even light inside the building is lovely, but one could be anywhere, there is no sense of locality in time or place. The building was completed in 2000, after many contentious years of construction failures and delays. And twenty-four years later, my recent trip to San Sebastián revealed two dust-covered monumental glass cubes bereft of human presence. In that sense, Moneo partially accomplished his goal of abstraction: one side of the river bustles with life and overflowing

[FIG. 4] Kursaal Convention Center, San Sebastian, Spain, showing the empty plaza and the only three windows that look out at the ocean. Courtesy of Sarah Robinson

[FIG. 5] Kursaal Convention Center, San Sebastian, Spain, showing the roof which looks out at the ocean, forbidden to humans. Courtesy of Sarah Robinson

cafes, while the Kursaal cafe at lunchtime was completely empty. But the consequences of his design decision, the alienation of the buildings from the living fabric, is that he created lonely volumes that do not belong to the place, nor summon associations with massive boulders cast ashore, as he had intended. The plaza built to face the sea was similarly stark, not a single person was there, despite its prime position on the beach. And the roof which could be accessible from the plaza was off limits, while another wide recess on the opposite side was filled with wind-blown garbage. One of the pleasures of giant seaside rocks is to climb on them, to lounge on their sunbaked curves, but this enactive opportunity was apparently incompatible with the drive for abstraction. And although photos show the cubes glowing from within, they were never illumined during the time of my visit, and if they had been, the energy consumption to create the effect would not have been trivial. Because there are few actual windows to indicate signs of life from within, the building is disturbingly eerie at night [FIG. 5]. It feels unsafe. I noticed people speeding up as they walked past it to get to beyond it (Ellard 2020). Yet none of these mundane concerns seemed to have mattered: Moneo won the Pritzker prize, the highest honour in the architectural profession during its completion. This is another project praised for its formal inventiveness, but which actually repels life and all of its messy complexity.

We not only tolerate, but continue to reward this value system in architecture. Big flashy forms get noticed and replicated while truly innovative building strategies are undervalued and overlooked. (CD)

(CD) CARLO DEREGIBUS:
This critique is jolly inspiring and revealing. My only doubt is, do architects have the power to influence the direction of architecture, or to make this idea of architecture the strongest one? Indeed, there are many architects working differently from the purely formalist cases you highlighted, and a couple of them even won a Pritzker. Only, in too many cases the market asks for «readily recognisable and infinitely instagrammable» architecture, and starchitects or less-the-star-architects provide them. Like musicians cannot change music, but can do a kind of music hoping for a change, here we, as architects, are called to a resistance, way more difficult and inglorious.

SARAH ROBINSON:
I like your analogy of musicians who cannot change music but can play it differently, but this is only partially true. Architects are given the site, the brief of the program and budget, etc, and that becomes the substance to be composed, more than playing the music, we actually compose it. I am arguing for a more bottom up approach that allows the ingredients and their histories to emerge in relationship and those ties constrain the form, form in terms of music is a much better analogy than solid form, it is situational, alive, enacted.

CARLO DEREGIBUS
Yes, I intended to say composers :)

Conclusions

The three projects primarily critiqued in this essay all draw inspiration from the geological forms of the earth, but only one of them succeeds in embodying that relationship in a way that is not absurd. To pretend that one's crumbly concrete canyon, or tilted glass cubes are poetic odes to the earth is pure hubris. To bring people closer to a living earth they can witness, touch, breathe and feel, requires a generous humility. Hubris and humility share a common root in *humus*, like humour and human, which comes from the Greek word earth and soil. In Greek, *hubris* meant to violate the bounds set for humans and was mercilessly punished by the gods. It is not an exaggeration to say that the punitive consequences of our formal hubris are well underway, not by the gods, but through the imbalances we ourselves have caused and continue to allow to take place here on earth. But rather than ending on this grim note, let us reflect on the possibilities of generating ecological form.

The first tenet is that in building we are not designing merely free-standing objects, but *habitats* for animals whose flourishing is interdependent with other forms of life. And, in order to effectively do so, we must understand something about the behavior, physiology, psychology and the evolutionary history of the subjects in question. From this flows the second tenet: form is always situated and emerges from specific places in all of their varied and multidimensional complexity. The third related tenet is that built responses are not isolated, but interact and interdepend within a system of mutually reinforcing strategies. Aesthetics and performance are not two separate domains but are fused. This web of interconnectedness leads to the fourth tenet: material and form cannot be treated apart from one another, they interact, and mutually constrain one another. The fifth tenet would be that insides and outsides inform and constrain each other in nontrivial ways. While this list is only a beginning, an essential feature of ecological form is the acceptance of and creative reckoning with limits. Perhaps we can end on the upbeat note. As Igor Stravinsky (1960) noticed when composing music, «the more restraints one imposes, the more one frees oneself of the chains that shackle the spirit». Indeed, in ecological form, constraints and limits are emancipatory, freeing one to create in synch with the multitude forces that in their dynamic balance affirm and promote life.

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