

Cabinet, Vault and Luminous Forest: Complexity and Contradiction in Green Library Architecture

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In this essay I consider the many promising synergies between the design of the contemporary library and imperatives of building in a more sustainable manner. I begin by describing tenants of 'green' building, for example the need to adopt highly resourceful design approaches to heating, cooling, lighting and ventilating. I next observe certain design attributes and qualities that many celebrated libraries share, with an emphasis on the architectural meaning that accrues when projects are designed that support immersion in study and processes of learning, enable the pleasurable experience of occupying a space with others engaged in their own intellectual enterprises, and assume distinctive and memorable character as a function of the configuration of elements deployed in space: walls, columns, desks, stacks, light. Finally, I endeavor to integrate these considerations in advocating for a symbolically and culturally meaningful, spatially rich, highly functional and deeply green approach to library design. Such an approach prioritizes optimized, highly resourceful building performance in the service of experiential and intellectual delight. Library architecture in this sense is not a simple, open book (or a 'one-liner') and is instead a complex narrative replete with layered and interwoven passages.



1.0 Green Building as an Open Text

Those involved in the green architectural movement focus on making buildings that perform better, that is to say projects that conserve energy (and perhaps produce more energy than they consume), rely on natural means as much as possible for heating, cooling, (day)lighting and ventilating, consume less embodied energy during construction, recycle water, and in numerous other ways are less environmentally impactful than has been the norm for buildings in the modern era. It is even possible for a site scale work of

architecture (an individual building) to contribute to broader ecological function when it:

creates more diverse urban habitat frameworks, filters and cleanses stormwater in order to improve biological conditions in compromised waterways, fortifies the connective ecological tissue of neighborhoods and regions, and in other ways supports broader, regenerative landscape processes.¹

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In many respects, the objectives of a sustainable architecture and the creation of contemporary environments for research, learning and discovery align closely. There is much work underway to design sustainable buildings that *demonstrate* “greenness” to users. In this manner a green library would serve as a receptacle for learning *and* act as a didactic learning tool. Elements are configured and deployed for both their functional qualities and for the ‘stories’ they communicate about efficiency, resource use and an overall ethos of sustainability. For example, a vertically oriented exterior shade device that helps reduce a building’s thermal load by blocking the low west sun in late afternoon becomes a register (a sun dial) for the occupant of the sun’s movement through the sky. Similarly, a “rain dial” could be incorporated in a project to inform its users about the amount of stormwater captured from roofs and directed to cisterns for use in restrooms and other parts of the building. In this approach, if green architecture can be described as a book, it is a textbook or an open notebook for a pop quiz calling for direct, clear and unequivocal answers.

And yet architecture should be thought of as more than a tool that measures and makes explicit its own performance in relation to a dynamic environment. A work of architecture as a *supportive and meaningful setting* for learning must give shape to our activities and aspirations in ways that positively affect our imaginative capacities. Here the link between ‘green’ design and the architecture of libraries gains complexity and interest. In the construction of environments that function more sustainably *and* that support and embody processes of intellectual discovery, there are dimensions worthy of our attention that are both difficult to quantify, more challenging to lay out in the form of an open book, and yet are essential to an architecture of meaning, one that *sustains* the ability to delight over many generations. Learning involves taking bearings of one’s intellectual territory and organizing its features into coherent and meaningful narratives. Learning also involves acts of extension, of pushing beyond the familiar and embracing the incongruous. Over time we assimilate that which is recognizable and

that which at first seems more distant within the space of our imagination. From a secure step hold we proceed repeatedly into uncharted and uncertain realms of understanding and cognitive stimulation.²

As we will see, these dimensions of processes of learning serve as root metaphors and conceptual drivers that can guide the design of the library. I will now furnish a handful of examples of such projects created prior to the era of the imperative of sustainability before directing attention to libraries that are decidedly green.

2.0 The Lyrical Library

Louis Kahn’s Phillips Exter Library in Exeter, New Hampshire, furnishes a compelling example of a library project that derives meaning through correspondences between the metaphorical, spatial, and experiential, organized as it is around the notion of *taking a book and bringing it to the light*. As I have elaborated previously:

A conceptual notion (how we gain knowledge) originates in embodied experience (vision made possible by the presence of light, such that light enabling vision = knowledge). Kahn projects this construct back upon the physical realm through patterns of spatio-luminous organization “embodied” in the Library: one literally takes a book from a low ceilinged and relatively dark “stack space” and brings it to a generously daylight study carrel at the building’s periphery.³

The vast interiors of Hans Scharoun’s Staatsbibliothek in Berlin (1967–78) are similarly a study in the poetics of space. Arrayed on tray-like platforms are to be found ensembles of desks, lamps and shelves. These outfittings for one’s immediate experience act in concert with a vast and enveloping, sky-like ceiling-scape that appears without limits (walls, floors and roof are not primary architectural elements; instead, we find large inhabitable platforms or trays poised between the equipment of learning and the vault of the heavens). If the Exeter Library sets up a spatial sequence

that culminates in contemplative views from study carrels to adjacent green spaces, Scharoun creates a vast internalized landscape, a cosmography within which the studios are immersed.

Behnisch Architects' University Library in Eichstaett elaborates many of the same spatial themes that Scharoun develops in the Staatsbibliothek, organized as it is around localized symmetries of straightforward, rectilinear spaces that are collaged together to create dynamic resultant transitional spaces (in other words, the study spaces are quiet and static; circulation spaces more 'energetic' in character). If *taking a book and bringing it to the light* provides symbolic inspiration for Kahn, Eichstaett is built upon a notion of taking a book from stacks (symbolizing the street grid and block pattern of the city), carrying it through light-filled meadows and up a forested hill to a light filled cubicle (monastic study retreat). The project is both a landscape and its completion, an intervention that makes salient the qualities of its surroundings. The great Finnish architect Alvar Aalto's Mount Angel Library in Oregon, a project I have described elsewhere as a landscape 'couplet,' behaves similarly as it:

augments awareness of contrasts of surrounding landscape rooms by embedding their distinct characters in an architectural progression. One-story rectilinear volumes reinforce the spatial structure of the seminary's hilltop quadrangle to the south. In contrast, the fluidly organic reading space opens to the sky while stepping down toward and framing views of the mixed agricultural/forested landscape to the north. Block-like forms as extension of the geometry of the adjacent quad act as threshold and foil in preparation for focused study in concert with glimpses of forest, farms and the vault of clouds merging at the distant horizon.⁴

In all these instances the journey of design begins with descriptions of fundamental spatial experiences oriented toward the landscape and that arrive as kernels where notions of meaning, order and symbolism

inhere in concentrate. The designer unfolds these, contriving settings that juxtapose the comfortably familiar and immediately at hand with features at a remove. A library in this sense is first and foremost an internalized topography of elements that call upon that which extends the horizons of our imagination.

3.0 Making Meaning out of Greener Architectures

From this short description of the architectural significance of contemporary libraries we turn to dimensions of meaning of green architecture and how these are manifest in the design of contemporary library and research environments. In the introductory section I provided a rudimentary outline of the numerous and interrelated aspects of sustainable architecture. In his 1984 essay "Formal Speculations on Thermal Diagrams," Harrison Fraker was among the first to make the case for the value of assimilating these concerns with architecture's formal and experiential dimensions. Fraker wanted to elevate conceptions of 'solar' buildings beyond an engineering and accounting focus (the measuring of Btu's) and challenged designers to consider how passive or natural heating, cooling and lighting strategies could couple with fundamental elements and aspects of architectural experience such as path, procession, and discovery. For example, if a solar house is by nature relatively closed and opaque on the north side and open and light-filled on the south, the architect could play with the experiential effects and embodied meaning of moving toward light (north to south) or in parallel with light (east to west).

Fraker's focus thirty years ago was on single-family dwellings of a largely 'alternative' nature, the near exclusive focus at this point in time for energy conscious design and the precursor to a more robust and comprehensive approach that we now call sustainable architecture. Today, one can find countless complex buildings across a range of scales and project types that successfully operationalize powerful conceptual armatures in marrying dimensions of resourceful performance and dimensions of memorable experience, including many notable libraries.

March 25-28, 2015, Portland, Oregon

Mecanoo Architects library of 1993-1997 for TU Delft (Delft University of Technology) in the Netherlands provides a striking example of how a simple and strong formal move can serve commitments to green and enhanced user-friendliness simultaneously. The green roof is an extension and upward folding of the (formal) campus landscape. This massive south facing inclined lawn is a popular spot for picnics and naps in summer and sledding in winter (this constructed topography also affords views seldom available in the level Dutch landscape). The green roof's insulating qualities also reduce cooling loads of the library's spaces below. Additionally, the roof reduces the rate of stormwater runoff making its way to storm drains and nearby water bodies, thereby reducing impacts on water quality and aquatic habitat.

Deriving morphological inspiration from a desert slot canyon, Will Bruder in his Burton Barr Central Library in Phoenix (1989-1996) deploys copper-screen clad thickened masses on the east and west sides of the urban site as a primary design move. These volumes house the more utilitarian spaces—offices, fire stairs, restrooms—while bracketing and shading the more public spaces that lie in between and that open to the light and views of the mountains and city to the north and south. The initial conceptual organizational gesture acknowledges the climatic realities of the Sonoran Desert, with the thick masses reducing solar gain in the public interior spaces and therefore enabling significant downsizing of mechanical cooling equipment. The project is also at once a poetic analog of and visual corridor to this spectacular landscape.

In the design of several recent libraries, Behnisch Architects of Stuttgart would appear to be engaged in an ongoing experiment in the reallocation of interior space in association with dramatic reduction in material use combined with enhanced thermal performance. For example, with the John and Frances Angelos Law Center at the University of Baltimore,

Behnisch deploys minimized planes of 'smart' concrete to circulate air and absorb heat and that operate in concert with heat exchangers

embedded in facades. The ensemble allows for the elimination of ductwork. Mechanical equipment is transformed into furnishings; learning communities occupy volumes once taken up by air distribution networks.⁵

Although elemental in form—a block-like volume fronting a rectangular plaza—Mecanoo Architects second place entry for the Kaoshuing Library pushes to the limits a notion of green architecture as an assemblage of dynamic interacting systems that blend the organic and inorganic. Arrays of palm trees and pergolas shade the plaza. Intensive green roofs, water harvesting features, a ground source heat pump, chilled beams, and hundreds of potted plants deployed at the perimeters of floor slabs on all eight of the building's levels interact to form an immersive, responsively thermo-regulated learning environment. As with recent projects by Rana Creek Living Architecture and Hyphae Design Laboratory, water is the connective tissue for a project that *is* an ecosystem embedded within a larger one.

These projects derive material form from a formal and conceptual armature developed by the design team in which a multiplicity of functional and aesthetic attributes are embedded. These projects use less material and energy than is typical while at the same time accommodating a more encompassing set of concerns. Although this is somewhat of an exaggeration, it would be in the spirit of design intention to say that if in a conventional architectural undertaking fifty elements are enlisted to perform fifty functions, an integrated green approach would demand that five elements address those fifty functions. The emphasis is less the *expression of performance*, that is to say the didactic open book (a project designed as a tool that demonstrates efficient means for conserving energy and resources) and more the *performance of expression*: design begins at the conceptually connective level, where a basic organizational schema empowers the architect to fold dimensions of building efficiency seamlessly within a field of the tactile, intellectual and symbolic.

These projects go beyond Fraker's relatively straightforward, crisply direct formalism and speak to the increased sophistication and aesthetic resonance of an approach called green or sustainable. Building from these examples, we are now at the point where we might begin to entertain greater levels of complexity and delight, to more fully open up lyrical dimensions in the fashioning of contemporary and green library and learning environments. I will conclude this essay by describing one possible journey through a hypothetical built landscape for learning and in so doing hope to motivate those responsible for administering college and research libraries to dream and advocate for fantastically poetic yet highly resourceful green design.

4.0 Complex Allegories of the Symbolically Luminous

The individual is not the sum of his common impressions but of his unusual ones. ~Gaston Bachelard⁶

Laced with paths running at diagonals, the quad adjacent to the library gathers, orients and disburses students and faculty going to any number of destinations. Many make their way to the block-like library that forms the quad's northern edge. A lively, lapidary ceramic screen, configured to block summer sun yet allow controlled penetration of the low rays of winter, stands proud of the library's 4-story glass, steel and wood façade. The screen is an abstracted pattern of the periodic table (or perhaps the trophic levels of a forest ecosystem). Pockets integral to the patterning contain soil and collect water and provide purchases for the growth of plants and nests of birds.

Set within the façade is a cubic void, twenty feet on each side, serving as entry vestibule allowing visual transition and adjustment to an interior of fewer footcandles. A path of flagstone continues from the quad into the library as a continuous patterning. The sound of gently flowing water reinforces the sense of threshold, paralleling the passing from the active and

light-filled lawn to a space charged with greater ritual formality.

The vestibule can only offer limited preparation for the great hall that is to come, a dynamic double height space of information and orientation, help desks and information services. While of simple rectilinear form, the space's enclosing surfaces produce illusory effects, with mirrored walls, coffered ceilings and constellations of recessed lights creating the perception of a limitless vaulted starry heaven above. Portions of the floor are taken up by silent pools of captured rainwater that act as cooling thermal mass.

A gentle, generous ramp of vibrant hue (by far the most brilliant element in the hall) leads to reading spaces. The ramp, a celebrated element in the procession underway, proves that universal design is simply good design that lends grace to everyone's passage. Its white folded guardrail is configured to optimize distribution of light from the ocular skylight above to the library's darker recesses. The opening in the second floor carved by the ramp is a plenum that allows for stack (natural) ventilation and the subtle perceptions of cool air gliding across skin.

The ramp spills and settles on a landing within a space generous in its amplitude, a volume far greater than the hall below. Deployed within this great room are furnishings and built ins: stacks, tables, lamps and chairs. Additionally, pod-like private study carrel volumes, 20' x 20' in plan and 10' in height, are spaced at regular intervals. Clad in reflective metal, these pods bounce diffuse natural light from above. As with Donald Judd's aluminum cube installations at the Chinati Foundation in Marfa, Texas, these 'inhabitable cabinets' play thermal and luminous roles and become the control structures against which movement and variation enter into our perceptions.⁷ They are moments of crystallization amidst an atmosphere of indeterminate luminescence, figures of clear outline that make all the more evident the natural light at the room's corners of hidden source.

A most prominent wall that defines this great room is largely glazed and looks upon an atrium space with paradise garden below, in which are to be found

numerous places of study gathered under green shadows and dappled light. The atrium's greenhouse roof provides a preliminary buffer against the elements and the heat and cold, enabling a level of porosity of the adjacent great hall wall than would ordinarily be possible. Daylit cisterns at the garden level store captured rainwater channeled from the greenhouse roof for use in the library's restrooms and for watering the garden's many plants (evapotranspiration of plants produces a cooling effect that allows for a downsizing of mechanical cooling equipment). The garden also house odorless 'living machines' that process the sewage waste collected within.

To leave such an environment, to descend along the ramp to the hall, to check out and to walk into the gathering night, is to enter a different space of perception than one occupied earlier in the afternoon. The library awaits the "next morning, when colour and light would be born again in each blade and leaf."⁸

5.0 Sustainable Architectures of Magical Realism

In his groundbreaking *Complexity and Contradiction in Architecture* of 1966, architect and theorist Robert Venturi turned us away from modernism's pure white light and called our attention to the delights of history and ambiguity.⁹ Iconography, symbolism and the exaggerated ornament were means to forge links with the past of a decidedly ironic, postmodern sort. Contemporary circumstances, the current cultural moment, call for greater complexity and contradiction in green architecture, where the integration of systems leading to minimized energy and material use leads down richly thermal and luminous spatial paths. Each step of the journey is within a world of fertility of effect animated by simple means, a marriage of embodied and cerebral engagement and resourceful performance. The metaphors that serve as scaffold for such an architecture are more hybrid and landscape-like in nature than Kahn's powerfully direct conveyance of the text to the full light of the sun.

This is the full promise of green architecture in resonance with the intoxication of learning: the re-

sourceful deployment of finite elements enlisted in a striving for boundlessness. While the setting is comfortably familiar, there is much more to read into the situation than a first glance leads one to believe. Some things do not add up; there is always remainder. A crisply direct Enlightenment-style sustainability gives out upon a Romantic sustainability.

The architectural orders that allow these effects do not derive inspiration from the Great Chain of Being and the striving of humanity toward the unity of the immutable and immortal, as is the case with many libraries of classical inspiration. Instead these orders emerge from new classifications, ones more lateral and network-like in their aesthetic transpiration. The library is not one great book of indisputable truths and instead consists of layered passages of sometimes blunt and sometimes subtle effect, multi-stories in the manner of Borges, that is to say, greener architectures of magical realism. The library is a landscape is a book is a world.

Notes

1. Muller *Ecology and the Architectural Imagination* 2014, ix
2. Note the inherent and inevitable spatiality and luminosity of our archetypal metaphors for learning, as sure an indication as any of the tight correspondence of the meaning of the library and the making of meaningful architecture.
3. Muller *Ecology and the Architectural Imagination* 2014, 59
4. Muller *Ecology and the Architectural Imagination* 2014, 92
5. Muller *Graphic Ecologies* 2014, 36
6. Bachelard 1983, 7
7. See: <https://www.chinati.org/visit/collection/donaldjudd.php>
8. Sitwell 1950, 237
9. A few years later, an English edition of Jun'ichiro Tanizaki's *In Praise of Shadows* acclimated a western audience to the virtues and beauty of darkness; for example the limited light of the interiors of the traditional Japanese house. This work complimented Venturi's in encouraging an approach to architecture characterized by layered ambiguity.

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