

Science, Pseudo-Science, and Architecture

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A few years back, I wrote a critical survey of Princeton University's architecture for the school's alumni magazine. The article argued that the buildings that had gone up on the campus since the 1950's -- the modernist buildings -- were for the birds. It pointed to the campus's much-loved Collegiate Gothic architecture as an eminently appropriate model for future construction. The response to the article was pretty much what you'd expect. First there were the normal people -- students and alumni alike -- who tended to be quite supportive of my critique. Then there were the architects.

In a letter to the alumni magazine's editor, a 50's-vintage architecture grad who had been editor-in-chief of the *Architectural Record* weighed in with this observation: "I would suggest to the author that he go find a laptop computer with gargoyles, a microwave oven in the shape of an ogee arch, or a multiplex cinema held in place by flying buttresses." This gentleman has my deepest sympathy. He's spent his professional life thinking about architecture, and he's reached the conclusion a building should be designed according to the same criteria as your kitchen toaster.

This fallacy boils down to "form follows function." We don't hear that hoary aphorism much nowadays, but it is one of the founding dogmas of modernist architecture. Though it was first enunciated in the 19th century by romantics like the sculptor-writer Horatio Greenough (a friend of Emerson's) and the gifted *Art Nouveau* architect Louis Sullivan, its roots are in natural science -- specifically, the fitness of the skeletal structures of animal organisms to the functions they perform. The organic analogy assumed an ideological twist, courtesy of Darwin: Just as organisms evolve, so should architecture. And from the git-go it dovetailed with a rationalist doctrine, itself grounded in scientific progress if not science: Buildings should be designed with the same functionalist efficiency as machines.

There was supposed to be a social justification for such ruthless efficiency. The idea was that industrialized, mass-produced housing could shelter all those wretched proletarians consigned to rat-infested tenements. "I consider the industrialization of building methods the key problem of the day," Mies van der Rohe famously proclaimed in 1924. "Once we succeed in this, our social, economic, technical, and even artistic problems will be easy to

solve...I am convinced that traditional methods of construction will disappear. In case anyone regrets that the home of the future can no longer be made by hand workers, he should remember that the automobile is no longer manufactured by carriage makers."

The Princetonian who suggested I find a laptop with gargoyles was basically barking up the same tree. One thing, however, had changed over the 75 years since Mies's *pronunciamento*. The social justification for the industrialization of architecture had evaporated. Indeed, to modernists of a Nietzschean bent like the late Philip Johnson, altruism was never part of the package. And come to think of it I can't recall any public housing projects Mies designed after emigrating from Nazi Germany to our shores in the late 30's. In fact, the project for which he's best known, the Seagram Building on Park Avenue in Manhattan (designed in association with Johnson), was anything but a product of the assembly line. With its lobby decked out in travertine and its façades given much-needed if altogether decorative and un-functional texture in the form of slender vertical I-beams of bronze, this building required tons of custom fabrication and was extremely expensive.

Nevertheless, erection of public housing projects across the country after passage of the United States Housing Act of 1949 put modernist social ideals to the test. The "projects" turned out to be a dreadful welfare-state variant of the Skinner box. They made Skid Row, which the "urban renewers" aspired to eradicate, look like the Waldorf-Astoria.

Meanwhile, Mies's vision of factory-made Bauhausian residences for the masses failed to materialize. The vast majority of American homes are still stick-built at the construction site, as has been the case since the 19th century. The typical new suburban home fulfills the practical necessities of modern life admirably and often offers plenty of creature comforts to boot, but in terms of design it tends to be a low-grade knock-off of one traditional style or other. (We'll return to this issue.) The same applies even to modular houses whose components are shipped to the building site from the factory.

What's more, "form follows function" proved a profoundly dysfunctional artistic precept. After all, a boxy steel frame provides all the "fitness" an office building is likely to require. Tack on an exterior panelized cladding, or "curtain wall," that makes no pretense to load-bearing function, let alone any gesture in the way of beauty and dignity, and, strictly speaking, you've filled the bill. This is precisely the kind of structure that proliferated in countless downtowns and suburban office parks after World War II, resulting in an epidemic of visual sterility unprecedented in the annals of civilization.

The Rejection of Tradition

Why did this happen? Again, modern science's intrusion into a realm where it tends to sow confusion lies at the heart of the matter. Given the wonders science has performed, the intrusion was perhaps inevitable, but it's high time we took stock of the consequences.

Some pundits would argue that a big reason the modernist pioneers rejected the Western tradition in architecture is that it was obsolete. (By the Western tradition I mean the classical forms of ancient Greece and Rome that have been continuously employed since the Renaissance, as well as classicism's various tributaries, including the Romanesque, the Gothic, and the baroque; these tributaries also include the many regional "vernaculars," such as the Spanish styles employed in Florida and the American Southwest.) Well, next time you're in Manhattan, take a look at Whitney Warren's majestic Grand Central Terminal, or the brilliant and inventive original façade of the Metropolitan Museum by Richard Morris Hunt, or the Woolworth and Municipal Buildings designed by Cass Gilbert and McKim Mead & White, respectively. You're not likely to take these buildings for symptoms of obsolescence. Indeed, the Municipal and Woolworth are noteworthy for their brilliant integration of traditional architectural forms with the steel-frame construction technology that, along with the elevator's advent, made the skyscraper possible. Traditional architects continued to produce first-rate institutional buildings right into the 30's.

No, the grounds for the rejection of tradition lay outside the realm of design. Science was thought to have re-created man, and this new man was entitled to a new architecture. For the likes of Le Corbusier, Gropius, and Mies, the frontiers of human knowledge had so vastly expanded and the prospects for humanity's material existence so vastly improved as to dispel any notion of a fundamental continuity in the human condition. In the early decades of the 20th century, a European coterie of Nietzschean *Übermenschen* thus went about the business of ushering in a brave new architectural world whose foundations were sunk in the same sort of theoretical quicksand as "scientific socialism." In the "new world order of the machine," as Gropius called it, the classical Orders (i.e., Doric, Ionic, and Corinthian columns and the entablatures they support) were history, period. But from the ruins of the great tradition no new set of acceptable architectural conventions has emerged. Certainly "form follows function" didn't get us there. Not surprisingly, plenty of new recipes have followed in its train.

The history of modernist architecture is thus like a highway whose

exits are abstract theories about what contemporary architecture should be. Instead of a home for architecture such as it knew when tradition ruled, each exit leads to a dead end. So the architect gets back on the highway to nowhere and heads for the next exit, and the next dead end. The result has been an extreme stylistic instability involving recurring discoveries of new modes of artistic dysfunction. You can't make a city more beautiful on these terms.

Consider the case of Philip Johnson. He was an A-list architect, which is not to say he was a particularly gifted one. After his death at age 98 last January, his obituary in a German newspaper was appropriately headlined, "The Chameleon." His first celebrated work, dating to 1949, was a Miesian glass box -- his own residence in New Canaan, Connecticut. After tiring of such boxes, he moved onto pavilion-like institutional buildings fronted by rudimentary porticos or arcades that are astonishingly banal -- e.g., The New York State Theater at Manhattan's Lincoln Center and the Amon Carter Museum in Fort Worth. Then came enormous office buildings whose stark geometries were supposedly justified by their unboxiness. Then came the famous ersatz-classical Manhattan skyscraper with its crowning Chippendale flourish and a glassy, glitzy ersatz-Gothic office tower in Pittsburgh. Later he would dabble in disjointed deconstructionist follies. For Johnson, there was no destination. His way was the highway. The game was simply to get to the next exit before the herd.

Johnson wasn't driven by scientific concepts, it's true. He was largely concerned with the use (or abuse) of "historical" elements reduced to crude abstractions, or, depending on the way the wind was blowing, their complete abandonment. And yet scientific or technological "paradigm shifts" akin to the "new world order of the machine" continue to be adduced as justification for new fads. During the 90's, the critic Charles Jencks hailed a new architecture he saw emerging in tandem with a new understanding of the universe capable of rescuing us from our cultural confusion. This was the "jumping universe" of complexity science, of quantum mechanics and chaos theory -- a universe not static or mechanistic nor, least of all, created but rather "self-organizing," unpredictable, creative, and still-evolving. The computer would serve the architecture reflecting this new paradigm as a sort of womb, giving birth to new architectural forms that would somehow embody aspects of the ongoing "cosmogenesis." Hence the waves, blobs, torques, and fractals preferred by our current crop of "starchitects." (Whatever the computer's conceptual role, computer-aided design and digitally-programmed machinery do in fact make the starchitects' crazy geometries possible.)

But any number of alternative critical ruminations on the nature of post-industrial "modernity" have been marshaled in justification of the starchitects' endeavors. Moreover, the weird structural eruptions produced by the likes of Frank Gehry, Rem Koolhaas,

Thom Mayne, and Steven Holl (whose new dormitory at M.I.T. was inspired by a sponge) cannot serve as the basis of a generalized approach to design. They are both very expensive to build and explicitly "exceptionalist," a sort of viral reaction to the dismal mainstream architectural culture "form follows function" generated. The architects thus acknowledge that modernism failed in its crucial mission of providing a new architectural canon that would make man at home in his brave new world.

Needless to say, we haven't reached the end of the highway to nowhere. More exits lie ahead. But by now, it should be clear that apart from the baleful influence of science, and to a degree because of it, modernism has been completely hamstrung by its realism. Structural realism lies at the heart of "form follows function." But more to the point, modernists believe architecture's formal vocabulary, not just the practical purposes it serves, must be determined by its immediate cultural context, whether that context be global, national, or regional. That context, in turn, entails some combination or other of the reigning cosmology, religion (or lack thereof), political ideology, and technological and ecological conditions. This is *cultural* realism. But of course divining the significance of the age is a completely subjective business. The same goes for divining the way architecture should reflect it. The "authenticity" cultural realism extols, therefore, inevitably lies inside the architect's (or the critic's) head. Far from serving as an objective basis for architectural design, it serves as a codeword for inflicting the rarified, ephemeral sensibilities of a tiny elite on the public realm.

The Great Tradition

In contrast, the great tradition has never relied on the crutch of theory. And it is generally indifferent to realism. It is, rather, unabashedly idealistic, and firmly grounded in human instinct as well as an enormous amount of empirical experience with building acquired over the course of millennia. Nor do classicism and its offshoots conjugate as a "scientific" approach to design.

Indeed, far from being an extension of science or politics or some gospel of progress or other, classical architecture forms part of the emotional life that is, as the philosophers say, prior to our intellectual life. In that sense, it is like music. Its development has of course been influenced by particular historical circumstances, but its essential qualities and normative achievements utterly transcend them. That is because classical architecture is, first and foremost, profoundly engaged with our embodied state. It is an expression of man's instinct to compensate for his mortality by projecting his body into abstract, monumental form. We tend to read architecture in terms of our bodies, whether we're conscious of it or not. But classical architecture is uniquely anthropomorphic. Its proportions, its masses, spaces, and abstract lines, its

sculptural decoration and ornamental motifs -- all are symphonically, dynamically calibrated to human perceptions and, as the English critic Geoffrey Scott emphasized nearly a century ago, to our unconscious physical memories of bearing weight (think of the columns supporting a pediment), of rhythmic movement, of serene repose.

The Greeks and the Romans possessed a profound knowledge of human perception. You can call it scientific knowledge if you like, but that knowledge was wholly subordinated to esthetic aims. In the rotunda of the Pantheon, erected in Rome in the second century A.D., the architects brilliantly manipulated our perceptions to make the building's great dome seem to float above a dematerialized wall-mass of colored marbles. The dome imparts a subtle bodily thrill, because it seemingly expands even as our lungs expand when we breathe. And yet this is a disembodied architecture -- in direct contrast to the vividly embodied architecture of the colonnaded Greek temples.

The Romans also displayed a phenomenal mastery of statics. Having developed the technology of concrete vaulting, they made the Pantheon dome span an open space no less than 142 feet in diameter, while the walls that supported it were ingeniously engineered to accommodate the tremendous compressive forces and lateral stresses the dome generates. But to pigeonhole this great structure as an engineering *tour de force* would be to miss the point. The Pantheon humanizes the universe, recreating it as a harmonious enveloping cosmos. The gilt rosettes that once studded its coffered dome evoked the firmament. Above all, however, the building engages our senses by elevating them to a musical, even spiritual level.

You can enjoy a similar experience in the rotunda of the United States Capitol in Washington, where the dome spans a mere 95 feet, but feels quite enormous nonetheless. No less than the Pantheon's revolutionary structure, the Capitol dome, which was completed during the Civil War, bears witness to classicism's enduring receptivity to new technologies that can be harnessed to the cause of a humanist architecture. This dome, whose exterior is painted to resemble marble, actually consists of two cast-iron shells fastened to an elaborate, invisible armature of iron trusswork.

Classical architecture, then, makes man at home in the world by humanizing the world in a mythic way. It makes man central to the universe, which is of course what philosophers have been telling us he isn't ever since we found out the Earth revolves around the Sun. And yet we know of no other intersection between the material world and the realm of the spirit than man. We know of no other organic being of man's cosmic significance. For this reason, and because there is precious little evidence of an acceptable artistic

alternative, there is simply no reason to suppress the humanist architectural tradition embracing classicism and the historic styles that derive from it.

Because modernists tend to know little or nothing of traditional design, and at the same time feel threatened by its enduring appeal, they often caricature it as a simple matter of "copying" or "mimicking" old buildings. The truth is that traditional architectural idioms are characterized by an organic complexity akin to that of the human body itself. Designing in the classical or Gothic manner takes a great deal of skill. You couldn't copy even if you wanted to, because the sites and programs of different buildings are rarely identical. And yet the architect can always emulate -- that is, strive to make a building worthy of comparison to one whose beauty has inspired him. But emulation is a challenge. Because traditional design revolves around enduring, objective forms and conventions, it provides the norms by which success or failure can be reliably measured. A classical architect can't mask his incompetence by indulging in novelty for its own sake, as modernists too often do. His inventions must have a sound esthetic justification.

Of course, there are good modernist buildings -- that is, there have been modernist designers gifted enough to produce admirable work despite the questionable theories to which they subscribed. I would rank Louis I. Kahn and Frank Lloyd Wright among them. The problem is not that all modernist architecture is bad. The problem is that so little of it is good.

But the classical threat to the ongoing modernist hegemony in institutional architecture goes deeper than esthetics. For modernism is itself based on a mythology, or a series of mythologies that have as their common denominator the notion that man is the malleable byproduct of his historical circumstances. Classicism rejects these mythologies. The great tradition's secular persistence is predicated precisely on the assumption that what is constant in human nature is of far greater import than what is not. Modernists are deeply aware of this ideological clash, and it fuels their visceral hostility to classicism. Tradition threatens the architect's "world," with the autonomous self -- the godlike creative "genius" -- at the center of an eminently subjective universe in which it is beholden to no higher reality than the self. No doubt plenty of classical architects are peacocks, but tradition has a way of getting their egos on a leash where artistic endeavors are concerned.

'New American World'

Between May and October 1893, over 27 million people converged on the World's Columbian Exposition in Chicago, where they beheld the Court of Honor, a magnificent architectural ensemble

fronting on a great Basin that opened onto Lake Michigan. Buildings and esplanades alike were generously enriched with sculpture -- everything from gods to elks. At one end of the Basin stood Daniel Chester French's towering female figure, *Republic*, at the other Frederick MacMonnies' Columbian Fountain, with a goddess serving as helmsman of a tremendous barque.

Nowadays, even some of our classical architects can't quite fathom the "White City," as the exposition was known. Its grandeur was "over the top," they say. One wonders whether they might be missing something upon encountering the Midwestern writer Hamlin Garland's recollection of how "the wonder and the beauty of it all moved these dwellers of the level lands to tears of joy which was almost as poignant as pain... Stunned by the majesty of the vision, my mother sat in her chair, visioning it all yet comprehending little of its meaning. Her life had been spent among homely small things, and these gorgeous scenes dazzled her, overwhelmed her, letting in upon her in one mighty flood a thousand stupefying suggestions of the art and history and poetry of the world."

Sitting on the steps of Hunt's superb Administration Building, situated at the head of the Basin, the patrician intellectual Henry Adams also beheld the "inconceivable scenic display," as he called it in *The Education of Henry Adams* (1918). The dogma of historical progress had been turned on its head. "Here," he wrote, "was a breach in continuity -- a rupture in historical sequence!" The public's enthusiasm for the White City afforded even the constitutionally pessimistic Adams the hope that "the new American world could take this sharp and conscious twist towards ideals." The Exposition's sound channeling of human endeavor -- the promotion of material progress in exhibits ranging from ocean steamers to explosives combined with emulation of the great artistic achievements of the past -- led Adams to conclude: "Chicago was the first expression of American thought as a unity. One must start there."

In the event, the White City exerted considerable influence on the architectural practice of the following decades, encouraging a classically-oriented eclecticism that unquestionably accounts for the vast majority of the high-quality architecture in the United States -- its best courthouses, churches and synagogues, college campuses, office buildings, banks, libraries, and schools. In this "new American world," architecture would idealize the various realms of human endeavor -- governing, worshiping, dwelling, studying, commerce -- allowing the public realm to form a poetic backdrop to our ephemeral lives.

Inevitably, many traditional architects simply banked on the sheer visual pleasure afforded by their work in staking their claim on the public realm. Yet a significant number of them responded to the

modernist claim on the future by reinterpreting traditional architectural and ornamental forms in a more abstract manner, by emphasizing "stripped," unornamented surface planes, and by integrating sculptural decoration with the masses of their institutional buildings in a primitive, expressionistic manner. Rhetorically, however, the traditionalist camp was tongue-tied in the face of a polemic like Le Corbusier's *Vers une architecture* (1923), written with the pungency of a political manifesto. Vacuous Corbusian slogans like "The house is a machine for living" and "The [historic] 'styles' are a lie" thus ruled by default. The material evidence that would proclaim their absurdity was still lacking. And once the country was in the throes of the Depression and the New Deal, the wheel-reinventers resolved with religious fervor that this was the great cataclysm from which the new, socially-responsible, machine-efficient architecture -- an architecture which summarily rejected the accumulated wisdom of thousands of years -- must emerge. As we've seen, they succeeded only too well in their crusade.

By the time the magnitude of the calamity became evident, the traditionalist ranks had been decimated: not just architects, but an entire architectural culture that had included sculptors, mural painters, ornamental plasterworkers, fabricators of wrought iron and ornamental tile and terra cotta, as well as stone and woodcarvers. And of course there was no cultural establishment to revive the rule of common sense. The architecture schools were all modernist. The architecture critics in the establishment press were all modernist. And the corporate boardrooms -- where the curtain-walled, steel-framed box was much appreciated for facilitating the cost-efficient exploitation of every last square centimeter of available space on a given lot -- had largely been won over.

The destruction of this traditional architectural culture, which was of course informed by high-end practice, was bad news for the mainstream building trades, too. A rudderless homebuilding industry would convert the average American home from an artifact into a commodity. Instead of Bauhaus residences in the suburbs, we got ersatz-traditional schlock. The same goes for "traditional" commercial buildings in city and suburb alike -- starting with all those misbegotten brick banks with the ridiculous porticos.

But things are changing.

In recent years, the Department of Housing and Urban Development has torn down high-rise projects across the country, replacing them with pedestrian-scale, traditionally-designed rowhouse developments under its Hope VI program. Historic preservation -- the public's only weapon against our institutionalized "avant-garde" -- has encouraged practice of the traditional decorative arts and crafts (admittedly on a vastly reduced scale), as has a resurgence of classical architectural

practice that got underway during the 70's. The Institute of Classical Architecture and Classical America, based in New York City, is educating mainstream-market home designers (who are not architects) in classical rules of proportion and detail. And the New Urbanism has generated a counterculture of pedestrian-scale, mixed-use community design that generally involves traditional architecture. It also inspired Hope VI, whose future, alas, is uncertain because the Bush Administration intends to zero it out of the 2006 budget.

As for Princeton, I wrote my critique firmly convinced that, apart from the intrinsic interest of the subject matter and the paycheck, it was a complete waste of time. Well, what do you know. It so happened that the trustees' buildings and grounds committee was headed at that time by Elizabeth Plater-Zyberk, a New Urbanist pioneer. Thanks to her skillful leadership, the university is erecting a new Collegiate Gothic residential college for 500 students designed by the London-based classical architect Demetri Porphyrios. It's also erecting a new science library by Gehry which features the familiar disjointed metallic folds.

I guess the good news is that neither of these buildings is designed like a kitchen toaster, or even a multiplex theater. But which of them will stand the test of time -- and I mean centuries, not just a few years? Which of these two projects reflects a sounder notion of building value into architecture? On the issue of quality of construction and durability, Gehry might be a risky bet. Last fall, the *Boston Globe* called his leaky new computer science building at M.I.T. "the \$300 million fixer-upper."

As for esthetic value, I would bet on the architect whose project reflects enduring human values in architecture. And I don't mean the starchitect.