

Review

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Review

# Can Dominant Architectural Culture Influence Cognitive Processes?

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## Abstract

The concept of the technological singularity is applied here to architecture (of buildings, not software). This is the point at which non-human intelligence surpasses ordinary human cognitive limits. AI betters mainstream architectural culture in one crucial aspect — its capacity to evaluate design that adapts to human emotional health. Postwar building architecture as an institutional power system rewards abstraction and stylistic conformity through media prestige while not accounting for embodied human experience. By narrowing judgment criteria, architectural studio pedagogy trains tacitly for imitation, not using evidence that conflicts with dominant formal ideologies. Yet findings from environmental psychology, health-related design research, neuroscience, and recent AI-based studies show that built form measurably affects empathic response and user well-being. This paper examines whether dominant architectural culture imposes population-level cognitive costs by systematically producing informationally-impooverished, stressful environments. The conclusion is that built-environment design suffers from an epistemic closure because (i) architectural education does not foster curiosity in how design affects users—the core mechanism for intelligence development, and (ii) prolonged media exposure habituates populations to ignore distress signals from harmful geometries. A discipline entrusted with human welfare has insulated itself from relevant knowledge, whereas empathic AI can now be directed to apply that knowledge to improve the built environment. In this sense, the singularity is already here in architecture.

**Keywords:** architectural education; biophilic design; built environment; cognition; curiosity; embodied AI; environmental enrichment; intelligence; neuroplasticity; stress

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## 1. Introduction

Architectural discourse treats the built environment as a question of style, symbolism, or taste, backed by professional design expertise. Yet buildings and urban spaces are causal factors within which cognition develops and operates. The same activity is judged using very different criteria. This paper moves past debating aesthetic preference to ask the question: can dominant architectural culture reduce the facility for solving problems in the general public? Environments that attenuate restorative complexity, chronically elevate human stress, and sever biological feedback from design could be achieving this outcome.

Most people accept historical and vernacular architectures as having evolved to accommodate human psychophysiological needs. Restorative and developmental benefits are repeatedly associated with naturalistic and geometrically rich environments. Criticism has arisen with more recent non-traditional buildings and urban spaces. At present, no study directly proves that postwar architectural styles as a class influence cognition in the general population. Environmental conditions influence the brain's attention, developmental neuroplasticity, executive function, stress regulation, and working memory [1]. Built forms thus shape cognitive restoration and engagement, either

negatively or positively [2]. The key task, therefore, is to connect a large body of established findings into a rigorous systems-level hypothesis about architecture's neglected effects.

It is worth pointing out that, due to its institutional epistemology, architectural education does not access these results [3]. It could be argued that dominant architectural culture should be understood as a learning system closed to empirical evidence. It privileges proxy variables—prestige, novelty, internal professional approval, and image circulation—over psychophysiological outcomes. If a profession responsible for shaping everyday environments systematically excludes signals by which its products can be evaluated, then its output becomes maladaptive.

In this paper, “architectural intelligence” means the degree to which built-environment design functions as an adaptive learning system, which is responsive to human cognitive and physiological outcomes. The adaptive intelligence of the architectural system itself has nothing to do with the intelligence of individual architects. Then, the public's cognition is the outcome through which the discipline's intelligence is evaluated, not the architectural intelligence being defined. The paper therefore identifies a rigorous way to judge whether architecture as a discipline acts intelligently.

No new experimental data are derived in this review, yet the resulting conceptual synthesis leads to a new conjuncture. Bringing together results from the literatures of distinct disciplines builds up a framework for addressing architectural intelligence as a system property. This scientifically legitimate question bypasses formal analyses occurring in architectural criticism such as aesthetic comparison of different design styles. The goal here is to encourage a focused program of empirical testing of the effects that built forms have on the user.

The methodology draws on what we term “Empirically Constrained Scaffolding” (ECS) — a label for a cluster of related techniques that practitioners in generative AI are already using heuristically, but which has not previously been named or systematized as a coherent methodological pattern. ECS is a methodological framework for AI-assisted assessment of built environments, not software design. The name is introduced here to make explicit design diagnostics that the second author (N.A.S.) and collaborators have applied in practice. Established results in theory-guided machine learning combine to validate the application of generative AI to architecture.

In substance, this review makes three original contributions. (1) Architectural intelligence is defined as the adaptive, feedback-sensitive learning capacity of the architectural system rather than as aesthetic expertise or public preference. (2) Synthesized evidence shows that dominant architectural culture appears maladaptive under this definition because it neglects measurable human outcomes. (3) ECS is introduced as a methodological framework for operationalizing evidence-based architectural evaluation with AI.

The paper proceeds in five steps. First, it defines intelligence in feedback-sensitive and environmentally situated terms. Second, it reviews evidence linking environmental form to attention, cognition, development, and stress. Third, it examines built-environment design as an optimization regime — but where dominant practice has acquired a tacit objective function. Fourth, it assesses how AI-assisted evaluation exposes this misalignment by reintroducing feedback channels that dominant architectural culture neglects. Fifth, it distinguishes clearly between what is already established, what is strongly inferred, and what remains conjectural.

The Appendix describes one LLM methodology belonging to “Empirically Constrained Scaffolding” (ECS). The exact LLM search queries and structured prompts for this AI-assisted literature retrieval are provided; and the validation steps taken to exclude hallucinated studies are specified. Different LLMs combine to amass empirical data from the literature in distinct disciplines, making possible the present synthesis. The Appendix gives the necessary details to replicate the ECS approach so that independent researchers can both validate and utilize the framework.

The different threads of the present argument are summarized in Table 1. Established points are separated from what is inferred or hypothesized, as discussed in Section 8.

**Table 1.** Inferential status of the paper's main results on public effects of architecture.

Claim	Representative evidence in paper	Status	Implication for public effects
Built environments affect stress, attention, behavior, recovery, and engagement	Systematic reviews, healthcare-design studies, eye-tracking, nature-exposure studies, façade-behavior studies	<b>Established</b>	Design variables are cognitively and physiologically consequential for the public
Chronic stress and environmental deprivation impair executive function, working memory, neurodevelopment, and cognitive performance	Stress, deprivation, enrichment, and executive-function literature	<b>Established</b>	If architecture elevates stress or reduces stimulation, cognition is placed at risk
Information-rich, restorative, and greener everyday environments support cognitive functioning and child development	Green-space, enrichment, and developmental-neuroscience literature	<b>Established</b>	Everyday environmental quality contributes to learning, attention, and developmental support
Healthcare and biophilic environments improve recovery, stress regulation, and well-being	Healthcare-design, biophilic-design, and restorative-environment literature	<b>Established</b>	Salutogenic design has measurable human benefits relevant to cognition and public health
Façade organization affects visual attention, environmental legibility, engagement, and pedestrian behavior	Façade studies, eye-tracking, visual-attention, and pedestrian-behavior literature	<b>Established</b>	Architecture changes how people process and use public space
Structured complexity and hierarchical order support perceptual fluency, engagement, and restoration	Fractal-preference, biophilic-geometry, and coherence-across-scales literature	<b>Strongly inferred</b>	Information-rich environments appear to better match human perceptual and cognitive processing
Dominant architectural culture does not function as an	Definition of intelligence as feedback-sensitive	<b>Strongly inferred</b>	The discipline systematically

intelligently adaptive learning system	adaptation; discussion of architecture optimizing for prestige, novelty, and elite approval instead of psychophysiological outcomes; divergence between expert and lay judgment; AI-assisted evaluation restoring external feedback		reproduces environments misaligned with human cognitive and emotional well-being
Dominant architectural culture may impose cumulative cognitive costs at population scale	Mechanistic synthesis of the established literatures above	<b>Hypothesis</b>	Requires direct longitudinal, quasi-experimental, and intervention-based testing

This reconceptualization of architecture as a feedback-sensitive learning system invites comparison with the technological singularity—the point at which non-human intelligence is hypothesized to surpass human cognitive limits. While conventionally treated as a future discontinuity, we argue that architecture has already reached its domain-specific singularity. By systematically closing itself off from the environmental feedback that constitutes intelligent adaptation, the discipline falls behind empathic AI systems that can register human physiological responses. When scaffolded by empirical constraints (Section 5.4), AI systems now demonstrate greater “architectural intelligence” than the profession itself. The discipline’s lack of adaptive capacity creates the precise conditions for AI to surpass it (Section 8.2).

The comparison between this domain-specific singularity in the discipline raises a philosophically important question that the paper’s own framework is well-positioned to answer: if LLMs do not reason in the classical sense, why should their outputs count as a form of intelligence at all? LLMs do not reason in the sense that classical cognitive science employs the term: they do not form explicit propositional representations, apply inference rules, or maintain world models in the way symbolic AI once attempted. Yet when scaffolded by empirically-validated constraints (ECS) (Section 5.4), they reliably produce evaluations that track human physiological and behavioral outcomes. The philosophical position already adopted in this paper — pragmatic instrumentalism — explains why this matters.

William James’s formulation of pragmatism holds that the meaning of a concept lies in its practical consequences: a claim is valid insofar as it produces effects that work [4]. Applied here, the relevant question is not whether an LLM “truly understands” architectural quality in some deep representational sense, but whether its outputs reliably distinguish environments that impair from those that support human well-being. When ECS grounds LLM evaluation in replicated empirical constraints, the system produces outputs with the same functional signature as good empirical reasoning — falsifiable predictions, consistent rankings across independent criteria, and convergence with physiological data. Under a pragmatist criterion, this functional equivalence is not a mere approximation of intelligence: it is a form of intelligence, characterized at the level of the system rather than the substrate.

Architectural intelligence is defined here not by the intrinsic cognitive properties of individual architects, but by whether the discipline as a system registers environmental feedback and revises its outputs accordingly. The same substrate-independent criterion applies to AI: what matters is

adaptive coupling between the system's outputs and the domain's empirical structure, not the internal mechanism producing that coupling. An LLM that consistently identifies environments associated with stress reduction, attentional support, and recovery — because it is constrained by evidence from environmental psychology and neuroscience — satisfies this criterion for architectural intelligence. The architectural profession, optimizing for prestige and stylistic conformity, currently does not.

This is what gives the singularity framing its technical, rather than merely rhetorical, force. The singularity is not simply that AI has become more capable; it is that the architectural discipline without empirical feedback, has fallen below the adaptive threshold that its own purpose demands — while AI systems, when appropriately scaffolded, have crossed above it. The crossing point is not about raw computational power. It is about which system is better coupled to the empirical consequences that define the domain.

## 2. Intelligence as Situated Interaction

Rodney Brooks argued that intelligence should be conceived primarily as effective adaptive coupling between an agent and the physical world [5]. In his behavior-based robotics, perception and environmental structure jointly produce successful action. The model rejects treating intelligence as detached symbol manipulation. Describing that “the world is its own best model” captures an important point: adaptive systems off-load part of their cognitive work onto structured environments rather than representing everything internally [6]. Peter Godfrey-Smith's environmental complexity thesis generalizes this intuition by linking the evolution of cognition to the structure of the environment itself [7].

An intelligent system shows adaptivity and continual improvement over time. For human beings, the built environment is not a neutral background to cognition. It organizes affordances for action, attentional demand, navigation, threat detection, visibility, and opportunities for restoration. The evidence from developmental neuroscience is that intelligence depends largely on access to complex yet ordered environmental structure. Brain development is driven by environmental experience and novelty [8]. Chronic adversity can reduce plasticity, whereas more stimulating environments support adaptation.

People vary greatly in how they sense and respond to their environments yet share baseline biological reactions. This point has implications for design. In a feedback-based account of intelligence, a design system registers human signals and updates its products on the basis of those signals. A system acting intelligently, in both a biological and AI sense, optimizes for outcomes that can be externally evaluated. A built-environment regime that systematically ignores stress, disengagement, and developmental fit may however be described as unintelligent.

In parallel, the extended-mind thesis holds that cognition is not confined to the skull but can be partly constituted by stable couplings between brain and environment [9]. Organisms survive because action, learning, and perception are continuously coupled to environmental structure. Intelligence is simply predictive adaptation under environmental constraints. Even when a human concentrates on thinking about an abstract problem, the surrounding environment continues to modulate cognition through attentional demand and emotional tone. These ideas shift the purely formal evaluation of built forms more towards biological interaction.

Both evolved cognition and modern AI depend on a generative relation to the world. The environment is part of the input loop that makes adaptive cognition possible at all. Constant, Clark, Kirchhoff, and Friston formulate this very clearly when they describe “extended active inference” as a process in which organisms construct and exploit beneficial states of the world beyond their own body [10]. The work by Karl Friston and co-authors casts the classical extended-mind thesis in terms of active inference, generative models, and predictive cognition.

Recent reviews of embodied intelligence in robotics emphasize that intelligent behavior depends on multimodal perception and interaction, rather than on abstract computation [11]. Generative AI now appears most promising as it moves beyond disembodied text production, to operate through

perception–modeling–action cycles constrained by external reality. This convergence reveals a shared principle across biological and artificial intelligence. Section 5.4 below develops this point methodologically through Empirically Constrained Scaffolding (ECS), where empirically-validated constraints for AI play a role analogous to environmental grounding in biological cognition [12].

### 3. A Logical Pathway from Built Form to Cognitive Cost

Feedback from built forms affects attentional load and physiological stress. This effect continues through well-established links between chronic stress, deprivation, and executive functioning. Prolonged exposure to stressful and impoverished settings therefore imposes a chronic cognitive tax.

#### 3.1. Environmental Geometry Triggers Attention and Stress

Architectural form affects physiological stress [13]. In a recent systematic review, Valentine concluded that built-form variables such as curvature, enclosure, proportion, and rhythm are associated with measurable physiological responses, while also calling for more research in the field [14]. Despite gaps to be filled in, the literature is already strong enough to reject the belief that form is physiologically irrelevant.

The same is true of visual complexity and restorative structure. Humans respond consistently to fractal ranges (i.e., geometries with a specific scaling hierarchy) common in nature [15]. This is not surprising, as the brain evolved to handle information coming from the natural environment. EEG work has found distinct neural responses to fractal imagery [16], and recent reviews synthesize evidence that certain fractal properties can reduce stress and support perceptual fluency. Natural and semi-natural indoor exposures also improve restoration and cognitive performance relative to more barren (informationally-deprived) built settings [17,18]. These findings identify coherence across scales, patterned complexity, and non-chaotic informational richness as relevant cognitive variables.

Several authors have proposed a structural kinship between fractal organization in living systems and the hierarchical organization of the brain itself. Goldberger suggested that the scale-free articulation of Gothic architecture can be understood as an externalization of fractal properties found in human physiology and neural dynamics, thereby linking architectural creativity to biologically grounded pattern formation [19]. The second author (N.A.S.) extended this analogy by arguing that traditional and adaptive architectures embody hierarchies of ordered scales that resonate with the scale-linked organization of cognition and perception [20].

Neuroscience reviews reinforce this analogy by documenting scale-invariant, fractal organization in brain structure and dynamics across multiple levels [21]. The present paper hypothesizes that when the environment offers fractal, hierarchically ordered structure, it better supports the outward extension and stabilization of cognition; but when the environment is geometrically impoverished, scale-flat, or non-fractal, a basic structural correspondence between mind and world is weakened. While this idea does not prove that intelligence is thereby lowered in a psychometric sense, non-fractal environments may be disrupting a deeper form of cognitive fit between neural organization and the external scaffolding on which human thought partly depends.

Design practices outside the architectural mainstream derived or understood many of these same results empirically. There exist separate intersecting movements in traditional built-environment design [22–25], design patterns and geometry [26–28], biophilia [29–34], and the mathematical basis of adaptive design [35–40]. For years, interested students have been able to learn adaptive, human-centric design from those independent (external) sources. Nevertheless, dominant architectural culture is strongly focused on a stylistic agenda for buildings detached from this body of knowledge.

The broader literature on nature — which is essentially fractal — exposure converges in the same direction. Reviews report associations between nature exposure and improved brain activity, cognitive function, stress regulation, and health [41,42]. A recent meta-analysis focusing on children and adolescents concluded that nature exposure benefits working memory and attentional processes [43]. These results break through the superficial “nature versus cities” contrast to identify restorative,

information-rich structures versus stressful or depleted settings anywhere. Positive-valence feedback comes in both natural and artificial environments that satisfy specific mathematical rules such as Christopher Alexander's 15 Fundamental Properties [44]. A description of the 15 properties is included as a downloadable file in Supplemental Materials at the end of this paper.

### 3.2. Chronic Stress and Executive Function

The next step is to establish that chronic stress impairs cognition. Lupien and colleagues reviewed evidence showing that longitudinal stress affects brain, behavior, and cognition through glucocorticoid-mediated pathways, with particular consequences for hippocampal and prefrontal systems [45]. Evans and Schamberg demonstrated that childhood poverty predicts reduced adult working memory and that this relationship is mediated by chronic stress [46]. A later study by Evans and Fuller-Rowell found that chronic stress links childhood poverty to young-adult working memory, with self-regulatory capacity offering partial protection [47].

Fishbein and colleagues found that experiential differences in the home environment relate to executive functioning and behavior in late childhood [48]. Lynch et al. showed that psychosocial environmental variables predict executive-function trajectories across childhood [49]. Poor housing quality has been associated with cognitive difficulties among marginalized youth [50]. Architecture could be one major component of chronic stress, and therefore a determinant of cognitive development and performance. However, housing quality and poverty are heavily confounded by variables such as crowding, indoor air pollution, noise, and severe socioeconomic stress. Architectural form language is only a contributing factor to cited cognitive deficits, yet one that is usually neglected when investigating cumulative environmental and psychosocial forces.

The implication is straightforward. If, by following a specific set of stylistic archetypes a profession systematically produces environments that elevate attentional burden or chronic stress, its products affect public health. Those built environmental stressors will contribute to the erosion of the brain's executive functions—working memory, inhibitory control, flexible attention—upon which general intelligence depends.

### 3.3. Deprivation, Developmental Plasticity, and Enrichment

A second line of evidence that geometry affects cognition concerns deprivation and enrichment from the environment. Mackes et al. studied adults exposed to severe early deprivation and found enduring alterations in adult brain structure despite later enrichment [51]. Tooley et al. reviewed environmental influences on brain development and argued that stimulation and stress can alter developmental trajectories in durable ways [7]. Human studies that are most relevant to the present thesis show that deprivation reduced cognitive functioning more than threat did [52]. In the animal literature, Khalil's systematic review found that changing spatial complexity stimulates hippocampal neurogenesis and plasticity in rodents, explicitly discussing possible translation to humans experiencing built and urban environments [53].

Some pandemic-era findings intensified concern about environmental deprivation. Deoni and colleagues reported marked declines in early cognitive performance among children born during the COVID-19 period, linking them to reduced social and environmental stimulation [54]. Other researchers discovered similar effects [55–57]. Even though the pandemic changed many variables at once, those findings are dramatic as a natural experiment of effects in reduced developmental richness. The cognitive system is sensitive to prolonged impoverishment of the everyday environment, which has its most severe effects on children.

Human studies on how green space influences cognition point in the same direction. Davdand and colleagues reported enhanced cognitive development among primary-school children exposed to greater green space at school [58]. Lifelong greenness exposure correlates with differences in children's brain volume. Dockx et al. associated early-life residential green space exposure with better visual memory and fewer behavioral difficulties in young children [59]. Flouri et al. reported that

children living in greener urban neighborhoods had better spatial working memory [60]. Another study found better cognitive performance in children exposed to more residential green space [61].

#### 4. Architecture as a Learning System

Once intelligence is defined as feedback-sensitive adaptation, the architectural problem can be formulated more precisely. An intelligent design system should: (i) register signals from its environment, (ii) update behavior on the basis of perceived outcomes, and (iii) optimize an objective function for the system's success. Those success conditions include attention support, developmental fit, engagement, navigational legibility, recovery, and reduced stress in the built environment. Yet the dominant profession operates with an entirely different set of objective functions measuring success against award visibility, conformity to elite taste, glamor value, internal prestige, and novelty [62–64]. Already, point (i) is problematic, as standard tools do not include a systematic mechanism for registering psychophysiological feedback from buildings on the human body.

This mismatch is well documented. Gifford et al. found that architects and laypersons judge buildings very differently [65]. Professional (expert) judgment uses measures that are not validated against human outcomes, hence the divergence from public opinion. When proxy metrics dominate the reward structure, a field can become locked into stable but misaligned outputs. In machine-learning terms, the system overfits to internal labels rather than learning from empirical data.

Architectural education amplifies this problem. Studio culture is structured to reward presentation rhetoric and stylistic abstraction. The pedagogical system tends to discount biometric evaluation and post-occupancy evidence. The result is an epistemic filter that excludes results on biofeedback gathered in the research literature. Historically validated human-centric design patterns are dismissed as “mere decoration”, or as socially discredited carryovers from the past. New empirical findings from AI-assisted evaluation, attention research, environmental psychology, and healthcare design are also marginalized when they conflict with dominant architectural styles [66]. A system that excludes both accumulated priors and new evidence cannot access the memory and feedback channels required for intelligent action.

One response to this epistemic closure has emerged from AI-assisted evaluation, which reintroduces systematic feedback channels through what we term “Empirically Constrained Scaffolding” — ECS (discussed in Section 5.4). ECS is a name for a method that combines existing frameworks for guiding LLM output. ECS permits the use of empirical data to check the validity of results. The present paper marks the first appearance of this term in the literature. This methodology demonstrates that the scientific knowledge architecture (in the sense of systems architecture used in computer science) that buildings architecture excluded can be operationalized systematically, suggesting the exclusion was an institutional choice rather than practical necessity.

#### 5. Architecture-Specific Evidence

The literature reviewed so far establishes general pathways linking cognition with the environment. This section turns to architecture-specific studies showing that built form can measurably influence behavior and health outcomes.

##### 5.1. Biophilia, Healthcare, and Human Outcomes

Accumulating evidence shows that environments richer in natural visual cues, light, materiality, and lower stress burden outperform stripped, stressful, or disorienting alternatives on human health outcomes. A group of researchers has undertaken to document the specific characteristics of salutogenic environments [67,68]. Since chronic stress and attentional fatigue impair cognition, these findings directly link the present paper's central hypothesis on architectural intelligence.

Healthcare design provides some of the clearest evidence by measuring outcomes such as pain, recovery, and stress. The biophilic effect — love of life and biological forms — in environments originated in healthcare experiments [69] and has by now extended to provide specific geometric

criteria for salutogenic design. Bernhardt et al. reviewed evidence relevant to stroke-care environments and concluded that hospital design influences patient and staff well-being [70]. Al Khatib et al. systematically reviewed therapeutic biophilic design in healthcare settings and reported beneficial effects on well-being and related outcomes [71]. Bulaj et al. further synthesized the case for biophilic and neuroarchitectural approaches to therapeutic home environments and digital health [72].

### 5.2. Eye Tracking, Façades, and Public Behavior

The attractiveness of façades was a topic of several design patterns in Christopher Alexander et al.'s *A Pattern Language* [26]. In more recent work, Kesici and Erkan Çolpan found that public-façade characteristics affect pedestrian behavior [73]. Eye-tracking and visual-attention work by Lavdas, Sussman, and the second author (N.A.S.) demonstrates that more articulated and coherent façades engage attention differently from blank or fragmented alternatives [74,75]. Such studies uncover a universal design grammar involving organized visual complexity and verticality. The lesson is that façade organization changes how the environment is cognitively processed, which in turn influences pedestrian behavior.

These effects matter for implementing an intelligent system in the broadest sense of being situated in physical reality. Practical cognitive tasks include environmental legibility, prediction of entrances and affordances, the effortless distribution of attention, and wayfinding. If large portions of the contemporary urban fabric are designed in ways that the human visual system rejects, then those environments impose either a processing burden or a withdrawal response. Both situations are cognitively harmful.

### 5.3. AI-Assisted Evaluation as Externalized Feedback

Recent AI-assisted architectural studies demonstrate that AI can reintroduce explicit evaluation criteria into a field that now does not address them. Boys Smith and the second author (N.A.S.) report that large language model judgments aligned with public preference across selected architectural image pairs [66]. Independent sets of criteria were used to prompt an LLM — geometric versus emotional ones — and the results agreed. The second author (N.A.S.) argues that built environments can be evaluated in terms of how they support cognition, not just how “attractive” they might appear as images [76]. In a window and façade evaluation, empathic AI analysis favored more coherent and articulated windows over fragmented and minimalist alternatives [77].

These exploratory studies provide explicit proof-of-concept. Their main significance is methodological: AI tools that draw from experimental data can bypass stylistic controls to identify salutogenic designs and environments. Once evaluation criteria are specified in terms of engagement and well-being, algorithmic systems can act as instant and low-cost external critics. This broad toolkit leveraging AI is a great advantage in a profession that often lacks empirical validation. Empathic AI does not replace empirical evidence, but it can help flag evaluative criteria when those diverge from human-centered ones.

### 5.4. Empirically Constrained Scaffolding — ECS: A Methodological Framework

The AI studies cited above succeed through a specific methodological pattern that addresses architecture's feedback problem directly. We term this approach Empirically Constrained Scaffolding (ECS)—a technique where large language models perform specialized evaluations by combining their latent distributional knowledge with explicitly-provided, empirically-validated domain constraints. In machine learning, a constraint is a condition the model or its outputs should satisfy.

ECS operates through three components: (1) empirical constraints from domain research (e.g., Alexander's 15 geometric properties validated through neuro-architecture studies); (2) LLM's pattern recognition trained on vast architectural image/text corpora; and (3) structured prompting that maps constraints to evaluation criteria. Critically, constraint quality matters—those must reflect actual

empirical relationships discovered through systematic research, not arbitrary aesthetic preferences. The practical purpose of such a setup is to move some of the burden of correctness from the model's next-token prediction into an external system of checks. LLM applications thus become more reliable without requiring a fundamentally different base model.

Scaffolding provides an external support structure that helps a model perform a task it does not robustly manage on its own. One LLM plays against another LLM in a repair loop such as the “ping-pong” model or “LLM-as-a-judge”. Workers in generative AI are evolving ECS methods heuristically, even though they do not label them as such. Those self-corrective models are used by the second author (N.A.S.) in the group of articles referred to above that derive architectural values based on empirical criteria. An example of such a model, including the actual prompts, is included in the Appendix.

The ECS approach bridges established paradigms. Theory-guided machine learning (embedding domain knowledge as structural constraints [78]) couples with neurosymbolic AI (integrating symbolic reasoning with neural pattern recognition [79]), and few-shot learning with task specification [80]. ECS differs from the methods in machine learning listed above by emphasizing empirical validation as the source of constraint authority. Constraints function as “grounding anchors” that partially address the symbol grounding problem by providing explicit mappings between abstract terms (e.g., “bilateral symmetry”) and measurable properties (physiological stress reduction).

The methodology requires four conditions: (1) dense training coverage—the architectural domain is well-represented in training data; (2) constraint measurability—properties must be expressible in visual/textual terms accessible to LLMs; (3) empirical constraint quality—relationships validated through replicated studies; and (4) constraint clarity—properties definable without excessive mutual dependence. When these conditions hold, ECS enables domain experts to create AI evaluation tools without machine learning expertise. The method effectively operationalizes scientific knowledge through prompt engineering. The Appendix provides a worked instantiation of ECS for architectural image evaluation, illustrating how these components operate in practice.

Philosophically, ECS adopts pragmatic instrumentalism [81]—constraints are validated by practical success rather than requiring the LLM to possess “true understanding”. This connects to extended cognition frameworks [82]: empirical constraints function as cognitive prosthetics structuring the LLM's pattern recognition, creating a distributed cognitive system where system-level intelligence emerges from human-constraint-LLM interaction. The approach transforms subjective judgments (architectural beauty, stress response from subject surveys) into empirically-grounded classifications through operationalization [83].

ECS results show internal consistency across independent evaluative criteria (geometric versus emotive), suggesting the approach may correlate with the human-centered outcomes those criteria were derived from. Direct validation against physiological ground truth (e.g., wearable stress measures, behavioral task performance) remains an important next step.

Therefore, ECS permits the LLM to apply constraints drawn from that experimental database in order to make testable predictions. This framework explains why the AI studies cited above succeed where architectural judgment fails. Architectural culture optimizes for proxy metrics (prestige, novelty); whereas ECS optimizes for empirically-validated outcomes (attention support, recovery, stress reduction). The former epistemological model is circular—buildings are “good” because experts trained in the same system say so. The latter model is falsifiable—predictions can be tested against physiological measurements.

### *5.5. Improving School Architecture Through Visual Mathematics*

Even authors who propose human-centric design principles insufficiently emphasize the need to incorporate complex and ordered symmetries into educational structures [84–86]. Recent work inspired by observations of the biophilic effect reveals that informationally-enhanced school environments (though fractal and symmetric patterns) directly improve learning outcomes [87,88].

The mathematical content of interior spaces and the views from classroom windows measurably influence the learning process. Surprisingly, these revolutionary findings have not made their way into either design or educational guidelines, nor has the teaching profession called for more experiments.

Educational facilities overwhelmingly follow current architectural trends. Maintaining a minimalist aesthetic on school buildings typically means the absence of any cornice or trim in defining geometrical transitions. For several decades, simplified interior fixtures of schools are standard: industrial minimalism defines door handles as steel spheres and balustrades as plain metal tubes. Design elements on all scales conform to an austere aesthetic. Blank walls and surfaces — intentionally devoid of articulation that could introduce symmetric patterns — can play no informational role in catalyzing student intelligence.

## 6. How Architectural Education Influences Curiosity

The link between dominant architecture and public intelligence is partly causal, partly correlational, and partly hypothetical. Exposure to the built environment is not optional. Hospitals, housing, offices, schools, streets, and transport systems impose repeated sensory conditions on people regardless of their aesthetic preferences. Those inputs affect both short-term and longitudinal stress. This section puts forward the hypothesis that environments low in affordances and organized complexity, but high in stress, discourage exploratory attention and user questioning, thereby decoupling cognition from curiosity.

Intellectual curiosity is a core mechanism supporting information seeking and learning. Recent neuroscience research establishes that curiosity enhances hippocampal function and memory encoding. This occurs because curiosity triggers dopamine release, enhancing neuroplasticity and making learning intrinsically rewarding [89]. In a major synthesis of the literature, von Stumm, Hell, and Chamorro-Premuzic positively associated intellectual curiosity with intelligence-related measures [90]. Subsequent longitudinal work linking cognitive ability with curiosity has reinforced this point [91]. Curiosity enhances learning, and the Prediction-Appraisal-Curiosity-Exploration (PACE) framework explains this effect in terms of strengthened memory encoding [92]. The process helps intelligence grow because it drives information seeking and a more effective consolidation of new knowledge [93].

The “crit” system— the central pillar of postwar architectural pedagogy—functions more as a ritual of authority compliance instead of a structured inquiry into measurable outcomes. A decades-long tradition of judging student projects (instituted by the early modernists in the 1920s) does not reward open-ended questioning about health effects, measurable human outcomes, or user response. In effect, studio culture discourages evidence-seeking questions when those challenge dominant priorities [94–96]. Architecture schools therefore operate using implicit criteria that are not updated through empirical validation.

When educational settings fail to elicit curiosity, the motivational and memory-related benefits associated with evidence-seeking is likely to be reduced. Learning becomes strenuous rather than intrinsically motivated. Architecture-studio scholarship repeatedly describes a pedagogical culture driven by authority and critique norms. Bashier reports on design-studio culture that values project appearance over the actual design process, with students focusing on form-making rather than rational inquiry [97]. Research on critique pedagogy likewise shows that the design studio is structured by authority, tacit norms and standards, and unstable evaluative criteria [98]. In a recent comprehensive survey of global architectural programs Patil et al. found that only 26% of schools address health and well-being in their curricula [99].

Curiosity is the mechanism that would lead a student to ask questions absent from architectural studio culture: (1) How will users actually experience this space? (2) What stress signals does this geometry induce? (3) What empirical evidence supports this façade typology? (4) How can I shape this building or space so that it gives the strongest positive-valence signal? (5) What is known from neuroscience, environmental psychology, or eye-tracking that should alter the design? When tutors

deflect such questions as “not architectural”, the educational system is training students away from exploratory cognition. It is instead steering them toward compliance with internal stylistic priors. Graduates have learned to reproduce canonical modernist forms—abstraction, cubes, plate glass, raw concrete, steel —without the tools to evaluate whether those forms support human neurophysiology.

In computational terms, lack of curiosity produces premature convergence on a narrow solution space. Design can become mere repetition. Dominant architectural education therefore bypasses one of the principal mechanisms by which intelligence updates itself in response to evidence. Over 4–5 years of training, intensive studio instruction redirects attention and emotion away from embodied human needs and toward image compliance. This represents a form of “reward hacking”, where students learn to optimize for instructor approval rather than human sensitivities.

## 7. Media Exposure Dampens Innate Distress Signals

This paper’s claim is both falsifiable and specific: anxiety-inducing and minimalist architectures cause measurable reductions in working memory and intelligence through the allostatic overload mechanism. The process occurs in three steps. (i) Media exposure causes neural habituation, which (ii) causally suppresses the distress signals that would otherwise drive curiosity, which (iii) causally impairs intelligence development. Neurobiological conditioning operates through the same hippocampal mechanisms already described, but via the media rather than pedagogy. Media/imagery exposure adds a parallel, though less obvious pathway to physical environmental exposure (buildings people inhabit).

A link between architectural imagery and human hippocampal habituation — and possible subsequent intelligence decline — is entirely theoretical, while the mechanism’s individual components (e.g., stress habituation in mice) are supported by the literature. Until experiments are done directly, a causal neurobiological pathway from media exposure to architecture acting on humans should be regarded as a well-supported hypothesis rather than an established consequence.

The mediating variable for cognitive costs in the general population is the built environment itself. Architecture schools train future practitioners, clients’ advisers, competition jurors, editors, and public officials within a professional culture that privileges internal stylistic criteria over user-centered evidence. Those actors then operate through programs and systems that decide on the built environment. Dominant architectural culture establishes a tight interpretive frame on the informational space. Labeling traditional buildings as “kitsch” or “nostalgic” and celebrating minimalism as “innovation” delegitimizes public curiosity about traditional forms.

In this sense, the public is persuaded by built forms it cannot refuse. Because daily exposure to environments is compulsory and cumulative, impoverished or stressful settings may impose chronic attentional and physiological costs [100,101]. The press and specialist media (architectural journals) help to legitimize elite taste and confer prestige on certain selected form languages. Authoritative discourse avoids questions like: “Why does this building make me anxious?” as unsophisticated. Nevertheless, the more consequential power lies in the financial, legal, and regulatory machinery that normalizes those form languages.

Chronic exposure to images of buildings deviating from natural statistical properties produces increased hemodynamic responses in the visual cortex and subjective discomfort—indicating that even photographs of unnatural architectural forms activate stress pathways [102]. When architectural media, professional publications, and social platforms repeatedly circulate images of anxiety-inducing deconstructivist or minimalist structures—forms that activate the amygdala and anterior midcingulate cortex —they bring a chronic low-level visual stressor to the population.

The neurobiological consequence is a habituation-mediated suppression of distress signals. Research demonstrates that chronic activation leads to transcriptional habituation in the hippocampus because the neural response to repeated stimulation attenuates over time [103]. These acute physical effects tied to repeated stress in mice are not directly translatable to the subjective visual processing of architectural media in humans, but they are suggestive. Applied to architectural imagery by extension, this means that repeated media exposure to distressing geometries trains the

brain to ignore its own hippocampal warning signals. The public learns to suppress the innate aversion that would otherwise activate the Prediction-Appraisal-Curiosity-Exploration (PACE) system [104], effectively disabling the neural mechanism that detects psychological harm.

Research on chronic stress demonstrates that habituation represents blunted gene expression in stress-responsive genes and receptor downregulation. The brain continues to suffer metabolic wear from elevated glucocorticoids and pro-inflammatory cytokines, but without the alarm signals that would normally trigger restorative behavior [105]. This creates a state of allostatic overload that taxes physiology [106], yet the cognitive system remains unaware of the threat, disabling the curiosity-driven problem-solving that would seek relief.

The consequence is a measurable reduction in aggregate cognitive function. Chronic stress—whether from inhabiting stressful environments or chronic visual exposure to their imagery—impairs the hippocampus and prefrontal cortex, degrading the executive functions upon which problem-solving depends. Working memory capacity is reduced, attentional flexibility is compromised, and the capacity for novel problem-solving (fluid intelligence) is attenuated. The chronic stress load depletes neural resources, while suppressing curiosity prevents the exploratory learning that would otherwise build cognitive reserve. Subjective discomfort thus links to a documented reduction in the brain's capacity to process information, adapt to challenges, and generate solutions.

## 8. What Is Established, What Is Inferred, and What Remains Conjectural

### 8.1. *Dominant Postwar Architectural Culture may Impose Population-Level Cognitive Costs*

The present paper is one in a series of studies applying generative AI to solve architectural problems. LLMs were used here to amass empirical data from the literature in distinct disciplines, making possible the present synthesis. This AI data gathering supplements actual experiments and is proving very worthwhile. Dominant architecture discarded memory of traditional practices in seeking radical design innovation. That policy was explicit in the modernist architects' call of "starting from zero" [107–109]. Yet postwar design culture rejected both historically validated design patterns, as well as newer evidence coming from science [110,111]. The habit of erasure devaluated all evidence, both old and new.

From the published literature, environmental conditions influence developmental trajectories, executive function, and stress. It is also established that built forms influence behavior, engagement, and recovery-related outcomes. Evidence strongly infers that informationally impoverished and chronically stressful built environments can impose a cognitive tax. What remains conjectural is the population-scale claim: that dominant modernist and deconstructivist architectural cultures affect how the public interprets its environment. That question is serious enough to justify direct study.

The ECS method (Empirically Constrained Scaffolding) is instrumental in distinguishing between empirical data and conjecture. Drawing from published peer-reviewed sources brings together a corpus of authoritative knowledge. This basis provides a groundwork from which conjectures can be investigated and possibly verified.

Maintaining the distinction between conjecture and proof does not weaken the paper's main argument. On the contrary, it makes the central claim more robust. The paper does not need to prove society-wide psychometric changes in order to show that dominant architectural culture may be affecting general cognition. If built form inhibits learning from outcomes, impairs developmental support, raises chronic stress, reduces restoration, and weakens attentional engagement, then it already satisfies a meaningful definition of cognitive influence on the public.

### 8.2. *The Singularity in Architectural Intelligence*

The "singularity" in intelligence is supposed to occur when AI surpasses human cognition. This moment was predicted by Vernor Vinge [112] and later popularized by Ray Kurzweil [113,114]. While most scientists envision this event as the runaway self-improvement of AI in a way that could trigger rapid, transformative change, we propose another interpretation. That is, to look at benchmarks of

intelligence for domain-specific capabilities in a particular discipline. If a field has, for whatever reason, lost its ability to interact with its environment in a way that intelligent systems do, then it is a candidate for being overtaken by AI — or that has happened already.

“Architectural intelligence” is defined here as the capacity of an architectural system to adapt its judgments and outputs in response to reality-based feedback from human use. In this sense, intelligence is not mere stylistic inventiveness, nor technical cleverness, nor computational sophistication by itself. It is the ability to register signals from the built environment’s actual effects on people—attention, development, engagement, legibility, restoration, stress, and well-being—and then to revise design practice accordingly. Architectural intelligence is the discipline’s collective intelligence. The key question is whether architecture as an institutional system — which consolidates critics, juries, media, practitioners, and schools — behaves intelligently.

We distinguish this systems-theoretic definition from recent discussions of “architectural intelligence” as the application of generative AI to complex geometry and formal innovation [115–117]. In those contexts, the term denotes computational capacity for engineering optimization and stylistic novelty—a usage that exemplifies precisely the proxy-driven optimization (based upon image appeal and prestige) critiqued in Section 4 above. Our usage, by contrast, recovers intelligence as the adaptive fit to human cognitive and physiological outcomes, consistent with the biological definition.

Optimizing for image over embodied experience, architectural intelligence has fallen below the threshold of environmental interaction. By neglecting environmental feedback, the discipline now operates in a state of cognitive isolation. Empathic AI represents the antithesis of architectural formalism, because it is designed to process human feedback loops — operating at a higher level of environmental intelligence. This paper presents AI as a rival evaluative system that may now display more architectural intelligence than the profession itself, precisely because it can be scaffolded by empirical constraints and user-centered criteria.

## 9. Discussion

### 9.1. *Clashing Authorities Resolved by AI*

This review supports a systems-theoretic reinterpretation of architecture. The built environment is part of the public infrastructure of cognition. It shapes the perception–action loops through which people learn, orient, predict, and recover. If those loops are burdened continuously by impoverished, incoherent, or stressful environments, intelligence-related performance will tend to degrade. Small effects repeated across millions of people and across developmental periods can matter greatly at the population scale. What is being described is a chronic cognitive tax, not immediate psychometric decline.

The architectural profession frames its formal preferences as being advanced, historically inevitable, and necessary. Based on this institutional authority, expert judgment has become decoupled from ordinary human responses. Yet from the biological perspective adopted here, a design culture that dismisses measured stress and ignores restorative evidence behaves like a system that doesn’t learn. Its outputs may remain stable because the system’s internal reward structure is institutionalized, not because the outputs support user health and well-being.

The emergence of Empirically Constrained Scaffolding — ECS (Section 5.4) demonstrates a crucial point: the knowledge gap between architectural culture and relevant science is not unbridgeable. ECS shows that empirically-validated constraints from environmental psychology and neuroscience can be applied systematically to evaluate designs. This suggests that architecture’s failure to incorporate such knowledge is an institutional choice rather than something demanded by epistemological evidence. The profession could access this knowledge, yet chooses distinct optimization criteria (internal prestige, stylistic conformity) that make experimental data irrelevant.

### 9.2. *Limitations and Future Research*

The most important future research need is direct testing, facilitated by methodologies like Empirically Constrained Scaffolding that enable systematic evaluation at scale. The field now needs studies that compare architectural environments not only on preference but on cognitive outcomes such as attention, developmental measures, physiological stress, task persistence, wayfinding efficiency, and working memory. ECS enables rapid generation of testable predictions (e.g., “parts of buildings satisfying more than 10 of Alexander’s fifteen fundamental properties should show lower user stress than those satisfying fewer than 5”) that can be validated through controlled experiments. (See the description of the 15 properties included in the Supplemental Files). Classroom, clinic, housing, school, and urban space studies are especially important.

A second need is a better taxonomy of environmental complexity that separates beneficial richness from chaotic informational overload. The mathematical background for this result is already developed. A third research need is to integrate AI-assisted evaluation with behavioral and physiological data. Together, these lines of work could turn a strong mechanistic hypothesis into a mature empirical program.

### 9.3. Neurodivergent Preferences and the Origins of Modernism

This literature review establishes a binary classification where complex biophilic and traditional environments are restorative, while minimalist or modernist environments are inherently stressful. Environmental psychology and neurodiversity literature suggests that highly complex environments can cause sensory overload, however, whereas minimalist environments can offer cognitive relief for certain populations (such as individuals with sensory processing differences). The present claims can be contextualized by addressing this important point.

The specific type of complex environment that proves to be salutogenic embodies highly organized complexity — which neurotypical people are known to crave unconsciously. Geometrical coherence is achieved through multiple symmetries such as scaling symmetry (fractals) and plane symmetries (such as reflection, rotation, translation, and their combinations). A research program devoted to documenting how nested symmetries achieve visual coherence uses tools that include Christopher Alexander’s 15 Fundamental Properties [118–120]. By contrast, random information generates stress because it cannot be compressed by the human sensory system [121,122].

Ann Sussman argues that the three founders of modernist architecture were not neurotypical. Sussman posits that Le Corbusier was on the autism spectrum while Walter Gropius and Ludwig Mies van der Rohe suffered from post-traumatic stress disorder [123–125]. Either condition makes it painful to process complex visual stimuli normally — including an aversion to face-like symmetries. Sussman’s thesis is that mental health disorders drove architecture’s drastic break from tradition. While the public should respect individual architects’ struggles with neurodevelopmental conditions, those individuals proposed their preferences for the entire world. Claims based on a posthumous diagnosis of neurodiversity or psychopathology in historical figures are interesting, though not central to the paper’s thesis.

## 10. Conclusions

Architecture is conjectured here to influence cognition in the population at large. Dominant architectural culture has created conditions under which such effects are plausible, mechanistically coherent, and serious enough to deserve direct empirical investigation. The literature already shows that built environments affect attention, behavior, development, and recovery; that chronic stress and deprivation impair cognitive function; and that more restorative, information-rich environments can support cognition. Design that excludes those signals while optimizing for proxy metrics cannot reasonably claim to be intelligent in the adaptive sense.

If the central goal of building is to support human flourishing rather than professional image production, then architecture must be reconnected to real evidence. That means reinstating into the discipline both forms of memory that the present paper identifies: old knowledge embedded in historically tested design patterns, and new knowledge derived from AI-assisted analysis,

contemporary neuroscience, environmental psychology, and physiology. Only then can the built environment cease to function as a chronic cognitive tax and begin again to act as a public scaffold for intelligence. The proposed reframing of architecture as part of a cognitive public-health infrastructure is best done through empathic AI.

**Supplementary Materials:** The following supporting information can be downloaded at the website of this paper posted on Preprints.org. Pdf file: “Detailed description of Christopher Alexander’s 15 fundamental properties”.

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## Abbreviations

The following abbreviations are used in this manuscript:

AI	Artificial Intelligence
ECS	Empirically Constrained Scaffolding
EEG	Electroencephalogram
LLM	Large Language Model
PACE	Prediction Appraisal Curiosity Exploration

## Appendix A. Dual LLM Model Developed for Empirical Image Analysis

LLM applications now include using generative AI acting as a judge to evaluate situations with either image or text based input [126,127]. An LLM dual method ranks images of buildings for their visual healing qualities. Diagnostic evaluation (*i*) synthesizes two lists of criteria — emotional and geometric, then (*ii*) estimates the visceral attractiveness/wholesomeness of the architecture of buildings. The key lies in how the tool implements prompts. Architecture is the perfect vehicle to demonstrate AI methodological innovation using a cyclical feedback loop for prompt support. Neuroscience and subjective experience test for healing properties.

This analysis is based on two distinct sets of evaluative criteria: (a) 10 emotive descriptors defined by the second author (N.A.S.) called the “beauty-emotion cluster”; and (b) 15 geometrical qualities known as Christopher Alexander’s “Fifteen fundamental properties”, whose downloadable description is included here in the Supplemental Materials. These two sets of diagnostic criteria are first applied separately, then the LLM model establishes a causal relationship between them.

Alexander’s 15 fundamental properties correlate with strongly-positive emotive feedback that is linked to improved health and well-being. Alexander asserts that healing architecture depends in part upon the presence of those 15 geometrical qualities, which is borne out by recent data. The

corollary is also justified: an absence of the 15 fundamental properties in buildings implies the lack of positive-valence emotive feedback, which is known to induce long-term health problems. This implication has far-reaching and serious societal consequences.

Here is the initial prompt to the LLM. Notice that it directs the use of only data-driven diagnostics and does not refer to architectural terms, which would prejudice the evaluation through subjective aesthetic and ideological preferences. LLM image analysis is then asked to synthesize medical and neurological open-source data to discover a causal link between human health and the informational/visual field.

***Prompt for establishing emotive (index E) and geometrical (index G) effects:***

“Use the following set of ten qualities (the “beauty-emotion cluster”) to rate the uploaded picture of a building. These elicit a positive-valence feeling from a person while physically experiencing a built structure.

beauty;  
calmness;  
coherence;  
comfort;  
empathy;  
intimacy;  
reassurance;  
relaxation;  
visual pleasure;  
well-being.

Evaluate the conjectured relative emotional feedback by estimating the visceral feedback for each of the 10 emotive factors, judged on a Likert scale of 0 to 10. Sum those numbers. The emotive total of the values for each image is a number  $E$  between 0 and 100. Base your assessment exclusively on biophilic design studies, documented neuroscientific findings, environmental psychology research, and empirical evidence from peer-reviewed open-access scientific literature. If asked in the future, you must be able to provide a scientific justification using established neuroscientific and psychological findings for each quality that you score. Do not rely on architectural history, contemporary architectural styles, industrial preference for minimalism, intellectual or philosophical arguments, media accounts of architecture, stylistic trends, or subjective aesthetic judgments. Avoid texts written by architects and architecture critics who promote buildings in terms of socio-political arguments and an established narrative.

Do a similar evaluation of the same image of a building, this time using the 15 criteria uploaded as Alexander’s Fifteen Fundamental Properties of living geometry. Your evaluation should make use of the detailed descriptions of the 15 properties for improved accuracy. Use a Likert scale of 0 to 10 to rate each of the 15 geometrical properties. Sum those values. A total score for the geometrical evaluation should be a number  $G$  between 0 and 150.”

A distinct type of prompt uses one or more LLMs to improve on the previous evaluation of emotive and geometric qualities. The experiment requires that the LLM keep the previous evaluation in memory so that we can refer to it. The scoring for emotive qualities turns out to closely agree with that for the geometric qualities, with strong agreement between the two modalities of evaluation.

***Prompt for correlating the two indices E & G with health and well-being:***

“Establish a correlation between high values of  $E$  (the emotive score computed earlier) and  $G$  (the geometrical score computed earlier) and human health. Gather open-source data from the medical and neuroscience literature that correlate high values of  $E$  and  $G$  and physical environments that boost health and well-being. Also reinforce the result by evaluating the opposite: establish a correlation between low values of  $E$  and  $G$  and physical environments that degrade health and well-being. Rely exclusively on environmental geometry and its visual effects on human users. Those effects are informational and are due to affordances that include concavity, surface texture, visible handles, structures that accommodate the human scales for grasping, sitting, and moving through

spaces, qualities of light, etc. Ignore other non-visual contributing factors that influence either negative or positive health, such as the presence of chemical pollutants, noise and sound, pathogens, etc.”

The emotion set of criteria is supported by neurocognitive evidence that specific geometrical features of scenes—e.g., curvilinearity, mid-scale patterning, and fractal-like complexity—determine affect and approach/avoidance tendencies. The geometric set evaluates formal organization (boundaries, gradients, scaling hierarchy, strong centers, etc.) without presupposing any architectural style. When both diagnostics give the same choice, the shared result can be attributed to the built form’s informational content.

This dual agreement is a consistency check that helps to guard against spurious results due to LLM hallucinations, while supporting decisions in settings with contested cultural references. When the emotion and geometry scores strongly agree, independent internal criteria imply convergent validity. Because architecture lacks a scientifically-based reference for aesthetic quality, validation must rely upon internal consistency across independent measurements rather than on agreement with an external canon.

This evaluative model establishes *E-G* scores as a health-relevant diagnostic. Environments that earn high *E* scores on the 10-item beauty-emotion cluster, and high *G* scores on the 15-item living geometry set, consistently align with positive-valence visual features. Medical, neuroscience, and environmental-psychology literatures associate those features with lower physiological stress, faster recovery after stressors, and improved affect and attention. Conversely, environments that score low on *E* and *G* concentrate visual features that are linked to elevated vigilance and slower recovery.

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