

Interdisciplinary Symposium

Neurophenomenology & Sacred Architecture

Toward an Experimental Theological Aesthetics

The Catholic University of America – School of Architecture and Planning. Washington, DC, USA.

DETAILED PROGRAM

THURSDAY 23 MARCH

5:00pm WELCOME WORDS

5:15pm **LECTURE 1: Anjan Chatterjee. *Neuroaesthetics of the Built Environment***
** WEBINAR (internet broadcast)

Abstract: Neuroaesthetics is a relatively new discipline that investigates the biology of aesthetic experiences. I will review its conceptual underpinnings in light of three core questions. What is the biology of aesthetic experiences? How are they malleable? Why do aesthetic responses matter? Given the fact that people in the materially developed world spend more than 90% of their time in the built environment, and our environment has a profound effect on our well-being. I argue that our brains respond automatically to our aesthetic environment by discussing how we harbor hidden behavioral and brain responses to architecture. Our brain responds to spaces based on psychological constructs of coherence, fascination, and hominess. We are often not aware of these responses, the weightings of which varies by individual differences, educational expertise, and the influence of nature.

Respondents: **Mohamad Koubeissi, Milton Shinberg, and Richard Viladesau**

6:45pm RECEPTION

FRIDAY 24 MARCH

8:30am COFFEE & BAGELS

9:00am **WORKS PANEL 1: *EMPIRICAL RESEARCH*** (moderator: Julio Bermudez)

Abstract: The intention of this panel is to provide a broad overview of what is happening, empirically speaking, at the intersection of neuroscience, phenomenology, and the arts (architecture in particular). Panel participants will briefly describe their area of inquiry, theoretical framework, the hypotheses being considered, the methods and technologies utilized, the results (if work is finished), the significance of such work, and the challenges being confronted. The following four researchers will be presenting and discussing their current research work

Thomas Beaudoin: *Constellating Multiple Forms of Attention: Empirical Research at the Pantheon*

Abstract: Since 2004, I have been studying the Pantheon in Rome. My empirical research is an aggregation of theological forms of attention informed by social science and concerned for the politics of knowledge. It commenced with the savoring of, and reflections on, my experience of the architecture. I then turned to textual studies: historical and architectural research helps me understand how the Pantheon came to be, how it changed over time, and what it has meant to its different curators and visitors over nearly two thousand years. Continued visits vitalized my reading and stoked my curiosity. In 2019, I began an ethnographic theological study, in which I have interviewed 20 Pantheon personnel, taken hundreds of photographs, recorded video, and spent 160 hours so far onsite in participant observation, keeping “field notes” and a research journal. In 2022, the help of a Templeton Religion Trust grant opened a quantitative wing of the project, as I designed and implemented a survey of Pantheon visitors that was completed by 1525 people describing their experience of the architecture and art. Along the way, tracking my entanglement in the research makes reflexivity another source of understanding. I try to constellate these multiple forms of attention.

Elisabetta Canepa: *First Impressions: Capturing the Ineffable Nature of Architectural Atmospheres*

Abstract: We tested the hypothesis of ineffable architectural atmospheres, which is informed by a phenomenological approach to the architectural space, by integrating a first-person perspective (self-report questionnaires) with a third-person perspective (measurements of autonomic nervous system activity). To investigate our nonconscious responses to atmospheres we employed virtual reality, eye-tracking, and sensors specialized for heart rate, electrodermal activity, and skin temperature. This presentation illustrates the first RESONANCES experiment, designed and carried out at the Kansas State University Plab2003, directed by Professor Bob Condia. Theoretical framework, working hypotheses, methods, employed technologies, and preliminary results are discussed.

Robin Jensen: *Assessing the Impact of Sacred Art on Viewers' Spiritual Understanding*

Abstract: My current work attends to how different viewers engage works of art and to what degree changing physical and temporal context as well as varying subject matter and style affect the depth of engagement or spiritual impact of the works upon them. As an art historian whose research primarily focuses on visual arts of Late Antiquity, especially those works with evident religious content, I tend to concentrate more on the objects than on the (long-dead) viewers of those objects. By turning to the viewer, I now ask how the works would have affected different kinds of viewers (e.g., distinctions of gender or social position) depending on where, when, or why they would have encountered them. This has prompted me to explore the potential of empirical research using living viewers of art and to draw upon the results of research conducted by a team that includes members of the Psychology Department at the University and funded through a grant from the Templeton Research Trust. This research uses the methodologies of visual and event cognition to measure the viewing behaviors and reported responses of subjects to works of art ranging from the secular to the sacred in subject matter and from more representational to more abstract in style and in varying contexts and at different seasons of the year.

Ann Sussman: *How 21st-century Biometrics Change How We 'See' Architecture + Ourselves*

Abstract: We live in a *New Age of Biology* Where new understandings in neuroscience and new biometric tools transform how we 'see' ourselves and can be used to understand the human experience of the built environment in new ways. The talk briefly reviews key biometric tools including eye tracking and facial expression analysis, showing how, when applied to analyzing architecture, they are revolutionary. Biometrics reveals that our perception of the built environment begins non-consciously, subliminally, and that our non-conscious animal nature directs our experience of the built environment, whether inside or out, far more than most realize. These tech tools, widely adopted in the automotive and advertising industries to promote consumption, will be transformational in architecture and design, offering the promise, of promoting connection, happiness, and community well-being. For, as Nadine Burke Harris, MD, writes: "When you know the mechanism, you can use that understanding in countless ways to drastically improve the human condition. That is how you spark a revolution. You shift the frame, you change the lens, and all at once the world is revealed, and nothing is the same." - *The Deepest Well*, (2018)

10:30am SESSION BREAK

11:00am TOPIC PANEL 1: *ON NEUROPHENOMENOLOGY* (moderator: Yoshio Nakamura)

Abstract: What is neurophenomenology and how can it help us advance in the scientific understanding of architecture in general and sacred architecture in particular? The work and thought of late neuroscientist Francisco Varela loom large here, but much has occurred since his passing, and a whole new world is unfolding. Additionally, this panel will consider connections to what has been termed 'aesthetic cognitivism' by some philosophers (notably Gordon Graham and Christoph Baumberger). Four researchers and scholars (**Michael Arbib, Gordon Graham, Yoshio Nakamura, and Sarah Robinson**) will be speaking about these issues and more in this panel.

12:30pm Lunch Break

2:00pm LECTURE 2: Richard Viladesau. *Divine Transcendence and Sacred Space: a Theological-Aesthetic Perspective* by (Theological Aesthetics) ** WEBINAR (internet broadcast)

Abstract: Both feeling and thought operate largely through a process of associations. Some of these are learned; some seem to be transcultural. In Western art it has long been assumed that certain arrangement of sounds, shapes, and colors evoke particular emotions and ideas. Rudolph Otto proposes that the experience of the "Holy" as "*mysterium tremendum et fascinans*" is unique and irreducible to any other experience. However, there is a "law of association" by which aesthetic and moral experiences evoke the "numinous" by a kind of analogy. Otto's analysis raises the question whether there is in fact a specific experience of "the holy." Is religious consciousness a *sui generis* experience, or is it rather an interpretation of

experience? Post-Kantian transcendental theology proposes that "depth" or "limit" experiences are implicit in consciousness, and provide the basis for a variety of associations with the ultimate mystery of existence. The divine is anticipated as infinite transcendence that is at the same time radical immanence. The implicit intentionality of the divine can be implicit or can be formulated at different levels as feeling, image, concept, and transcendental intentionality. The "sacred" is an aesthetic construct signifying heightened awareness of the mystery. Sacred spaces are places consecrated to such awareness; they can be constructed in response to various aspects of communal awareness. All such aesthetic mediations of the sacred have an ambiguous relation to religious conversion.

Respondents: Anjan Chatterjee, Gordon Graham, and Sarah Robinson

3:30pm SESSION BREAK

4:00pm WORKS PANEL 2: EMPIRICAL RESEARCH (moderator: Julio Bermudez)

Abstract: The intention of this panel is to provide a broad overview of what is happening, empirically speaking, at the intersection of neuroscience, phenomenology, and the arts (architecture in particular). Panel participant will briefly describe their area of inquiry, theoretical framework, the hypotheses being considered, the methods and technologies utilized, the results (if work is finished), the significance of such work, and the challenges being confronted. The following four researchers will be presenting and discussing their current research work

Jonathan Berger: *Cross-sensory Ambiguity as a Factor in Eliciting Deep Affective Aesthetic Response*

Abstract: We seek to understand whether, and if so, how sensory mismatch between auditory and visual estimates of architectural size and space are factors in evoking deeply affective states. Our study focuses on sacred spaces and the music written for, and performed in these spaces. We conduct in situ measurements and recordings of impulse responses in select sites. We then create virtual acoustic models of these spaces and have listeners respond to auditory cues in these virtual acoustic spaces. We seek to see how, absent of visual cues, spatial proportions and geometries are inferred. We then use virtual reality to integrate vision into the experimental paradigm to examine the interplay of visual and auditory information on perception. Finally, we study how music performers adjust characteristics of their performance in virtual acoustic spaces. This talk will describe the experiments and initial results and findings, and provide cultural and historical context to our work.

Julio Bermudez: *Empirical Studies of Cause and Effect in Sacred vs. Secular Architecture*

Abstract: Throughout history, religious buildings have been educational devices to advance spiritual information and facilitate the experience of spiritual reality. Beauty has always been a protagonist as builders of holy structures almost universally sought to induce aesthetic delight. The fields of theological aesthetics and other scholarships have provided reasons for such practices and successes. Yet, lacking significant empirical evidence, these arguments cannot survive serious scientific scrutiny nor advance our comprehension of how architecture enables access to spiritual reality. This presentation briefly shares two in-progress research efforts gauging (1) architecture's capacity to produce spiritual cognitive-aesthetic effects and (2) what and how building features may elicit such responses. Specifically, last-generation mobile electroencephalography, ambulatory eye-tracking technology, and biosensors are used to measure the physiological and visual responses of 30 Catholics to two architectural conditions in Washington, DC (one religious: the Basilica of the Immaculate Conception, and one secular: Union Station) in combination with their experiential responses (i.e., phenomenological data). The intention is to empirically explore links between architectural cause and effect using first and third-person data, a work that is inspired by Francisco Varela's vision of neurophenomenology.

Zakaria Djebbara: *On the Neuroscience of the Unconscious in Architecture*

Abstract: Architecture is primarily experienced by sensing and acting, shaping the backdrop of our lives. As the sensory and motor systems involve the suppression of unnecessary information, most of experience is limited to few impressions. This implies that architecture operates at the level of our automatic and adaptive skills that are largely unconscious. Architecture thus implicitly influences our behavior as we move through the world by appealing to particular sensory and motor dynamics. This process may be stimulated by automatic focus on environmental features that correspond to particular sensorimotor responses. This perspective links the built environment with behavior through cortical structures. More specifically, it involves a thalamo-cortical network that combines environmental cues with motor aspects of behavior. We hypothesized that the thalamus functions as an integrational hub between major brain regions in an active fashion, which should be expressed in an effective connectivity analysis of the brain when participants are exposed to spaces that control the sensory dynamics. Such an experiment should provide deeper insights into the relationship between space and the unconscious adaptive. This required the use of Virtual Reality, mobile EEG, and dynamic causal modelling. We report on early findings and the potential of the methodology.

Matthew Niermann: *Priming Effect of Church Architecture. Empirical Investigation of the Relationship between Christian Church Design and Belief Plausibility Structures*

Abstract: In the United States, Evangelical Protestantism has had a major influence on religious practice in America – including an influence on religious building trends. Stemming from the historical missiological theory known as Church growth Theory, Evangelical Protestant church designers developed what is known as ‘architectural evangelism’; a building style that sought to remove barriers for the unchurched by utilizing secular building typologies as the basis for church design, ultimately suppressing religious expression via architecture. Yet, as sociologist Peter Berger observes, religious practice participates in a dialectic process of world shaping which includes a process of the externalization of religious beliefs, which is then objectified for all, followed by individual internalization of these beliefs. With this observation, the question is raised as to how the lack of recognizable externalization of religious belief via architecture could affect, or possibly hinder, the eventual internalization of beliefs. Drawing from multiple empirical studies, this presentation explores applied empirical aesthetics research to the study of sacred architecture and in particular the study of both religious participants and non-religious participants. Further, this presentation identifies key empirical research methods for the study of pre-cognitive understandings as well as identifying the effects of personal constructs of religious and non-religious populations

5:30pm SESSION BREAK

6:00pm LECTURE 3: Sarah Robinson. The Resonant Body and Sacred Space (Architecture)

**** WEBINAR (internet broadcast)**

Abstract: Three first-person encounters in sacred spaces, each in a different spiritual tradition—an Islamic mosque in Iran, a Catholic Church in France, and a Buddhist temple in Japan—ground an exploration of the patterns of resonance, rhythm and synchrony that connect these places with human experience. The hope here is to gain insight not only into how these relational patterns create order in terms of space, but to examine how they might create order in terms of time. Resonance will be considered both as a sonic phenomena, and as a more general physical process operating at multiple architectural, physiological and psychological scales. The closely related phenomena of rhythm, will be investigated in terms of light, shadow, texture, posture and procession. And the ubiquitous natural phenomena of synchrony will be approached as an organizing force shared by all of these processes. This exploration questions the boundaries between body, mind and architectural space and wonders how the reverence and care that characterise the sacred might be practiced and applied to design that dignifies and graces the cycles of daily life.

Respondents: Michael Arbib, Thomas Beaudoin, and Suchi Reddy

6:45pm RECEPTION

SATURDAY 25 MARCH

8:30am COFFEE & BAGELS

9:00am TOPIC PANEL 2: METHODS AND CHALLENGES (moderator: Yoshio Nakamura)

Abstract: This panel will present and discuss current empirical methods and their associated technologies (hardware and software) being utilized in the study of the arts and architecture vis-à-vis highly intangible and spirituality-related matters. The following four researchers and scholars will share very different yet productive scientific approaches to tackling the perplexing challenges behind the phenomenology of sacred spaces.

Jonathan Berger: *Developing Ecologically Valid Methods of Studying the Interaction of Architectural Space and Sound*

Abstract: Perception and psychoacoustic studies are typically carried out under conditions that allow for replication and quantitative analysis of results. The downside to imposing these constraints is the challenge of delivering insightful meaning about how the findings transfer from the laboratory to the real world. While far from solving this conundrum, this talk will present our current work on auditory and visual perception experiments using ecologically valid stimuli and simulating real-world conditions.

Elisabetta Canepa: *Resonance and Attunement. How to Apply Phenomenology and Neuroscience to the Study of the Priming Potential of Architectural Atmospheres*

Abstract: To empirically investigate the atmospheric vocation of architecture, we elaborated a scientific method embedding a dualistic approach: atmosphere and architecture; resonance and attunement; impressions and appraisals; nonconscious and conscious; emotions and feelings; living body and lived body; third-person perspective and first-person perspective; physiological measures and self-report questionnaires; neuroscience and phenomenology; experimentation and theory. In our experiments, we analyze a series of lit corridors, where we alter the light quality (via luminosity and colors), assuming light is a primary generator of atmosphere. We aim to determine whether and how different atmospheres prime the emotional experience of the next room, which we assess in terms of resonance and attunement. We do not test atmosphere per se but as a *priming* condition for spatial experience. The priming potential of atmospheres is a deep-rooted intuition among designers, but we have to consolidate evidence by collecting empirical data. We want to transform an intuition into an informed intuition.

Lin-Ching Chang: *Using Machine Learning with EEG Data to Analyze Cognitive-Aesthetic Experience*

Abstract: For thousands of years, architects have designed sacred and secular buildings to create specific psychological and spiritual states in those who view and enter them. However, until the present day, the only means of testing the effectiveness of these designs was to observe and survey those who experienced the buildings. Using machine learning algorithms with the recent advent of wearable technology such as mobile EEG devices and biometric wrist monitors that record the electrical activity of the brain and measure physiological data, we now have new tools to analyze the effectiveness of these designs. In this talk, I will present our findings in using machine learning with EEG data to classify the cognitive-aesthetic effects of sacred vs. secular architecture on believers.

Zakaria Djebbara: *Challenges Ahead for Neuroarchitecture*

Abstract: While Mobile Brain/Body Imaging (MoBI) remains a popular methodology to understand the relationship between brain, body, and environment in neuroarchitecture, I identify some of the current limitations and suggest how to overcome these. As architecture encompasses various aspects of the environment, including the light conditions, temperature, bearing structure, materials, and even smell, an architect can be held accountable for choosing one particular door handle over another. The number of parameters is enormous—and it thus follows that the studying of cortical responses to architectural settings deals with the same enormous number of parameters. The characteristic of neuroarchitecture is the application of a neuroimaging method to the interaction with architecture to better understand how the brain is affected by those particular architectural parameters. This thus requires a systematic change of a single architectural feature at a time. However, if the objective of neuroarchitecture is to uncover what kind of behaviours, to what extent, and under what circumstances architecture has an impact, we should divide our focus between architectural parameters and the functions they can affect. This view considers the functional integration of the brain, body, and environment as equally important as their physical structure.

10:30am Session Break

11:00am LECTURE 4: *Gordon Graham. Spiritual Reality and Its Investigation* (Philosophy)

**** WEBINAR (internet broadcast)**

Abstract: This lecture explores the philosophical basis of the program of research established and funded by the benefactions set up by Sir John Templeton. It articulates the conception of 'spiritual reality' elaborated by Templeton in his book *The Humble Approach* (1981), and critically examines the methodologies he recommends. Key to his book are two related distinctions, the contrast between spiritual and material and the distinction between natural and supernatural. The lecture offers an analysis of these distinctions and argues for their necessary interconnectedness. It then turns to Templeton's advocacy of a 'scientific' investigation of spiritual reality and identifies some historical precedents for this recommendation. This provides the backdrop for considering whether, and how, the concept of 'scientific' might relate to the arts as sources of spiritual knowledge and understanding.

Respondents: Jonathan Berger, Robin Jensen, and Ann Sussman

12:30pm Lunch Break

2:00pm **LECTURE 5: Michael Arbib. *Atmosphere, Symbolism, and Narrative. Towards a Neuroscience of Sacred Architecture* (Neuroscience) ** WEBINAR (internet broadcast)**

Abstract: Does a place have to be constructed by a religious community to be sacred, or may a grove in the forest or a seashore at sunset create a sense of ultimacy that is the basis for emotions that may be interpreted by the faithful in terms of their own beliefs as a religious experience? Accepting the latter, one challenge is to understand how the metaphorical atmosphere of a space can elicit such emotional experiences in the human brain. However, while architected sacred space may be designed to offer an atmosphere of awe or contemplation, the elicitation of religious experience, though perhaps more routine than ultimate, may in general demand two further aspects: symbolism and a shared community. As part of this, we must briefly address the debate between those who view God as a social construct and those who view God as the ultimate Reality, noting the diversity of religious beliefs and the diversity of conventions that shape their sacred architecture (or are notably departed from in later practice). The symbols of a religion find their meaning through their relation to extended narratives. For example, what may to a Christian believer be a crucial symbol of their faith may to the outsider appear to be a disturbing exaltation of death by torture. This requires us to reconsider how social schemas and narratives that express them may reshape our perception of the affordances of objects, whether for practical or ritual purposes, and this in turn requires us to understand how the brain not only supports language as a social construct but also how language can be both crucial to, and abstracted from, practical behavior. However, such an account of the power of narrative can also explain how a site of pilgrimage for Christians or a stretch of the Ganges for Hindus can become sacred. Finally, for this talk, we must begin to understand the social cognitive neuroscience of how behaving as part of a group can transform one's emotional state, whether in the joint performance of prayer or in the communal singing of hymns. As we better understand how people experience the places and buildings they hold sacred, so can the architect gain new insight into when and how architecture can create or enhance the sacredness of a space. In this way, we can chart a variety of challenges for the neuroscience of sacred architecture – but all too briefly and with only early steps to report.

Respondents: **Harrison Fraker, Mohamad Koubeissi, and Sarah Robinson**

3:30pm **SESSION BREAK**

4:00pm **TOPIC PANEL 3: NEUROPHENOMENOLOGY IN DESIGN? (moderator: Harrison Fraker)**

Abstract: The intention of this panel is to hear from design practitioners. How do the knowledge and insights generated by the empirical and theoretical work happening at the intersection of neuroscience, phenomenology, and architecture/the arts/urbanism, impact design practice? Does it influence the design process or change our design sensibility? Can we get some examples? What topics, issues, areas should scientific research explore next? What is missing or needs reframing? Do we see any significant changes in the way architecture and the arts are addressed by society or the professions as a result of these new insights? The following five panelists will tackle these and other questions using specific examples of their practice/work.

Harrison Fraker: *Field Notes on Neuroscience and the Poetics of Public Space*

Abstract: The presentation refocuses urban design on the tangible and visceral experience of public space, to remind urban designers that our concept of the city is grounded in bodily experience. It discusses emerging insights from neuroscience and their potential impact on urban design in detail, not as a formula for design, but to bring awareness, a new sensibility to the design process. It uses a set of case studies to illustrate how the insights from neuroscience might be operative in how we experience and value the built environment. The Case Studies are presented as hypotheses, not as evidence about how insights from neuroscience are operative. The presentation is intended to ask how these hypotheses might be verified and made more present in our creative imaginations

Juliet King: *Environmental Agency: Neuroscience, Art, & Related Therapeutics*

Abstract: Scientific studies that investigate environmental impact on health and well-being are necessarily advancing. Art therapy is a human services profession that uses artmaking processes and products to effect psychological change within the therapeutic relationship. Art therapy encounters take place in ecological settings that capitalize on the dynamic interplay of the brain, nervous system, and environment. Physiological changes in response to environmental cues are supported with relevant insights from neuroaesthetics. Less known is the influence of aesthetic senses on affective perception and social interaction. Psychotherapy requires autonomic stabilization and is crucial in the treatment of psychological trauma and stress-related conditions. Thoughtfully planning aesthetic nuances of the built environment could positively influence the preparation for clinical work and cost-effective treatment outcomes.

Suchi Reddy: *Form Follows Feeling*

Abstract: Architecture and design are powerful tools that shape our experience as humans in our environments. It is my strong belief that how we feel in our spaces is as important as how we function in them, if not more important, to our physical and mental health. Calibrating our work to this goal, “Form Follows Feeling” is the guiding ethos of my practice Reddymade, which looks to reorient the compass of design to the quality of our experience in the built environment. Leveraging the technology of our time, in particular the advances in the fields of neuroscience, and the relatively new field of neuroaesthetics that explore the impacts of space and experience on our biology, our work seeks to amplify the potential of architecture. In this presentation, I will share some of our work as case studies in this exploration.

Carol Rickard-Brideau: *Designing for Conscious and Unconscious Experience*

Abstract: Frequently, architectural design places heavy focus on the building as an object without showing equal emphasis on user experience and the qualities and characteristics of space that have a direct impact on human physical and mental health. Much of what is designed is done without knowledge of, or regard for human neurobiological processes, and this imbalance results in both negative physical and mental health outcomes. Designing in ways that take human experience and neurobiology into account is an imperative for the design community. Moving any firm toward this goal requires both instruction and intentionality. This presentation will share some of our journey with you.

Milton Shinberg: *Drawing Architecture from Unspoken Needs*

Abstract: The presentation identifies specific ways the speaker’s study of cognitive science over the last forty years has impacted his design of schools, in parallel with teaching architecture in design studios, seminars, and at conventions for practitioners. Strategies for translating insights from science, phenomenology, art, and music, into concrete architectural design proposals are illustrated. In the process, the dual roles of evidence-based design and informed speculation about design impact are contrasted, while some tentative conclusions are proffered.

5:30pm SESSION BREAK

6:00pm OPEN DISCUSSION (moderator: Julio Bermudez)

Abstract: This final session is about openly sharing observations, insights, and ideas gained in the symposium. It may be the time to return to topics or questions that were left unfinished or start completely new ones. The moderator will kick off the conversation by asking a few participants (speakers, panelists, and attendees) to share their impressions. Upon hearing these 10 or so commentaries, the floor will be open for discussion. It is the hope that the ensuing exchanges will define relevant issues, directions, questions, and areas upon which we could build an experimental theological aesthetics.

7:30pm THANK YOU & GOODBYE

8:00pm DINNER