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Blending the Subjective and Objective Realms of Sacred Architecture at the Pantheon: Creating a Comparative Framework for Evaluating Transformative Experiences in Ritual Contexts

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Abstract: This paper seeks to create a comparative framework for evaluating transformative experiences for different types of ritual contexts found in sacred architecture by bridging the gap between the phenomenology of human experience and architecture's built conditions. The methodology creates a framework for statistical analysis, whereby evidence of people's actual (i.e., real, lived) "subjective" experiences can be evaluated against the "objective" architectural conditions. The comparative framework is put to the test by comparing the experiential and environmental conditions found at the Pantheon in Rome. Experiential data for the Pantheon is extracted from Julio Bermudez's large survey database (N = 2872) of "extraordinary architectural experiences" for this study. This data is compared against "objective" graphical architecture analysis using Lindsay Jones' "morphology of ritual-architectural priorities" with a specific focus on ritual contexts. The quantitative and qualitative data reveals that the Pantheon produces transformative experiences for visitors that are related to the expected outcomes of specific design features. The percentages from the "objective" and "subjective" analysis both rank the priorities of theatre, contemplation, and sanctuary in the same order. This study concludes that built environments possessing a higher presence and quality of "ritual-architectural priorities" are more likely to be perceived as sacred and produce transformative experiences.

Keywords: sacred space; aesthetic experience; ritual contexts; hermeneutics; Pantheon; Rome; phenomenology; architectural design; comparative framework; transformative environments; survey research

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1. Introduction

Sacred spaces have the potential of creating lasting and meaningful experiences for human beings. Recent studies in neuroaesthetics and neurotheology reveal the important role of human–environment interactions and spirituality on the cognitive, emotional, and behavioral aspects of human health and well-being (Bermudez et al. 2017; Chatterjee and Vartanian 2014; Coburn et al. 2017, 2020; Ishizu and Zeki 2014; Miller et al. 2019; Wang et al. 2011). Throughout the history of architecture, or at least the histories written by architectural historians, certain notable sacred buildings are repeatedly discussed due to the important role they have played in society or to the discipline of architecture. One simply needs to consider the Pantheon in Rome, Chartres Cathedral, or Notre Dame-du-haut in Ronchamp, France (Bermudez and Ro 2012, 2013). Interestingly, many of these sacred buildings are included in the history books because they continuously produce some of the most profound aesthetic human experiences. Despite their time, culture, or place, each building is a "timeless" piece of architecture that continues to create memorable experiences that speak to the human soul. As a result of these types of experiences, as Julio Bermudez and I argue elsewhere, "the architecture discipline has devoted much energy to map the 'objective' framework (e.g., dimensions, proportions, materials, light, etc.) supporting such extraordinary responses. Yet, little attention has gone to actual 'subjective' reactions (e.g., emotions; body reactions; levels of spontaneity, volition, or introspection; focus; reached insight, etc.)" (Bermudez and Ro 2012, p. 689).

When scholars have attempted to address the subjective side of architecture, they often run into challenges because experience is lodged within our mental and physiological being. It is true that some philosophers, social scientists, and religious specialists recognize the power behind successful architecture and its ability to engender various sorts of "transformative" experiences (Jones 2000, vol. 1, pp. 94–99). In fact, these transformations are often viewed as a "mechanism of human understanding" that range from the "metaphysical, sociopolitical, psychological, religious, or pedagogical" (Jones 2000, vol. 1, pp. 99, 103). Tracking or even studying the transformations of a particular architectural situation, however, may prove to be challenging since these experiences appears to be embedded "in the (seemingly) inaccessible nature of consciousness" (Bermudez and Ro 2012, p. 689). Some scholars "have tried to close the gap by resorting to scholarship or reductionist science to speculate about how we experience space, place, tectonics, scale, meaning, etc. (Bachelard, Hillier, Krampen, Mearleau-Ponty, Norberg-Schulz, Rasmussen)". Unfortunately, the results of these efforts are often "frustratingly vague and scientifically weak at best" (Bermudez and Ro 2012, p. 689).

On the other hand, empirically-driven qualitative scholars, such as Ellen Moffat and Kim Morgan, are pioneering efforts to close these gaps by mapping the somatic rhythms of urban space using ECG sensors that monitor heart rate, breathing, and footsteps while simultaneously tracking the path of travel with Smartphone GPS applications (Moffat and Morgan 2012). While these methods are seemingly stronger in the scientific arena and such an application could be a viable alternative solution for the study of architectural experience, especially in the realm of sacred spaces, yet we find that the methods still lack the ability to track what changes actually occur in one's human understanding.

Despite the arguably (un)successful efforts to map the subjective experience of the built environment, there are new opportunities on the current horizon. One such opportunity is the prospect of mining Julio Bermudez's survey database of "extraordinary architectural experiences" (or EAEs). From April 2007 to April 2008, Bermudez conducted "two parallel and independent online surveys (one in English and the other in Spanish)", which resulted in producing a database of the largest number of personal architectural testimonies ever collected (N = 2982; English n = 1890 and Spanish n = 982). Each survey was designed to gather empirical information about "people's most profound, lasting, and/or intense experiences of architecture". Bermudez uses the term EAEs to describe the phenomenological interaction between people and built forms which he defines as: "an encounter with a building or place that fundamentally alters one's normal state of being. By 'fundamental alteration', it is meant a powerful and lasting shift in one's physical, perceptual, emotional, intellectual, and/or spiritual appreciation of architecture. In contrast, an ordinary experience of architecture, however interesting or engaging, does not cause a significant impact in one's life" (Bermudez 2008). Since Bermudez's survey is primarily concerned with the alteration of "one's normal state of being" and the transformation that occurs in human understanding, the dataset provides an opportunity for researchers to begin the task of linking the subjective experience with architecture's objective conditions.

In general, Bermudez's survey methodology mirrors "existential-phenomenological research", as it deals with "specific experiences of specific individuals and groups involved in actual situations and places" (Seamon 2000; von Eckartsberg 1998b, p. 4). Similar methods have been utilized by phenomenological psychologists and include "the analysis of protocol data provided by research [respondents] in response to a question posed by the researcher that pinpoints and guides their recall and reflection" of events, experiences, and places (von Eckartsberg 1998a, p. 21). Thus, Bermudez's survey methodology of asking individuals to recall their extraordinary experiences in architecture through a series of questions and then inquiring about the actual place or building where it occurred. In Bermudez's seminal article connecting his survey to sacred places in the magazine *Faith and Form*, he offers several questions to guide future researchers who may use the database. "One important area of work will be to look at the correlation between the reported subjective states and the objective conditions present in a particular environment", he explains. "For example,

how do the psychological states reported by multiple individuals at the Pantheon in Rome correlate to the physical attributes of that place? Are there links between such relationships and those found for other buildings? Can we develop psychological and architectural frameworks or profiles that favor EAEs?" (Bermudez 2009).

The issues Bermudez raises are not only thought provoking but are exactly the types of questions this paper is seeking to address. Since the original survey was not necessarily designed to address these types of questions, we are led to develop a way to analyze the built conditions and then relate them back to the subjective experiences found in the responses. Thus, Bermudez's database is a valuable resource as it contains people's experiential accounts for specific religious buildings. My decision to use his database is in many ways similar to methods in experimental-empirical philosophy. Experimental philosophers are sometimes referred to as "reverse engineers" who are "trying to figure out how the mind works" (Prinz 2008, pp. 196–97). In the present study, I am also trying to figure out how the mind and body work and how they are affected by the built conditions of sacred architecture. In essence, the scope deals with the existential-phenomenon of human–environment interactions—indeed, I am an architectural philosopher-phenomenologist who is mining "the data of others" (i.e., Bermudez's survey database in combination with Jones' conceptual model).

Yet, how can a comparative framework actually help us blend the subjective and objective realms of sacred architecture? In order to answer this question, the main objective of this paper is to produce a comparative framework that can be superimposed on Lindsay Jones' three categories for ritual contexts (Jones 2000, vol. 2, pp. 315–23, 328–32). The comparative framework allows us to analyze both the built conditions for a specific case study and compare them to people's experiential responses within that same building while using Jones' categories as a baseline. The successful design of such a comparative framework will be its ability to maintain a level of statistical validity and prove reliable once tested against a set of case studies. Within the current paper, the comparative framework is used to analyze the objective built conditions of the Pantheon in Rome and the subjective human responses that the sacred space produces.

2. Methodology

An important step within the "evidence-based design" (EBD) process is collecting and gathering information and evidence relevant to one's research questions (Hamilton and Watkins 2009, pp. 212–14). Since the overarching question is whether there exists a link between human experience and built conditions within sacred architecture, the comparative framework employs a mixed methods research approach involving hermeneutics, statistics, and analytical architectural (graphical) analyses. The first section assesses the importance of Jones' categories for ritual contexts and then defines them. The second section takes Jones' hermeneutical interpretations of each category and their experiential qualities and compares them to Bermudez's survey questions. After a preliminary grouping is made, three stages of statistical tests are performed to achieve an ideal question set that can be used later to test specific case studies. In the third section, a cross-tabulation matrix is constructed for graphical/architectural analyses based on evidence from similar scholarly studies. The method for selecting specific case studies from the existing EAE survey database is outlined next in the fourth section. Lastly, the "how to guide" of applying the various steps for the comparative framework is explained briefly.

2.1. Assessing the Importance of Jones' Ritual Contexts

2.1.1. The Promise of Ritual Contexts from Two Early Studies

In order to construct a comparative framework blending the objective and subjective realms of sacred architecture within the evidence-based design process, the importance of Jones' categories for ritual contexts were assessed by a series of two parallel studies. The first was derived from the findings from a preliminary survey assessing the public perception and viability of Lindsay Jones' "morphology of ritual-architectural priorities"

(Ro 2013). The pilot survey revealed that participants overwhelmingly agreed that Jones' categories for ritual contexts were important for sacred architecture. In fact, three of the four ritual contexts were among the top ten most widely accepted (popular) categories. The popularity of the categories for ritual contexts led the author to perform another small study.

The second study was similarly aimed at assessing the importance of Jones' categories, but now it took a closer examination at the interconnectivity between each ritual context to the rest of the Jones' "ritual-architectural priorities". It was discovered that the theatre (III-A), contemplation (III-B), and sanctuary (III-D) ritual contexts were the most thoroughly connected. They each had relationships to the seven other morphological categories. The propitiation (III-C) ritual context, on the other hand, significantly lacked what the others had to offer with only one connection to morphological categories (see Figure 1). The assessment from both early studies helped demonstrate the importance of Jones' three ritual contexts and why choosing them to serve as a baseline for the comparative framework was a viable solution.

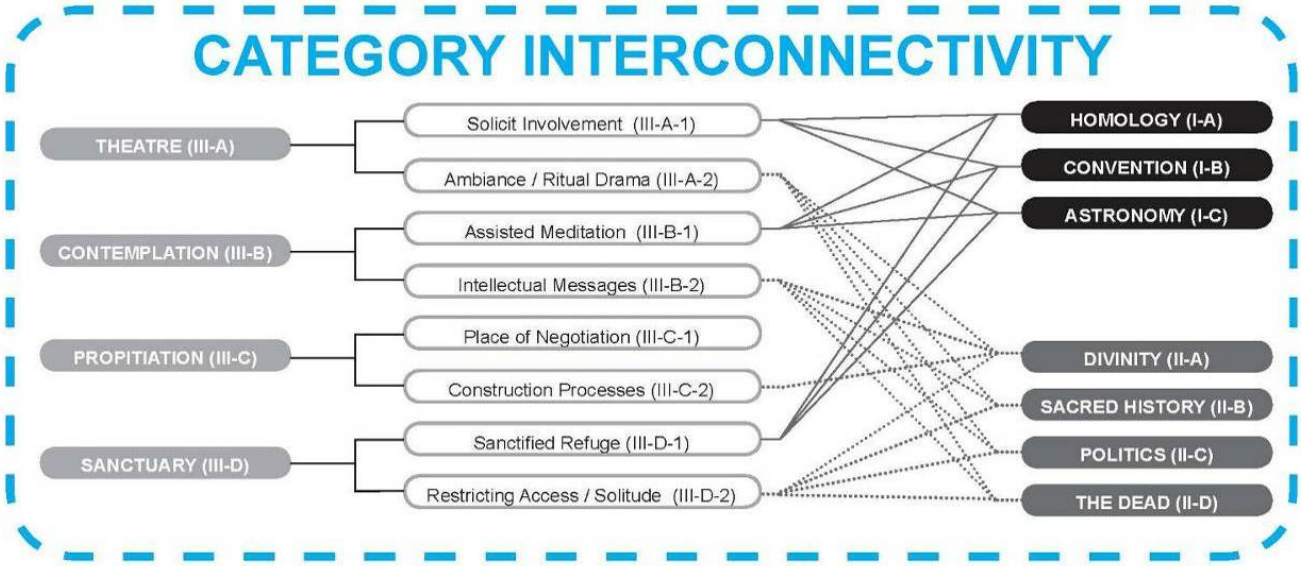


Figure 1. Diagram by author demonstrating the interconnectivity between ritual contexts (**left**) and other categories (**right**) within Lindsay Jones' "morphology of ritual-architectural priorities" (2000). The subcategories for each ritual context (**center**) illustrate how the connections are made to both allurement based strategies (**top-right**) and commemorative based categories (**bottom-right**).

2.1.2. Defining the Ritual Contexts of Theatre, Contemplation, and Sanctuary

Lindsay Jones claims that architecture can serve as ritual contexts; this is especially true during the presentation of ritual-architectural events. In each ritual context, there is both a front half and a back half of the equation. The front half of the equation deals with the level of instigation, allurement, or enticement that a particular architectural configuration has to offer (Jones 2000, vol. 1, pp. 69–103). Some ritual contexts, for instance, try to attract participation while others seek to restrict access. The back half of the equation is comprised of the level of content, meaning, or messages that are conveyed through architectural configurations. For instance, does a building take a less active role (the back seat) by serving only as a backdrop for ritual performance? Or does it actively attempt at becoming a direct object of devotion (the front seat)? There is a unique, yet distinct, front half and back half for each one of the three ritual contexts that will be explored in this paper. The ritual contexts are briefly defined below and can be understood from examining Figure 2.

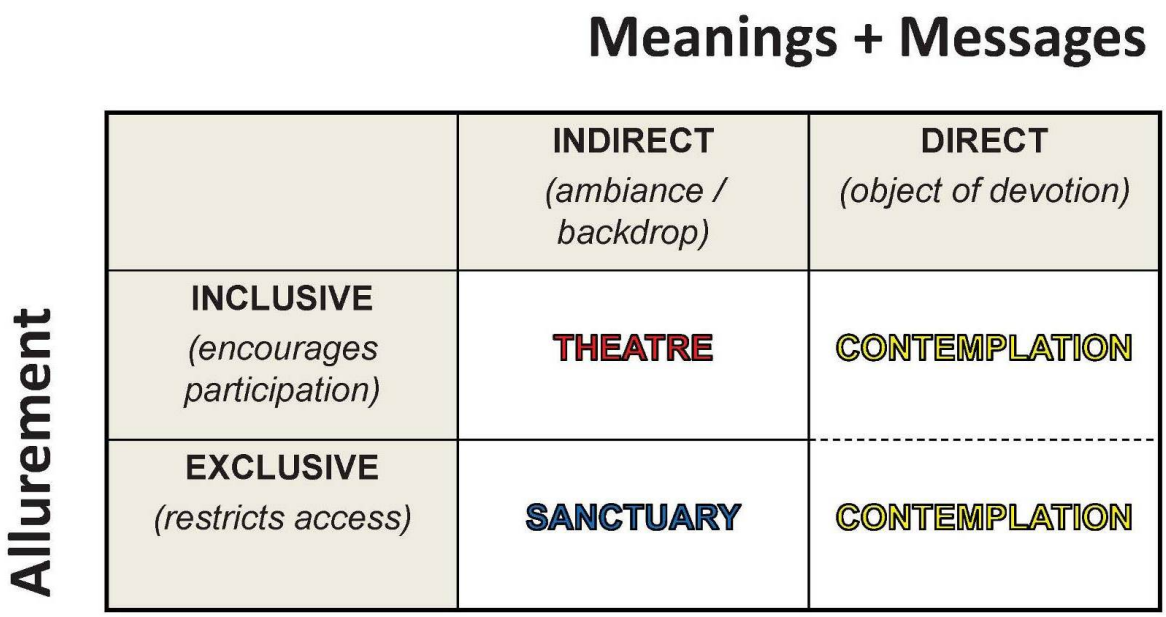


Figure 2. Graphical overview of Lindsay Jones' three main ritual contexts by the author. The diagram illustrates the level of allurement (e.g., inclusive versus exclusive) that is associated with each ritual context and the types of indirect or direct messages that are conveyed to people through the architecture.

- First, the ritual context for "*theatre*" plays an inclusive role by encouraging participation during the front half of the equation. Then, it shifts into an indirect role for the back half, as the architecture serves merely as a backdrop for ritual performance (Jones 2000, vol. 2, pp. 184–212).
- Second, "*sanctuary*" ritual contexts for the front half of architectural allurement are the opposite of theatre by promoting exclusivity and restricting access to participants. The back half of the equation with its meanings and messages, however, is similar to theatre by taking a passive (indirect) role that once again uses architecture as a backdrop (Jones 2000, vol. 2, pp. 184–87, 264–93).
- Lastly, ritual contexts expressing "*contemplation*" can be either inclusive or exclusive in their roles of soliciting involvement during the front half. The back half is unlike the other two categories, since the architecture takes on a more direct role when communicating meanings and messages. The architecture becomes an object of devotion that enhances one's concentration, meditation, or contemplation (Jones 2000, vol. 2, pp. 184–87, 213–36).

In each of the above ritual contexts, we find that both architecture and experience can be evaluated in terms of either level of allurement or types of messages (Figure 2).

2.2. Mapping Subjective Architectural Experience: Linking EAE Survey Questions to Jones' Morphological Categories

"It is not enough to see architecture; you must experience it", writes Steen Eiler Rasmussen (1962, p. 33). The following section shifts its attention to the important task of mapping subjective architectural experience. In order to conduct an extensive analysis of people's subjective experiences from the data found in Julio Bermudez's "extraordinary architectural experiences" (EAEs) survey database, it was necessary to select three distinct sets of questions for each one of Jones' ritual contexts. To accomplish this task, a series of statistical tests were performed to determine the strength of the relationship between survey questions and their relationships with one another. The first stage of statistical tests analyzed groups of EAE survey questions as they were defined by Jones' hermeneutical interpretations for ritual contexts (Table 1). The second stage of testing involved combining

groups of EAE survey questions based strictly from their statistical relationships to each other using Chi-Square tests of significance. The last stage was a combination between the first and second stages and grouped EAE survey questions based on both Jones' hermeneutical interpretations as well as the Chi-Square statistical relationships. These three stages of statistical testing will be discussed in more detail below (Table 2).

Table 1. Experiential descriptor words for Jones' ritual contexts and their respective subcategories.

ID Tag	Category	General Definitions and Experiential Descriptions
III-A	**Theatre**	**"Sacred architecture that provides a stage setting or backdrop for ritual performance".**
III-A-1	Solicit Involvement	*invites, cajoles, forces participation; inclusive, appeals to emotion, stimulation of senses, show, spectacle, ostentation, pomp and panache, shock, seduction, amazement, stationary stages, ambulatory actors, stationary audiences, ambulatory audiences, communal, enjoyable, delightful, satisfaction, pleasurable, gratifying, embodied, weeping, surprise, suddenness, spontaneity*
III-A-2	Ambiance/ Ritual Drama	*atmosphere, stage, environment, ceremonies, ritual performance, enhance quality of knowledge, arrangements, processions, choreography, ritualistic, graceful (form, dance)*
III-B	**Contemplation**	**"Sacred architecture that serves as a prop or focus for meditation or devotion"**
III-B-1	Assisted Meditation	*features assist meditation, concentration, introspection, awareness, alertness; focal point, direct focus, configurations, elements that serve as supports, guides, maps to devotional experience; pilgrimage may lead to contemplation and spiritual growth; hopeful enthusiasm of expectations; individualistic and idiosyncratic motivations; exclusive and esoteric participation (educated, trained, elite, monks, mystics); inclusive and popular participation (unschooled, unlettered, untrained)- stained-glass, narrative murals, sculpture,* etc., *graceful, joy, profundity*
III-B-2	Intellectual Messages	*features, ornament, décor that communicates messages or meanings; commemorative, timeless meanings (sermons in stone, glass); messages may be highly rarified, cerebral, and abstract (metaphysical insights), or plainly educative and didactic (storiological reliefs); presentation can be elaborate, complex, abstract (floral, geometric patterns); elaborate, complex, representational (events in paintings, statues, stained glass); plain (Zen gardens); natural (rocks, waterfalls); accidental (scratches on floor, water stains); symbolism; filtered light; enhanced understanding, comprehension, ability to grasp abstract/immaterial*
III-D	**Sanctuary**	**"Sacred architecture that provides a refuge of purity, sacrality, or perfection".**
III-D-1	Sanctified Refuge	*sanctified place, retreat, refuge; natural sanctuaries (caves, mountains); preparatory sanctification, cleansing, purification of buildings, participants; peace*
III-D-2	Restricting Access/Place of Solitude	*restrict access, solitude, withdrawal, isolation, segregation, separateness, perfection, purity, ageless, archaic, timeless, eternal sacredness; enhancement of mental concentration, alertness, awareness—meditation, prayer; accommodate reenactment of ritual dramas; privileged access, highly restricted; rejection of world, society, a retreat, refuge (massiveness, protective, fortress, enclosure); exemplary model for society (monasteries); insiders* vs. *outsiders; socioeconomic or socioreligious boundaries; hierarchies of holiness; silence, introspection, order, beauty, paradise, sublime, spiritual, reverence; void of distractions/worldly*

Table 2. Summary of the findings from the three stages of statistical testing that were used to link EAE survey questions to Jones' morphological categories. The table outlines the quantity of EAE questions found in each ritual context during the testing period and the percentage of Chi-Square correlations for each category.

ID Tag	Category	Stage 1: EAEs Based on Jones' Hermeneutics		Stage 2: EAEs Based on Chi-Square Tests		Stage 3: EAEs Based on Hermeneutics + Chi-Square Tests	
		Quantity of EAE Questions	Chi-Square Correlations	Quantity of EAE Questions	Chi-Square Correlations	Quantity of EAE Questions	Chi-Square Correlations
III-A	Theatre	12	66%	18	71%	17	77%
III-B	Contemplation	12	48%	5	47%	16	71%
III-D	Sanctuary	12	50%	11	49%	16	70%

2.2.1. Stage 1: EAEs Based on Jones' Hermeneutics

In the first stage of statistical analysis, the experiential qualities and characteristics for each of Jones' three categories for ritual contexts were explored in depth. Part of the analysis included a literature review for each ritual context category based on Jones' claims. This resulted in gathering a series of experiential descriptor words that can be seen in Table 1. Each of the experiential terms and descriptive words were compared to Bermudez's survey questions and responses. For instance, question 4 asked respondents whether the arousal of their extraordinary experience in architecture was either sudden or gradual. Based on Jones' experiential definitions, a sudden arousal would indicate that a more theatrical ritual context was used. On the other hand, a more gradual experience conveys the use of a sanctuary-like ritual context. This comparative procedure resulted in twelve (12) EAE questions under theatre, twelve (12) in sanctuary, and twelve (12) in contemplation (Table 2). Naturally at this point, one is led to ask: How are all of the responses between the EAE questions in the theatre group interrelated to each other? Is there a positive correlation making the selection of the group of questions more reliable and valid?

Consequently, each set of EAE questions for Jones' three ritual contexts were then tested individually to look at the question to question (i.e., variable to variable) correlations. Thus, stage one used Pearson's Chi-Square test for independence and set a probability value (p-value) of 0.05 (i.e., 95% confidence rating) as significant for this study (Agresti and Finlay 1997, pp. 223–28). The null hypothesis for each test was that EAE questions that fall under the same ritual-architectural category, such as theatre, should be related to each other. Therefore, if the p-value is greater than 0.05 then the null hypothesis between those two questions/variables is rejected. In other words, if the p-value is less than 0.05 then there is a 95% chance or above that there is a positive correlation between the two questions being studied. After performing these tests for each of the three groups, several findings emerge. Two-thirds (66%) of the total possible relationships for EAE questions under the theatre category, for instance, proved to have a positive correlation. On the other hand, the contemplation category had correlations for nearly half (48%) of its EAE questions; meanwhile, the sanctuary category received only slightly higher correlations (50%) as outlined in Table 2. The second stage of tests attempted at looking solely at the relationships between the questions themselves from the Chi-Square tests in order to create the best-case scenario.

2.2.2. Stage 2: EAEs Based on Chi-Square Tests for Independence

The second stage of statistical analysis attempted to ignore Jones' original hermeneutical descriptions of experience and analyze the EAE survey questions based solely on their statistical relationships to each other. After moving EAE questions into new groupings (Table 2), theatre ended up with eighteen (18), contemplation with five (5), and sanctuary with eleven (11). This led the research endeavor to once again ask the following questions: How are all of the responses between the EAE questions in the ritual context groups interrelated to each other? Is there a positive correlation between the questions that confirms the reliability and validity of the grouping of survey questions?

Despite the differences in the quantity of questions assigned to each group from stage one, the percentages of the total positive relationships are similar to the previous ones. For instance, theatre received just over two-thirds (71%), contemplation had almost half (47%), and sanctuary ended with approximately half (49%). These findings can be seen in Table 2. Both the disproportionate number of EAE questions for each ritual context and the total low percentages of positive correlations between questions within each group set led me to undergo a third stage of statistical tests.

2.2.3. Stage 3: EAEs Based on Combined Hermeneutics and Chi-Square Tests

The third and final stage of statistical analysis involved combining the findings from the first stage of testing with Jones' hermeneutical descriptions of experience and the second stage's Chi-Square tests for independence. The goal of this last stage of testing was to create the best-case scenario that offered both a balanced grouping of EAE survey questions for

each of the three ritual contexts and possessed a percentage of at least 70% or above for the total positive relationships between the questions within each group.

After combining the previous two stages and moving EAE questions into a final group set, theatre ended up with seventeen (17), contemplation with sixteen (16), and sanctuary with sixteen (16). At this point, the following questions were asked: How are all of the responses between the EAE questions in the ritual context groups interrelated to each other? Is there a positive correlation between the questions that confirms the reliability and validity of the grouping of survey questions and what is the total percentage?

The efforts undertaken in this last stage of testing proved to be successful by increasing the percentage of positive correlations between EAE survey questions within each group. Theatre EAE questions, for example, received correlations for more than three-fourths of all possibilities (77%). The contemplation group ended with over two-thirds (71%) with sanctuary close behind (70%). Since each of the groups has a percentage of at least 70% or above, the statistical validity has greatly been improved (see Table 2). The final three correlation statistical matrices for EAE questions under the theatre, contemplation, and sanctuary ritual contexts can be seen in the Appendix A (Tables A1–A3).

2.3. Mapping Architecture's Objective Built Conditions: Linking Graphical Analysis to Jones' Morphological Categories

For Spiro Kostof, "Architecture . . . is nothing more and nothing less than the gift of making places for some human purpose" (Kostof and Castillo 1995, p. 12). Yet, in order to gain a holistic view of any piece of architecture, "the material aspect of every building should be looked at in its entirety" (Kostof and Castillo 1995, p. 8). This next section shifts its focus from the subjective architectural experience to the equally important task of mapping architecture's objective built conditions.

2.3.1. Implications of Jones' Framework for Evidence-Based Research and Design

In order to utilize Lindsay Jones' categories to interpret and graphically analyze the objective built conditions of sacred architecture, one must first understand his original intentions in designing his categorical framework. For Jones, interpretive hermeneutical comparison promises to help researchers and designers "to give serious consideration to versions of the interrelations between built forms, ritual processes, and human experiences" so that he or she is provided with "points of departure for endlessly diversified avenues of interpreting (and making) architecture" (Jones 2000, vol. 2, pp. 295, XXIII). Jones cautiously hints at the provocative idea that architects may be able to use his categorical framework during the design process to improve the experience of sacred spaces (Jones 2000, vol. 2, pp. XV–XIV, 5, 11, 295). The potential promise of Jones' conceptual model for designers is one reason why his scholarship is of great importance for the current study. In fact, Jones' framework has opened up the opportunity for researchers and designers to (re)evaluate evidence-based design for sacred architecture by comparing experience against built conditions. In the words of Jones, the framework is meant to be "an odd sort of manual, sourcebook, or map" with which students of architecture and religion are encouraged "to work, construct, and experiment in whatever ways suit their own purposes" (Jones 2000, vol. 2, pp. XV–XIV). As an architect, educator, and researcher, I find Jones' work beckoning me to explore its possibilities within the evidence-based design process.

2.3.2. Jones' Categories as a Quantitative Tool

Evidence-based design has a strong focus on data that can be quantified and has some level of statistical validity and scientific rigor. But is such an empirical approach to research compatible with Jones' conceptual model with its "ritual-architectural priorities"? If so, how can his categories be utilized as part of a quantitative tool? When explaining his morphological agendum, Jones cautions about using his framework as a "quantitative procedure" (Jones 2000, p. 2:9). He explains his design intentions in these words: "Instead of fashioning checklists of yes's and no's, the hermeneutical interrogational process should, in

every case, entail discussing how and to what extent each of the types of ritual-architectural priorities is pertinent" (Jones 2000, p. 2:9).

While there is some value in simply responding with a simple "yes" or "no" as to whether one of Jones' categories is present in a specific case study, there is more value when an assessment asks just "how and to what extent" that category manifests itself. For instance, in Nader Ardalan's (1980) study on the visual language of symbolic form for Islamic architecture he analyzed a series of mosques from around the globe. In his study, he first assessed whether a particular generic form, such as a dome or courtyard, existed in the case study. Then, he assessed the strength of its presence and labeled it as having either a strong or medium emphasis. The assessment of the architectural feature was then converted into a point system, whereby percentages of the total possible points were derived. This procedure, while a preliminary attempt at quantifying the generic forms of mosque architecture, follows Jones' suggestion of "how and to what extent" is something relevant.

Another useful precedent is M. Alan Overstreet's study titled "Temple Typology: Analysis and Adaptation of 'What Is a Temple? A Preliminary Typology;' an Article by John Lundquist". In this paper, Overstreet uses another scholar's list of architectural categories or motifs—identified formally as a temple typology—to analyze 46 buildings and archaeological sites. Similar to Ardalan's study, Overstreet quantifies the presence of each motif in a "yes" or "no" fashion and then converts it into a point system with percentages that are retrieved from the total points possible (Overstreet 1992, pp. 10–27, 33–51). Both studies demonstrate how Jones' "morphology of ritual-architectural priorities" could be used to as a quantitative tool to assess the built (objective) conditions for specific cases of sacred architecture.

2.3.3. The Cross-Tabulation Matrix and Definitions for Graphical Analysis

To objectively analyze each case study and quantify the results, a cross-tabulation matrix for graphical analysis was produced. The overarching objective for the graphical analysis was to capture the built conditions starting at a macro urban scale and narrowing down on the micro scale of architectural features or furniture. Thus, the focus of the categories is to look at the environmental setting as well as architectural form and space. Within each of the three key areas there are a total of thirteen subcategory areas of focus. First, under the environment scope the subcategories of analysis include urban, site, and landscape. For the analysis of architectural form, the issues shift their focus on the shell, exterior details, and structure. Lastly, architectural space is analyzed in terms of core, ritual, organization, light, acoustics, interior details, and furnishings. Table 3 provides a summary of the graphical analysis matrix terms with abbreviated identification (ID) tags. Expanded definitions of the terms will be explored below.

Table 3. Category definitions and key concepts for performing graphical analysis. Researchers begin their analysis at the macro environmental scale, work their way to the building's exterior form, and finish with the interior spatial conditions.

ID Tag	Category	Key Concepts
ENV	**Environment**	
UR	Urban	Hierarchy, Scale, Macro/Broader Context, Visibility/Prominence
ST	Site	Micro/Immediate Context, Approach, Orientation, Building Placement on Site
LA	Landscape	Terrain/Topography, Natural Features, Controlled Elements, Nature as Backdrop, Vegetation/Water

Table 3. *Cont.*

ID Tag	Category	Key Concepts
FRM	**Form**	
SH	Shell	Silhouette/Outline, Massing, Façade Geometry, Openings/Fenestrations, Proportions
ED	Exterior Details	Fixed Ornament, Non-Structural Elements, Texture/Materials, Sculpture, Painting
ST	Structure	Grid, Additive/Subtractive, Columns, Buttresses, Planes, Walls
SPC	**Space**	
CR	Core	Volume/Proportions, Overhead Planes, Spatial Geometry
RT	Ritual	Program Distribution, Public/Private, Sacred/Profane, Ritual/Non-Ritual
OR	Organization	Path/Narrative, Circulation, Spatial Sequence, Transitions/Thresholds, Progression/Gradation, Elevated Planes/Levels
LT	Light	Daylight Factor/Levels, Filtered Light (Colors), Solstice/Equinox, Qualities
AC	Acoustics	Sound Reverberation, Noise Control, Sound Absorption, Music Performance, Sound Distribution/Diffusion
ID	Interior Details	Non-Structural Elements, Fixed Ornament, Floor Paving, Ceiling Décor, Sculpture, Painting, Art, Texture/Materials, Rood Screens/Rails, Curtains/Veils
FN	Furniture	Moveable Elements, Fixed Features, Chairs, Altars, Benches, Pulpit, Lectern

Environment. An important aspect for any study of architecture is to take into consideration the environmental setting of the building. Spiro Kostof suggests that "the building should be thought of in a broader physical framework and not just in terms of itself" (Kostof and Castillo 1995, p. 8). In other words, a building is not an isolated object in space; it is part of a larger physical setting. The environment, therefore, is the setting for architecture. In this study, the environmental setting will be analyzed in terms of a building's macro and micro contexts. This includes the larger urban setting, site specific conditions, and the natural landscape with its geographical features. These three variables will help paint a picture of both the macro and micro environmental setting.

- *Urban*—For this study, the urban environmental setting focuses its attention on the macro context. Is the building located in a city, town, suburb, village, or rural countryside? How does the building fit into the larger urban fabric or city masterplan? Does the placement or scale provide a sense of hierarchy, visibility, or prominence? Or does the building blend into its surroundings as if it were intentionally hidden? These are important questions to ask when analyzing the urban environment.
- *Site*—The criteria for analyzing the actual site for a case study includes the immediate-micro context or surroundings. One must pay attention to the way that the building interacts with other buildings and/or with nature (Kostof and Castillo 1995, p. 8). Meanwhile, the building's actual placement on the site in terms of location, approach, and orientation are also important factors to consider.
- *Landscape*—When analyzing a case study, it is important to place it "within the broader context of physical and sacred features of the landscape", writes Johan Reinhard (2007, p. 139). For instance, one should pay attention to geographical features such as the terrain or topography of the site as well as adjacent mountains, hills, valleys, or caves. Likewise, the presence of vegetation, gardens, or other natural aquatic elements (especially lakes, rivers, or springs) should be studied. In each case, one should analyze how the landscape is controlled and/or used as a backdrop.

Form. Architectural form, according to Francis Ching, is comprised of "both internal structure and external outline and the principle that gives unity to the whole" (Ching 1996, p. 34). For our purposes in this study, form is defined by three elements: shell, exterior details, and structure.

- *Shell*—In order to gain a holistic view of any piece of architecture, "the material aspect of every building should be looked at in its entirety" (Kostof and Castillo 1995, p. 8). Analyzing the shell of a building is an important part of the process, since it refers to the external form and enclosure-like appearance. It is often the protective element that shields from the elements but also encompasses the silhouette or outline of a building. The shell can be thought of as massing and can be studied by analyzing the façade geometry or proportions as well as the openings or fenestrations.
- *Exterior Details*—Prior to Modernism and the "radical aesthetic purism" demanded by Adolf Loos in his 1908 manifesto "Ornament and Crime" (Conrads 1971, pp. 19–24), architectural forms were often adorned with various types of exterior details known as ornament. One source defines ornament as the "embellishment or adornment that is not structurally essential though it may affect the form of a building and either emphasize or disguise structural elements" (Fleming et al. 1999, p. 414). Sometimes the details, especially those on religious structures, can have "symbolic significance". Any exterior architectural features must be taken into consideration since Jones' framework suggests that messages can be communicated even if the original meaning is lost. "The art of ornamentation, therefore, stands in intimate relationship with material, purpose, form, and style" (Speltz 1959, p. 1). For this study, therefore, exterior details can comprise fixed ornament, non-structural elements, textures, color, materials, and sculpture or painting.
- *Structure*—Structure is the skeleton of a building which enables it to remain standing. According to Roger Clark and Michael Pause, "structure is columnar, planar, or a combination of these" and can be composed of "columns, walls and beams". Each of these elements "can be thought of in terms of the concepts of frequency, pattern, simplicity, regularity, randomness, and complexity" (Clark and Pause 2005, p. 3). Thus, for this study structure is analyzed by its additive or subtractive qualities as well as the organization of columns, walls, planes, buttresses, etc.

Space. While architectural form focuses on the exterior of a building, architectural space turns its attention to the interior. Ching defines space as a "three-dimensional field in which objects and events occur and have relative position and direction" (Ching 1996, p. 382). For the present study, architectural space is defined by seven elements. This includes an analysis of the core, ritual, organization, lighting, acoustics, interior details, and furnishings. A brief definition of each subcategory follows:

- *Core*—The inverse of a building's external form is its internal space. It is a void or "three-dimensional field" that is defined by boundaries such as walls and overhead planes. The core can be analyzed by its spatial geometry, proportions, and/or volume.
- *Ritual*—Ritual has a functional quality for religious architecture because it serves as a programmatic requirement informing the spatial needs of a particular design. As Spiro Kostof explains: "Ritual may be said to be the poetry of function: insofar as a building is shaped by ritual it does not simply house function, it comments on it" (Kostof and Castillo 1995, p. 19). Within each architectural space there is a certain type of "ritual context" that varies from religion to religion and building to building. Some architectural configurations, according to Jones, are "inclusive ritual contexts, designed in large part to beckon and entice even reticent, reluctant spectators into involvement", while others are more exclusionary and "restrict access, isolating the ritual proceedings both from the prosaic surroundings and from some other-than-elect constituency" (Jones 2000, vol. 2, p. 186). For the graphical analysis of buildings within this framework, ritual will look at program distribution, such as boundaries and

separations between public and private, sacred and profane, or ritual and non-ritual spaces (Hamilton and Watkins 2009, pp. 167–69).

- *Organization*—Path or procession through religious space is an important part of architectural experience within evidence-based design (Hamilton and Watkins 2009, p. 169). Researchers should pay attention to transitions or thresholds between rooms that signify some type of progression or gradation in space. Often this can appear subtly in the form of elevated horizontal planes or levels. Does the path tell a story through its spatial sequence? Does the experience ascend upwards or descend downwards? Does the path progress inwards, outwards, or circumambulate? Each question should be carefully evaluated for the case study at hand.
- *Light*—An important component of evidence-based design for religious buildings is lighting (Hamilton and Watkins 2009, pp. 165–67). Whether light comes from artificial sources or natural daylight, it is an essential component that allows architectural form or space to be visually experienced and perceived. As Le Corbusier explains, "Architecture is the masterly, correct and magnificent play of masses brought together in light" (Corbusier 1970, p. 16). Often in religious spaces, however, there is a preference for natural light. Louis Kahn suggests that "natural light is the only light, because it has mood—it provides a ground of common agreement for man—it puts us in touch with the eternal" (Hamilton and Watkins 2009, p. 167). For this study, the analysis of light includes daylight factors and lighting levels (Stein et al. 2006, pp. 459–516, 579–617). It also includes the integration of solar phenomena (alignment to solstices/equinoxes) and qualities of direct or filtered light.
- *Acoustics*—Acoustics play an important category within evidence-based design for religious spaces because they "can be a powerful tool in creating the desired impact on the believer", writes Hamilton and Watkins (2009, pp. 171–73). Acoustics have a large impact on people because they are an important sensorial quality within the experience of architecture. Peter Zumthor writes, "Listen! Interiors are like large instruments, collecting sound, amplifying it and transmitting it elsewhere" (Zumthor 2006, p. 29). Spatial geometry, materials, building placement and orientation are all variables that must be addressed in the design of sacred spaces. Within Jones' three categories for ritual contexts, each setting demands some level of acoustic performance. A building under the sanctuary category, for instance, would carefully site the structure in a location with low levels of exterior noise or provide a protective noise barrier to protect the internal acoustic ambiance. For theatrical performance, however, the building may emphasize sound reverberation and distribution for musical performance. As such, key design and analysis concepts include looking at noise control and absorption, music performance, sound reverberation, or sound distribution and diffusion (Stein et al. 2006, pp. 727–852).
- *Interior Details*—Interior details, just as exterior details, have often been neglected by Modernist influenced architectural discourse. As similarly defined earlier, interior details are "an embellishment or adornment that is not structurally essential" (Fleming et al. 1999, p. 414). For our purposes in the study of sacred spaces, interior details comprise non-structural elements such as fixed ornament, floor paving patterns, ceiling décor, sculpture, painting, art, art glass, textiles, and other types of texture or materiality. Some more specific features include screens, rails, curtains, and veils.
- *Furniture*—Lastly, furniture plays an important part within the study of sacred spaces. In general, furniture can be defined as either moveable or fixed elements such as chairs, benches, altars, pulpits, lecterns, etc.

2.4. Protocol for Selecting Case Studies from the EAE Survey Database

There are a number of excellent examples of sacred spaces from around the world that are known for their ability to facilitate transformative experiences. Many of the buildings that are reported to produce such "extraordinary architectural experiences" are found in Bermudez's survey database. These include the Sagrada Familia in Barcelona, the Pantheon

in Rome, St. Peter's Basilica, and the French cathedrals of Notre Dame and Chartres to name a few. In order to narrow the selection of a case study for this project, it was appropriate to select a case study that scored in the top ten most cited buildings said to induce "extraordinary architectural experiences" (Bermudez 2009). When asked to name the building or place that caused their extraordinary experience, some respondents in Bermudez's survey listed more than one building. In these cases, it would be difficult to determine which building a respondent's EAE was referring to when filling out the survey. As outlined in previous studies (Bermudez and Ro 2012, p. 690; 2013, p. 92), each of the top religious buildings had to comply with one of the following rules in order for a respondent's survey entry to be considered in a dataset:

- *Rule 1*: Keep survey entry if there is only one religious building cited in Question 3 as the sole place where the EAE occurred. While survey Question 3 asked respondents to "name the building or place that elicited such an extraordinary experience", many named more than one building where they had encountered an EAE. Such a response would cause it to be rejected from the dataset unless it could meet one of the subsequent rules.
- *Rule 2*: Keep the survey entry if there is an experiential account in Question 29 that affirms that the EAE corresponds to the case study even if it was not named or multiple buildings were named in Question 3.
- *Rule 3*: Keep the survey response if there is an experiential account in Question 30 that affirms that the EAE corresponds to the case study even if it was not named or multiple buildings were named in Question 3 or 29. Although similar to Question 29 and rule 2, Question 30 gave respondents a further opportunity to share additional comments or recollections of their EAE.

After the application of the above set of rules, the number of survey respondent entries for both quantitative and qualitative data was substantial enough for analysis for several of the top ten most cited religious buildings. The Pantheon in Rome, for instance, resulted in twenty EAE quantitative survey responses available for analysis (n = 20). A total of thirteen of the twenty responses also included qualitative narratives substantiating the evidence of their EAE (Figure 3).

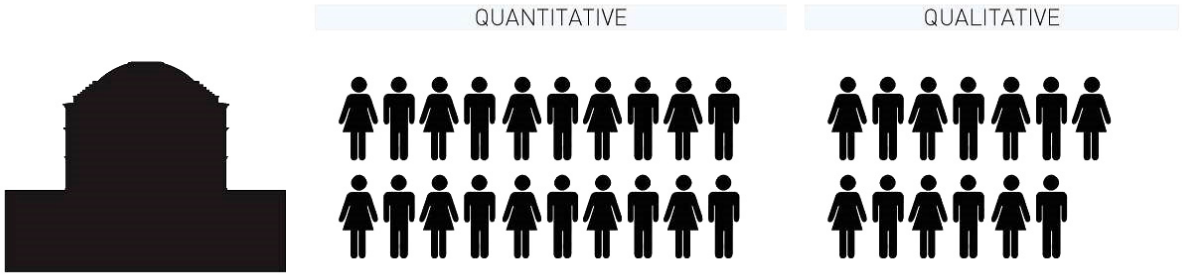


Figure 3. Graphical overview of available EAE survey responses deemed appropriate to include in the dataset for the Pantheon in Rome. This included both quantitative and qualitative data.

2.5. Applying the Comparative Framework to Evaluate Transformative Experiences in Ritual Contexts

2.5.1. The "How To" Guide for Analyzing EAE Survey Responses

After case studies have been selected, researchers must begin the subjective side of the comparative framework by extracting experiential accounts for the buildings themselves. A series of rules, as outlined above, are used to assure that the extracted survey data holds a high level of statistical validity. However, after the data has been extracted for a specific building, the next step is to take each of the EAE questions within a ritual context group and then compile the percentages of people's actual experiences in a table. These tables are compared against the objective architectural analyses for the built conditions under that

same ritual context. The success of the comparative framework, therefore, will be revealed in its ability to link human experience to architectural conditions.

2.5.2. The "How To" Guide for Graphical Analysis

How does a researcher or designer begin the process of using the cross-tabulation matrix for graphically analyzing a building? The process of graphically analyzing a building or site must first begin by choosing one of Lindsay Jones' "ritual-architectural priorities" to center one's attention. For the purposes of this study, the choices have been narrowed down from thirty-three (33) to just six (6) subcategories that cover three (3) ritual contexts. After choosing a ritual context, such as "theatre", and a subcategory, such as "solicit involvement", one would then work her or his way through each of the thirteen (13) architectural analysis categories going from macro to micro scale. The researcher must ask whether the subcategory is present for each architectural category within the cross-tabulation matrix. The procedure becomes a dialogue between the researcher and the building. It can be likened to the idea of reading between the lines to enrich one's interpretation—a mode of hermeneutical interrogation.

In general, each case study should ask the six (6) questions outlined in Table 4 for each one of the 13 architectural categories. If a "yes" is answered in any of the questions, then graphical analysis will be performed in that particular architectural category. Thus, if the subcategory is present, the researcher must then ask how and to what extent is the priority manifested in that architectural category (Figure 4). If there is a strong emphasis on the area it should be rated as two (2) points, meanwhile if it is a medium emphasis then it is one (1) point. If the subcategory does not exist, then it becomes a zero (0). In the end, the thirteen (13) architectural categories have a total of twenty-six (26) possible points. If the building scores under that number, then it is divided by the total possible points to derive a percentage.

Table 4. Six questions for researchers to ask for Jones' ritual contexts during graphical analysis for a particular case study.

ID Tag	Category	General Definitions and Experiential Descriptions
III-A	**Theatre**	**"Sacred architecture that provides a stage setting or backdrop for ritual performance".**
III-A-1	Solicit Involvement	*ALLUREMENT: Does the design invite or encourage people to participate in architectural events by promoting inclusivity? If "yes", how and to what extent?*
III-A-2	Ambiance/Ritual Drama	*MESSAGES: Does the design provide an atmosphere or stage for ritual performance, thus causing the architecture to take a back seat and function in an indirect way? If "yes", how and to what extent?*
III-B	**Contemplation**	**"Sacred architecture that serves as a prop or focus for meditation or devotion"**
III-B-1	Assisted Meditation	*ALLUREMENT: Does the design promote inclusivity or exclusivity by directly using the architecture to enhance one's concentration or meditation? If "yes", how and to what extent?*
III-B-2	Intellectual Messages	*MESSAGES: Does the architecture or features directly act as an object of devotion that communicates messages or meaning? If "yes", how and to what extent?*
III-D	**Sanctuary**	**"Sacred architecture that provides a refuge of purity, sacrality, or perfection".**
III-D-1	Sanctified Refuge	*ALLUREMENT: Does the design promote exclusivity by restricting access as an effort to maintain its sanctity or separateness? If "yes", how and to what extent?*
III-D-2	Restricting Access/ Place of Solitude	*MESSAGES: Does the indirect nature of the design act as a backdrop communicating messages of solitude, retreat, perfection, and/or refuge? If "yes", how and to what extent?*

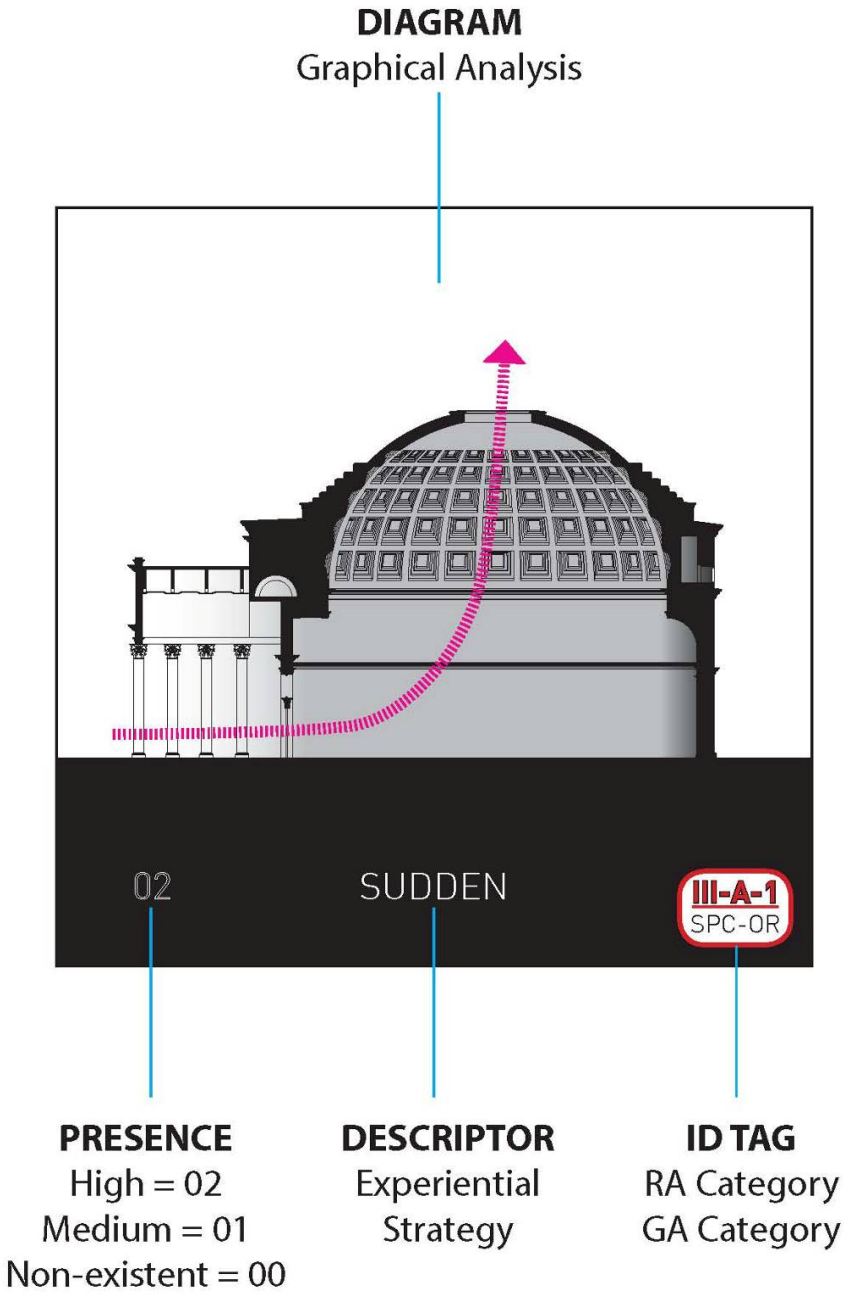


Figure 4. Overview of graphical analysis coding procedure. The number on the bottom left of the diagram designates how present a particular category is for the case study. The bottom middle section is a descriptor word describing the experiential strategy. The ID Tag on the lower right corner corresponds to Jones' "morphology of ritual-architectural priorities" (RA), such as the "solicit involvement theatre" (III-A-1) category. The number underneath pertains to the "graphic analysis" (GA) categories, such as "Space" (SPC) and "Organization" (OR).

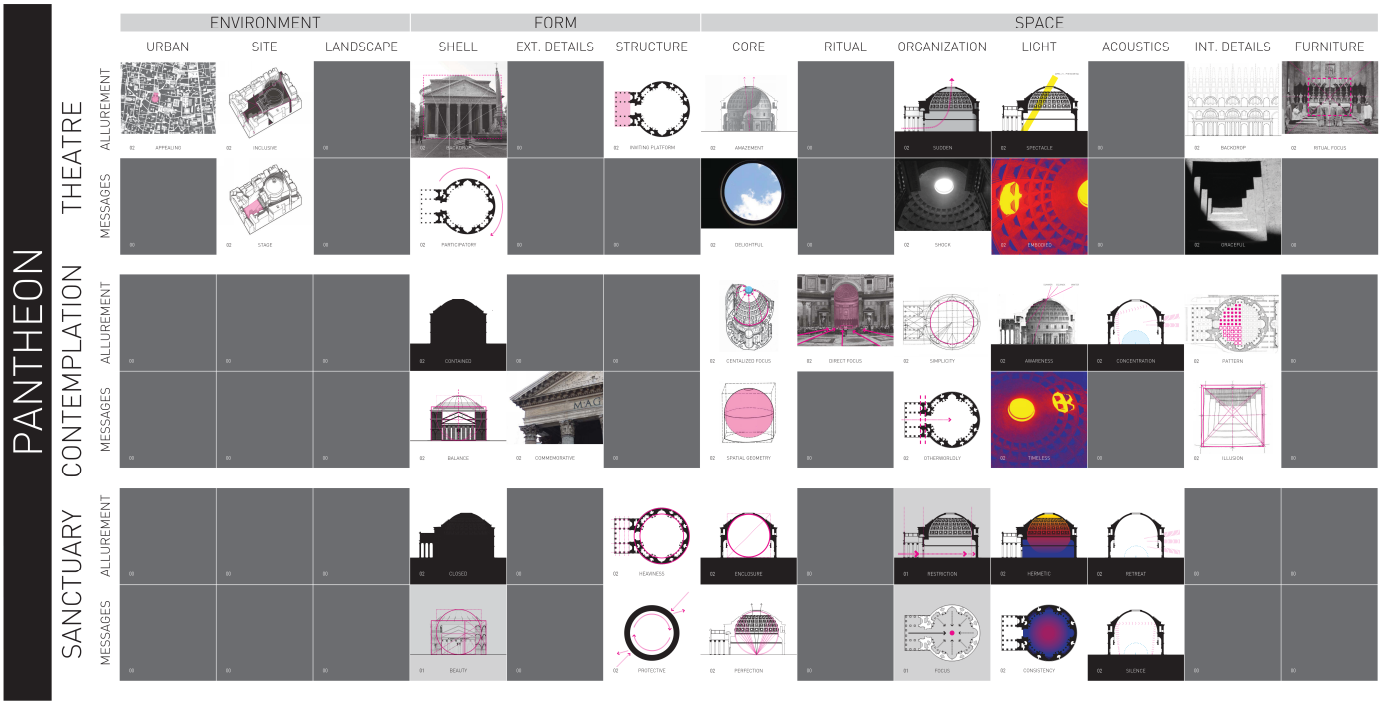
3. Results of Analyzing the Pantheon's Ritual Context and Extraordinary Architectural Experience

After setting up an extensive comparative framework that bridges the gap between Lindsay Jones' conceptual model for interpreting sacred architecture and Julio Bermudez's survey database for "extraordinary architectural experiences", it is time to test the model against the Pantheon in Rome. This section presents the results of graphically analyzing the Pantheon's environment against Jones' three ritual contexts. It also reviews the findings

from the subjective accounts of EAE survey respondents who actually reported having a transformative event at the Pantheon.

3.1. The Objective Graphic Analysis of the Pantheon

The objective graphic architectural analysis of the Pantheon, as seen in Figure 5, revealed several important findings. Based on Jones' definitions for ritual contexts, the Pantheon's ritual-architectural priorities ranked theatre first (58%), contemplation second (50%), and sanctuary third (40%).



NUMERICAL BREAKDOWN OF GRAPHICAL ANALYSES

Jones' Ritual Architectural Priorities			Environment			Form			Space							Summary	
Category	ID Tag	Subcategory	Urban	Site	Landscape	Shell	Ext. Details	Structure	Core	Ritual	Organization	Light	Acoustics	Int. Details	Furniture	Total Points	Percentage
CASE STUDY: The Pantheon																	
Theatre	III-A-1	Solicit Involvement	2	2	0	2	0	2	2	0	2	2	0	2	2	18	**69%**
	III-A-2	Ambiance / Ritual Drama	0	2	0	2	0	0	2	0	2	2	0	2	0	12	**46%**
Contemplation	III-B-1	Assisted Meditation	0	0	0	2	0	0	2	2	2	2	2	2	0	14	**54%**
	III-B-2	Intellectual Messages	0	0	0	2	2	0	2	0	2	2	0	2	0	12	**46%**
Sanctuary	III-D-1	Sanctified Refuge	0	0	0	2	0	2	2	0	1	2	2	0	0	11	**42%**
	III-D-2	Restricting Access / Solitude	0	0	0	1	0	2	2	0	1	2	2	0	0	10	**38%**

KEY: 2 = Stong Emphasis; 1 = Medium Emphasis; 0 = Nonexistent / Insufficient Information

Figure 5. Graphical analysis summary for the Pantheon is provided in a matrix to help researchers quickly identify the priorities for various ritual contexts on both the macro and micro scale (**top**). A numerical breakdown of the same graphical analysis is also provided (**bottom**).

The graphic analysis revealed that the Pantheon's configuration functions first and foremost as a theatre-like environment. It significantly solicits involvement from visitors (69%). This begins with the immediate site and external form of the building. The theatricality then continues to the inside through its spatial core, organization, lighting strategy, interior details, and furnishings. On a less insistent level, it creates an ambiance and backdrop for ritual dramas mostly through its dramatic interior space (46%).

As a contemplative type environment, the Pantheon assists in meditative practices through at least half of its features (54%). This includes all of the interior related spatial qualities. Contemplative messages and meanings are also conveyed through forty-six percent (46%) of the building's external and internal features.

Although it is not as strong as the previous two types of ritual contexts, the Pantheon does function as a sanctuary. The structure does appear to function as a sanctified refuge from the city by limiting physical access to its interior through a single entrance. Just under half (42%) of the Pantheon's external and internal features promote exclusive access. Similarly, over one-third (38%) of the Pantheon's features function as an indirect backdrop to communicate sanctuary-like messages.

Strictly from a graphical analysis standpoint, nearly two-thirds (62%) of the Pantheon's ritual context is comprised of interior spatial attributes. Another half (53%) are from external form related attributes and only a couple (17%) are related to the macro environment. The interior categories for the quality of light and the spherical spatial core both ranked first in importance. Second place was the exterior shell. Coming in third was the interior spatial organization. Lastly, interior details came in fourth.

3.2. The Subjective Experiential Accounts at the Pantheon

The subjective experiential accounts derived from EAE survey data for the Pantheon also revealed important findings (Table 5). According to the grouping of EAE survey questions under Jones' three ritual contexts, the "extraordinary architectural experiences" at the Pantheon were similar to the order of the graphic analysis rankings. For instance, theatre ranked first (68%). Contemplation was second (66%), and sanctuary ranked third (49%).

The EAE survey responses revealed that the Pantheon produced theatre-like experiential qualities. For example, respondents reported that their experience was "sudden" (80%), "surprising" (65%), and "spontaneous" (80%). As one would expect from theatrical configurations per Jones' descriptions, most people characterized their experience at the Pantheon as "sensual/perceptual/physical" (75%), "vivid" (88%), "intense" (65%), and "emotional" (65%). Such intensity led to a number of "body reactions" (77%). In fact, one out of every four EAEs resulted in "weeping" (24%). Nearly two-thirds of respondents reported that one of the major outcomes of their experience at the Pantheon was "joy" (60%).

Survey respondents at the Pantheon also reported a number of contemplation related qualities. Almost all participants characterized their experience as "introspective/silent" (95%) and "nonvocal" (88%). On the other hand, very few respondents characterized their experience as "analytical/intellectual" (30%) despite it having a profound "pedagogical" (75%) impact on them. Although contemplative ritual contexts tend to be more direct as objects of devotion, very few individuals "expected" (25%) this type of profound experience. Nevertheless, many people were "aware" (89%) of their experience at the Pantheon. While only one-third said one of the outcomes of their EAE was "knowledge" (30%), more than half reported gaining "insight" (55%). Overall, nearly all visitors claimed their experience was "profound" (95%) and made a lasting "impression on their memory" (95%).

Lastly, the experience at the Pantheon was said to produce several sanctuary-like qualities. For instance, a small number of participants said their experience was "stable" (39%), "controllable" (41%), "personal/private" (30%), and "gradual" (20%). This is important to note since the sanctuary category is opposite of theatre. Its exclusive nature is achieved by restricting access and discouraging participation. More than half of visitors left the building feeling a sense of "peace" (55%). Likewise, nearly all became "introspective/silent" (95%) during their experience.

Table 5. Summary of the subjective experience at the Pantheon based on EAE survey data. The EAE survey question numbers are organized sequentially and charted against Jones' three ritual contexts. All percentages are based on the size of the survey group for the Pantheon discussed earlier (n = 20). Some ritual contexts use the same EAE question based on the three stage statistical methodology outlined earlier.

EAEs for the Pantheon		**Jones' Ritual Contexts**		
Q#	**EAE Variable/Characteristic**	**Theatre (T)**	**Contemplation (C)**	**Sanctuary (S)**
4.1	Sudden	80%		
4.2	Gradual			20%
5.1	Surprising	65%		
5.2	Expected		25%	
7.2	*Sensual/perceptual/physical*	75%		
7.3	*Analytical/intellectual*		30%	30%
7.4	*Emotional*	65%		65%
7.5	*Personal/private*			30%
8	Nonvocal (no talking)	88%	88%	88%
9	Weeping	24%		24%
10	Body Reactions	77%		
11	Introspective/Silent		95%	95%
12	Aware		89%	
13	Stable	39%		39%
14	Intense	65%		
15	Profound	95%	95%	
16	Vivid	88%	88%	
17	Spontaneous	80%	80%	
18	Controllable		41%	41%
19	Termination (ended at own will)	47%	47%	47%
20	Duration (under 30 min)	60%	60%	60%
21.1	*Knowledge*		30%	30%
21.2	*Insight*		55%	
21.3	*Satisfaction*			10%
21.4	*Joy (happiness)*	60%		
21.6	*Peace*			55%
22	Impression on Memory (similar or more)	95%	95%	95%
27	Pedagogical (meanings/messages)		75%	
28	Recollection (strong)	60%	60%	60%
	Average Percentages	**68%**	**66%**	**49%**

4. Discussion and Interpretation of the Pantheon's Ritual Contexts and Extraordinary Architectural Experiences

After reviewing the objective and subjective results of this study, we turn our attention to how the Pantheon's two realms can be bridged together to further our understanding of "extraordinary architectural experiences". In particular, this section looks at how the comparative framework can help us to not only evaluate, but interpret just how and to what extent the transformative experiences at the Pantheon have been effective. We will analyze the quantitative and qualitative data and results against the various architectural strategies found in Jones' ritual contexts of theatre, contemplation, and sanctuary.

4.1. The Pantheon's Ritual Context as Theatre

The design of the Pantheon emphasizes theatricality by unmistakingly soliciting involvement from its visitors. This reality is affirmed through both objective and subjective analyses which rank the priority as the most important type of ritual context. The current building is a freestanding object surrounded by narrow streets and a main plaza (Figure 6). The approach from the plaza presents visitors with an inclusive stage-like backdrop or what Spiro Kostof calls a "standard temple front" (Kostof and Castillo 1995,

p. 217). Originally, however, the pathway leading to the entry was carefully framed by "a long, colonnaded forecourt" that hid both the external form and its internal spatial geometry (Ching et al. 2011, p. 199). Despite the difference in the 2000 year old intended choreographed approach, visitors continue to be shocked by the existing architectural conditions. Once a person passes through the threshold's large bronze doors (Figure 6), there is an unavoidable surprise from the spherical spatial geometry that often turns into an unbelievable emotional response. For instance, eighty percent (80%) of survey respondents reported that the arousal of their experience was sudden while sixty-five percent (65%) claimed that it was surprising. Interestingly, another eighty percent (80%) declared that the experience was spontaneous.

Figure 6. Whether the plaza in front of the Pantheon is experienced empty in the early morning or overcrowded with tourists, the standard temple front presents a theatrical stage set (**right**). The theatricality continues as individuals approach the massive bronze entry doors (**left**). Photographs by author.

The dramatic spatial geometry of the dome and the shaft of light from its oculus are features that often compel visitors to move to the center and engage in various observations (Figure 7). These behaviors are aimed at humble attempts to "figure out" the mechanics of the ritual space. "I expected it would be impressive, but then I stepped in and as my eyes adjusted to the light and that dome opened around me I didn't see how I could do anything else with my life", writes one EAE survey respondent. "I had to lie on the floor in the center to really see and feel it", he concludes. Light acts as a sensuous material against the Pantheon's spherical stage. In fact, one's appreciation of the theatrical play of light comes from watching the sun's rays "move slowly through the space like a searchlight, illuminating one by one elements of the architectural interior" (Ching et al. 2011, p. 200). Although the Pantheon's original design intent was to choreograph the appearance of light during ancient Roman ritual-political occasions (Hannah and Magli 2011), the architectural strategy remains effective to this day. Likely in connection to the dramatic qualities of light, a large majority of respondents characterized the most important quality of their experience as "sensual/perceptual/physical" (75%). Similarly, seventy-seven percent (77%) of participants claimed to have some sort of body reactions within the walls of the Pantheon. As one participant recalls, "The real impact took place when I entered the interior, my gaze took me immediately to the shaft of light and then upward to the center of the dome. It really did take my breath away". The theatrical nature of the Pantheon's design offers

a powerful punch of experience and is likely why it is ranked first for both objective conditions and subjective responses.

Figure 7. The theatrical play of light that penetrates through the dome's central oculus helps reticent onlookers enter into a contemplative state (**left**). The contrasts between light and shadow on the cascading profiles of the ceiling coffers fix the attention of visitors (**right**). Photographs by author.

4.2. The Pantheon's Ritual Context as Contemplation

Since contemporary people can neither access the signification of the (long gone) Pagan ritual nor for the most part grasp its (un)successful Catholic adaptation, the Pantheon's mode turns into one of contemplation that points to some abstract, perhaps purely aesthetic spiritual realm, an experience that is indeed enhanced by what topologically and tectonically remains of the original theater mode of religious practice. "The experience of the space was initially powerful enough to stop me in my tracks, and remove me from the flow of time and consciousness", writes an EAE survey participant. He continues, "I would compare it to the closest possible thing to a religious experience that I have ever had". This type of experience often led to some type of abstract metaphysical message or meaning. One person's reached insight, for instance, included how the Pantheon's roof and floor metaphorically expressed "the belly of the earth beneath the dome of the sky". Other visitors found themselves gazing at the ruin-like details of column capitals as they contemplated the ancient construction techniques and the material weathering that has occurred over thousands of years (Figure 8).

Figure 8. Both exterior and interior architectural details, such as ruin-like column capitals and cornice modillions, communicate different messages and meanings to visitors. Some gaze upon the spherical spatial qualities of the dome (**right**) as others contemplate the ancient construction techniques and vestiges of material decay over thousands of years (**left**). Photographs by author.

The simple centralized and circular plan of the Pantheon, roofed by its high dome and strategically pierced sky-gazing oculus, is another means of assisting in the meditative process (Figure 7). One survey respondent explains how she became completely "transfixed" when she "looked up to the oculus" and saw a single white feather floating slowly downward "between the pull of gravity and the updraft of warm air". Another individual similarly writes of the oculus: "Seeing the rain drops in the light coming through the opening filled me with incredible awe". The simplicity of the Pantheon's space and its quiet atmosphere perform under a version of Jones' contemplative mode of presentation and were consequently one of many factors causing individuals to cease from talking (88%), leave with some level of achieved insight (55%), or receive a transformation in their understanding of architecture (95%).

4.3. The Pantheon's Ritual Context as Sanctuary

The Pantheon's heavy yet protective shell and structure help provide a unique womb-like space that is completely cut off from its surrounding urban context. Here, the sanctuary mode is at hand. Kostof even categorizes the Pantheon as "a self-enclosed, hermetic world" (Kostof and Castillo 1995, p. 252). A feeling of security, safety, refuge, and retreat accompany visitors as they leave the busy urban streets of Rome and enter through the threshold separating inside and outside. External stimuli are nearly completely cut off for visitors except for the small glimpse of the sky through the oculus in the top of the dome (Figure 9). One visitor explains their experience in these words: "Enter, and the noise of the outside world disappears, in fact the whole outside world disappears". The protection from the outside noise, the consistent uniform light levels (Fontoynont 1999, pp. 67–70), and "thoroughly ordered space" all strengthen the notion of sanctuary for visitors and convey being in another world (Kostof and Castillo 1995, p. 217). "Walking into the pungent space of the Pantheon", writes a survey respondent, "brought on a cold glare of erotic proportions". He continues, "The contrast between the heavenly light from above and the hard temperature of the space below evoked the sense of being between

two worlds. I felt like I was symbiotic with both the sky and the ground, a purgatoric spatial experience I will certainly not forget".

Figure 9. The thick walls and lack of side windows in the Pantheon help create a working sanctuary by cutting off external stimuli. Likewise, the dome possesses hermetic womb-like qualities. Photograph by author.

Some studies have shown that places of retreat, such as monasteries, often result in feelings of peace and beauty (Ouellette et al. 2005). This appears to be the case with the Pantheon, as nearly half of survey respondents left with either a sense of peace (55%) and/or beauty (50%). Sanctuary spaces are also prone to eliminate distractions and promote silence. For the Pantheon, the unrestricted access of uncountable number of visitors literally kills the sanctity, purity, and exclusivity of the spiritual refuge; nonetheless, a large percentage of respondents reported that their EAE at the Pantheon caused them to refrain from talking (88%) and become introspective or silent (95%)—a surprising finding since only one-third (30%) of individuals characterized their experience as personal and private. One visitor recalls her "extraordinary architectural experience" in these words: "I was not expecting the overwhelming sense of awe and quiet that I felt when I walked inside the space. Even with dozens of other tourists inside, the space felt oddly intimate and as close to anything ethereal that I had ever experienced in a piece of architecture". As a result of the interior spatial qualities of the Pantheon, such as lighting and acoustics, many individuals claimed that their experience was stable (39%), controllable (41%), and ended at their own will (47%). Even the optically-driven design of the ceiling coffers (Figure 9) was a means to convey a world of beauty and perfection "when viewed from the center of the floor" (Ching et al. 2011, p. 201; MacDonald 1976, p. 38; García-Salgado 2009). These types of features caused one EAE survey participant to report the following: "The beauty, symmetry, and harmony of the Pantheon was breathtaking . . . There was a deep peace, tranquility, and a feeling of sanctuary to it".

Both the graphical analysis of the objective conditions and the subjective human experiential accounts confirm the power of architectural environments to produce transformative experiences. The evidence is clear that the Pantheon offers a theatrical stage set that produces an emotionally filled experience. Likewise, the sanctuary-like atmosphere of the Pantheon is mostly devoid of its original meaning, yet it continues to produce a secluded

and intimate experience for visitors. The building also recoils into a contemplative mode of functioning that eventually leads the pilgrim into an "open" sense of spirituality through its architectural features and references.

5. Conclusions

From the analysis, it is concluded that buildings possessing a higher presence and quality of "ritual-architectural priorities" are more likely to produce transformative experiences related to various ritual contexts. In other words, the higher the presence of theatre-like spatial qualities, the more likely it will result in human experiences that are more dramatic, emotional, sudden, and embodied. Contemplative spaces, on the other hand, will result in more introspective, analytical, nonvocal, meditative, and insightful experiences. Meanwhile, sanctuary-like environments will continue to produce experiences that are gradual, controllable, peaceful, silent, personal, private, and restorative in nature.

From the Pantheon, we learn that a combination of ritual-architectural strategies induce various types of spiritual experiences when the building is used as a contemplative apparatus. Yet, the configuration is first and foremost theatrical with its appeals to the body and emotions, yet it also focuses on sanctuary-like qualities that are introspective, silent, peaceful, personal, and private. All the experiences from the EAE dataset at the Pantheon reveal that most visitors attain some type of profound contemplative state that makes a significant impression on their memory.

This is an important finding for a few reasons. First, because the contemplative dimension of sacred architecture directly refers to aesthetics, that is, to the experience of the building itself as inducing the meditative state. In other words, the building becomes the object of contemplation. Now, this mode of aesthetic contemplation generated through sacred space is not based on critical, analytical, or intellectual appraisal but rather direct, perceptual, intuitive apprehension. As such, it goes against modern and postmodern aesthetic approaches, returning us back to a pre-modern understanding of the beautiful. The power of beauty to bring forth the transcendental was taken for granted for millennia by ordinary people and philosophers alike (think of Plato, Kant, Schopenhauer, Otto, and Stolnitz).

Second and related, this finding reminds one of how absent the contemplative power of architecture is from today's functionalist, technology-oriented, sustainability obsessed, market-focused, and politically correct interests in our discipline. Perhaps our forgetting beauty has something to do with following consumerist, secular, and scientific ways to engage a world seen as devoid of spiritual nature. Good sacred buildings teach us that beautiful architecture can operate like an instrument to re-enchant our reality and re-sensitize us with our true nature.

Lastly, since there is an ever-growing amount of research in neuroscience and medicine demonstrating solid cognitive, emotional, and biological benefits coming from contemplative practice, an architecture that regularly induces contemplative states (such as the one we are talking about here) begins to chart a rationale and strategy for advocating aesthetic excellence using evidence-based design strategies.

There is confidence that the empirical tool used in the research (i.e., survey) both informed and continues to inform an existing theoretical framework (i.e., Jones' morphology) in combination with statistical and interpretive methods. This could be a helpful methodological example for advancing similar or related approaches addressing highly qualitative and/or phenomenological issues in architecture. In this sense, we find that Jones' model of interpreting sacred architecture has proven fruitful in linking subjective human experiences to the empirical objective built conditions of architecture. The research and findings in this paper should be carefully reviewed by architects—especially those who are commissioned to design sacred spaces—so that they might be able to create more extraordinary experiences of architecture that positively shape our human understanding of existence.

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Institutional Review Board Statement: The Institutional Review Board of the University of Utah (IRB_00023112; 4/17/2007) determined that the study cited in this paper by Principal Investigator Julio Bermudez is exempt, under 45 CFR 46.101(b), Category 2, from the Federal regulations governing human research. The original study was conducted in accordance with the Belmont Report.

Informed Consent Statement: Participants in the original study were provided with the required informed consent information before proceeding with the online survey. The survey instrument may be accessed online at the following link: https://www.academia.edu/28326706/Survey_of_Extraordinary_Architectural_Experiences.

Data Availability Statement: No publicly accessible raw data is available.

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Appendix A

In general: Pearson's Chi-Square test for independence considers how likely a result is due to chance. In this study, the statistical test looks at whether responses for one question are independent of the responses for another. The null hypothesis is that they are independent (i.e., no relationship exists). A Chi-Square probability value (p-value) of less than or equal to "0.05" is justification for rejecting the null hypothesis that the two variables are unrelated. In other words, a p-value of "0.05" means that there is a five percent (0.05) chance of being wrong—or that there is a 95% chance that there is a true correlation between the two variables being compared. In general, anything below "0.01" (i.e., 1%) is considered to be an excellent result (i.e., 99% confidence rating) (Agresti and Finlay 1997, pp. 223–28).

Tables A1–A3 are the results of performing Chi-Square tests for independence for EAE survey questions. The EAE survey questions were grouped per their ritual context (e.g., theatre, contemplation, sanctuary) during Stage 3 of the methodology section.

Table A1. Chi-Square test correlation matrix for "extraordinary architectural experience" (EAE) variables from Bermudez's survey database and reorganized under Jones' "theatre" category for ritual contexts. Any variable with a white background (not black) a considered a statistically significant correlation.

EAE Variable	Q#	4.1	5.1	7.2	7.4	8	9	10	13	14	15	16	17	19	20	21.4	22	28
Sudden (not gradual)	**4.1**	1.000	0.000	0.035	0.002	0.468	0.069	0.000	0.080	0.000	0.010	0.001	0.000	0.008	0.000	0.003	0.006	0.000
Surprising (not expected)	**5.1**	0.000	1.000	0.078	0.145	0.038	0.025	0.002	0.455	0.012	0.000	0.002	0.000	0.002	0.000	0.399	0.000	0.000
Sensual/perceptual/physical	**7.2**	0.035	0.078	1.000	0.004	0.319	0.902	0.000	0.511	0.000	0.028	0.000	0.001	0.069	0.015	0.027	0.006	0.095
Emotional	**7.4**	0.002	0.145	0.004	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.698	0.114	0.000	0.131	0.000	0.000	0.006
Nonvocal (no talking)	**8**	0.468	0.038	0.319	0.000	1.000	0.000	0.000	0.000	0.016	0.068	0.155	0.006	0.000	0.000	0.133	0.001	0.000
Weeping	**9**	0.069	0.025	0.902	0.000	0.000	1.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.637	0.885	0.001	0.002
Body Reactions	**10**	0.000	0.002	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.002	0.021	0.000	0.000	0.139	0.001	0.000	0.000
Stable	**13**	0.080	0.455	0.511	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.002	0.000	0.052	0.001	0.175	0.051
Intense	**14**	0.000	0.012	0.000	0.000	0.016	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.031	0.063	0.000	0.000
Profound	**15**	0.010	0.000	0.028	0.000	0.068	0.001	0.002	0.000	0.000	1.000	0.000	0.004	0.001	0.000	0.807	0.000	0.000
Vivid	**16**	0.001	0.002	0.000	0.698	0.155	0.000	0.021	0.000	0.000	0.000	1.000	0.004	0.000	0.058	0.470	0.000	0.000
Spontaneous	**17**	0.000	0.000	0.001	0.114	0.006	0.000	0.000	0.002	0.000	0.004	0.004	1.000	0.000	0.002	0.195	0.003	0.000
Termination	**19**	0.008	0.002	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	1.000	0.000	0.003	0.001	0.001
Duration	**20**	0.000	0.000	0.015	0.131	0.000	0.637	0.139	0.052	0.031	0.000	0.058	0.002	0.000	1.000	0.531	0.000	0.000
Joy	**21.4**	0.003	0.399	0.027	0.000	0.133	0.885	0.001	0.001	0.063	0.807	0.470	0.195	0.003	0.531	1.000	0.197	0.062
Impression on Memory	**22**	0.006	0.000	0.006	0.000	0.001	0.001	0.000	0.175	0.000	0.000	0.000	0.003	0.001	0.000	0.197	1.000	0.000
Recollection	**28**	0.000	0.000	0.095	0.006	0.000	0.002	0.000	0.051	0.000	0.000	0.000	0.000	0.001	0.000	0.062	0.000	1.000

Table A2. Chi-Square test correlation matrix for "extraordinary architectural experience" (EAE) variables from Bermudez's survey database and reorganized under Jones' "contemplation" category for ritual contexts. Any variable with a white background (not black) is considered a statistically significant correlation.

EAE Variable	Q#	5.2	7.3	8	11	12	15	16	17	18	19	20	21.1	21.2	22	27	28
Expected	**5.2**	1.000	0.029	0.038	0.266	0.495	0.000	0.002	0.000	0.000	0.002	0.000	0.023	0.169	0.000	0.064	0.000
Analytical/intellectual	**7.3**	0.029	1.000	0.000	0.106	0.368	0.728	0.465	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.003	0.289
Nonvocal (no talking)	**8**	0.038	0.000	1.000	0.000	0.547	0.068	0.155	0.006	0.000	0.000	0.000	0.000	0.704	0.001	0.736	0.000
Introspective/Silent	**11**	0.266	0.106	0.000	1.000	0.006	0.000	0.212	0.044	0.003	0.065	0.213	0.000	0.294	0.000	0.724	0.084
Aware	**12**	0.495	0.368	0.547	0.006	1.000	0.000	0.000	0.007	0.005	0.904	0.104	0.634	0.000	0.001	0.002	0.468
Profound	**15**	0.000	0.728	0.068	0.000	0.000	1.000	0.000	0.004	0.193	0.001	0.000	1.000	0.000	0.000	0.006	0.000
Vivid	**16**	0.002	0.465	0.155	0.212	0.000	0.000	1.000	0.004	0.001	0.000	0.058	0.620	0.008	0.000	0.559	0.000
Spontaneous	**17**	0.000	0.000	0.006	0.044	0.007	0.004	0.004	1.000	0.000	0.000	0.002	0.001	0.426	0.003	0.007	0.000
Controllable	**18**	0.000	0.000	0.000	0.003	0.005	0.193	0.001	0.000	1.000	0.000	0.001	0.000	0.141	0.000	0.191	0.001

Table A2. *Cont.*

EAE Variable	Q#	5.2	7.3	8	11	12	15	16	17	18	19	20	21.1	21.2	22	27	28
Termination	**19**	0.002	0.000	0.000	0.065	0.904	0.001	0.000	0.000	0.000	1.000	0.000	0.000	0.639	0.001	0.030	0.001
Duration	**20**	0.000	0.013	0.000	0.213	0.104	0.000	0.058	0.002	0.001	0.000	1.000	0.000	0.031	0.000	0.000	0.000
Knowledge	**21.1**	0.023	0.000	0.000	0.000	0.634	1.000	0.620	0.001	0.000	0.000	0.000	1.000	0.000	0.047	0.011	0.521
Insight	**21.2**	0.169	0.000	0.704	0.294	0.000	0.000	0.008	0.426	0.141	0.639	0.031	0.000	1.000	0.029	0.001	0.011
Impression on Memory	**22**	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.003	0.000	0.001	0.000	0.047	0.029	1.000	0.581	0.000
Pedagogical	**27**	0.064	0.003	0.736	0.724	0.002	0.006	0.559	0.007	0.191	0.030	0.000	0.011	0.001	0.581	1.000	0.070
Recollection	**28**	0.000	0.289	0.000	0.084	0.468	0.000	0.000	0.000	0.001	0.001	0.000	0.521	0.011	0.000	0.070	1.000

Table A3. Chi-Square test correlation matrix for "extraordinary architectural experience" (EAE) variables from Bermudez's survey database and reorganized under Jones' "sanctuary" category for ritual contexts. Any variable with a white background (not black) is considered a statistically significant correlation.

EAE Variable	Q#	4.2	7.3	7.4	7.5	8	9	11	13	18	19	20	21.1	21.3	21.6	22	28
Gradual	**4.2**	1.000	0.000	0.002	0.005	0.468	0.069	0.062	0.080	0.000	0.008	0.000	0.383	0.000	0.052	0.006	0.000
Analytical/intellectual	**7.3**	0.000	1.000	0.129	0.036	0.000	0.014	0.106	0.005	0.000	0.000	0.013	0.000	0.018	0.000	0.000	0.289
Emotional	**7.4**	0.002	0.129	1.000	0.000	0.000	0.000	0.109	0.000	0.000	0.000	0.131	0.012	0.092	0.001	0.000	0.006
Personal/private	**7.5**	0.005	0.036	0.000	1.000	0.000	0.004	0.000	0.466	0.245	0.685	0.147	0.116	0.443	0.000	0.036	0.734
Nonvocal (no talking)	**8**	0.468	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Weeping	**9**	0.069	0.014	0.000	0.004	0.000	1.000	0.007	0.000	0.000	0.000	0.637	0.002	0.000	0.136	0.001	0.002
Introspective/Silent	**11**	0.062	0.106	0.109	0.000	0.000	0.007	1.000	0.285	0.003	0.065	0.213	0.000	0.059	0.000	0.000	0.084
Stable	**13**	0.080	0.005	0.000	0.466	0.000	0.000	0.285	1.000	0.000	0.000	0.052	0.362	0.219	0.000	0.175	0.051
Controllable	**18**	0.000	0.000	0.000	0.245	0.000	0.000	0.003	0.000	1.000	0.000	0.001	0.000	0.000	0.363	0.000	0.001
Termination	**19**	0.008	0.000	0.000	0.685	0.000	0.000	0.065	0.000	0.000	1.000	0.000	0.000	0.023	0.728	0.001	0.001
Duration	**20**	0.000	0.013	0.131	0.147	0.000	0.637	0.213	0.052	0.001	0.000	1.000	0.000	0.691	0.071	0.000	0.000
Knowledge	**21.1**	0.383	0.000	0.012	0.116	0.000	0.002	0.000	0.362	0.000	0.000	0.000	1.000	0.401	0.000	0.047	0.521
Satisfaction	**21.3**	0.000	0.018	0.092	0.443	0.000	0.000	0.059	0.219	0.000	0.023	0.691	0.401	1.000	0.000	0.007	0.029
Peace	**21.6**	0.052	0.000	0.001	0.000	0.000	0.136	0.000	0.000	0.363	0.728	0.071	0.000	0.000	1.000	0.034	0.939
Impression on Memory	**22**	0.006	0.000	0.000	0.036	0.001	0.001	0.000	0.175	0.000	0.001	0.000	0.047	0.007	0.034	1.000	0.000
Recollection	**28**	0.000	0.289	0.006	0.734	0.000	0.002	0.084	0.051	0.001	0.001	0.000	0.521	0.029	0.939	0.000	1.000

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