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Formal aesthetic organization and architectural representation of caisson ceilings in traditional Chinese architecture

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Abstract

The caisson ceiling (*zaojing*) is a special type of recessed ceiling commonly used in imperial halls, temples, ancestral halls, and pavilions in traditional Chinese architecture. Although often treated as a decorative element and symbol, it is also a visually prominent interior feature. This work examines the architectural form and composition of caisson ceilings through representation and analysis. Five purposively chosen examples of imperial, religious, educational, ancestral, and pavilion buildings are examined through a qualitative architectural research approach that includes visual analysis, geometric abstraction, diagrammatic interpretation, and comparative analysis. Five indicators—geometry, symmetry, layering, centrality, and hierarchy—are defined using evaluative criteria and serve as the basis of the analysis. The analysis identified recurring formal characteristics, such as geometric evolution from square to polygonal or circular forms, layering, and centralization. However, the findings are taken as suggestive of, rather than conclusive evidence for, a universal architectural system. This study provides a transferable method for analyzing interior space through the composition of the ceiling and reveals the role of caisson ceilings in creating spatial emphasis and hierarchy in traditional Chinese architecture.

Keywords: Geometric transformation; Spatial hierarchy; Morphological analysis; Interior composition; Architectural representation

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1. Introduction

Traditional Chinese architecture is characterized by sophisticated structural systems, symbolic expression, and refined formal organization. One of its most striking interior features is the caisson ceiling, or *zaojing* (藻井), which is a recessed and hierarchically structured ceiling style widely used in palaces, temples, shrines, and ceremonial interiors. The caisson ceiling, with its stratified contraction of geometry, centralized composition, and highly controlled ornamental order, occupies a central position in the spatial and visual logic of traditional Chinese architecture. Surprisingly, even though it has long been regarded as an important component of historic interiors, it has often been regarded by the academic community as an ornamental or symbolic feature rather than as an architectural element with its own formal order, compositional discipline, and representational significance (Bozorgi, 2025).

Chinese timber buildings have long been a topic of research in architectural history, whereby the typology and structural systems, bracket sets, roof construction,

ritual hierarchy, and stylistic development were studied. The formal aesthetics of interior ceiling structures have received comparatively limited critical attention. However, the caisson ceiling is not an incidental feature. It exhibits geometric variation, proportional recession (Caetano *et al*., 2020), axial alignment, concentric ordering, and all of them contribute to the expression of spatial significance of the interior. These features contribute to architectural emphasis, compositional order, hierarchical concentration, and directional coherence. Close examination of the caisson ceiling thus presents a chance to learn more about architecture in the context of interior form composition, arrangement, and visual expression of traditional Chinese architecture.

This study treats caisson ceilings as objects of formal architectural analysis as opposed to the support of untested cognitive and psychological assertions. This difference is necessary. This article carried its argument into other fields such as spatial memory, visual attention, and embodied experience, although it is based on the analysis of visual and diagrammatic form (Cao & Qian, 2025). The study is solidly in the field of architectural analysis in its revised framing that has been adopted in this case. It explores that which is visible, which can be described, compared, and even interpreted out of the formal attributes of the ceilings themselves: geometry, symmetry, overlay, centralization, and hierarchy of composition.

This is a new focus that is also required when it comes to heritage theory. Caisson ceilings are visible building elements. On the one hand, they can represent the knowledge of crafts, cosmological concepts, value of rituals, and construction customs inherited, but the actual ceiling must not be naively reduced to intangible cultural heritage (Čeginskas & Lähdesmäki, 2023). Previous studies obscured this difference by addressing formal patterns and geometric results as straight transmitters of intangible heritage, which can easily provoke conceptual confusion. A more viable explanation is that caisson ceilings conserve and articulate the historically gathered architectural knowledge by way of material shape. Their value lies in built form, which represents conventionally established systems of order, proportion, and ritual highlighting. On this basis, this paper conceptualizes caisson ceilings as architectural objects, the formal structure of which can provide more general answers to questions of design logic, culture, and representational practice (Chatzigrigoriou *et al*., 2021). Chinese timber architecture has been well documented in terms of its typology, structural systems, bracket sets, and ritual hierarchy (Fu, 2017; Guo, 2005; Steinhardt, 2019).

Architectural representation offers an appropriate means of inquiry. The clarity and consistency with which architectural form can be studied are made possible by drawings, diagrammatic reconstructions, geometric abstraction, and comparative visual analysis (Silbergeld, 1987). Representation does not merely reproduce buildings; it can reveal underlying formal order. The relationships in a photograph or a historic interior that may be hidden visually by a photograph or may not be immediately apparent in a sketch can be made explicit by drawing and redrawing, and parallel relationships can be made explicit so as to be compared by scholars. The use of representation is especially beneficial when it comes to caisson ceilings (Elyasi & Yamacli, 2023), the value of which extends beyond ornamentation, but also includes the organization of the fine layers, the transformation of geometrical forms, and the accentuation of the central elements. A representation-based approach is therefore what allows the ceiling to be studied as a formal system and not as a decorative surface.

The need for such an approach is even more evident in the case when one considers the relative lack of comparative frameworks that would permit studying caisson ceilings across cases. Present discourses tend to be descriptive (Guo, 2005), historical, or iconographic. They are conscious of dynastic context, of symbolic motifs, and general stylistic features, but do not consistently provide a critical vocabulary of comparison of formal composition across ceilings. How geometric order is generated, how symmetry is directed, how recession is structured, and how focal hierarchy is built are the kinds of questions that are normally implied, and not directly studied. This article addresses this gap by proposing an analytical method for the caisson ceiling, which is in the shape of an architectural representation and critique of the aesthetic design (Liu *et al*., 2024).

This article has three closely related objectives. The first one is that it talks about the formal aesthetic structure of caisson ceilings, particularly geometry, symmetry, recession, centrality, and hierarchy. Secondly, it evaluates how architectural representation may describe and compare these formal relationships with the assistance of a number of selected examples (Murphy *et al*., 2013). Third, it also considers what the exploration of caisson ceilings can contribute to the overall idea of the interior design architecture of Chinese traditional buildings. These aims locate the paper within the framework of the history of architecture, the studies of morphology and representation, rather than either experimental cognition or the generalized heritage rhetoric (Perez-Gomez, 2016).

The study makes three contributions. It reformulates the caisson ceiling as an architectural object of serious inquiry; it identifies a representation-grounded way of

its compositional rationale, and it shows how the interior ceiling systems could provide significant insight into the Chinese traditional buildings in the shape of architectural order, ritual organization, and visual organization. The article concentrates on perceptible formalities and avoids assertions that are outside of the evidence base to give a more efficient and believable account of the caisson ceilings as the architecturally patterned, culturally meaningful, and analytically readable aspects of the Chinese built culture.

2. Data and methods

2.1. Research design

The research design applied in this study is the qualitative architectural research design, which involves formal morphological research and architectural representation. It discusses the formal aesthetic composition of the traditional Chinese caisson ceilings (zaojing) and how they contribute to interior spatial organization through geometric composition, symmetry systems, and hierarchy layering.

The caisson ceiling can be described as a traditional Chinese structure that is found to be used within architectural interiors, which resembles a nested geometric frame and ornamental structures. The ceilings are usually located in major interior locations such as imperial halls, temples, ancestral halls, and ceremonial pavilions. These ceilings are often associated with spaces of institutional, ritual, and ceremonial hierarchy (Picon, 2010).

The approach focuses on observable architectural elements like geometrical structure, regimes of symmetry, structural stratification, and centrality of composition. The analysis is therefore of the formal side of the ceilings as a building system rather than attempting to make assumptions of the psychological or cognitive response.

The methodological premise of the research comprises three methods of analysis that are complementary:

(i) Aesthetic analysis of the form, geometrical, and compositional arrangement of caisson ceilings.
(ii) Visual documentation translated into analytical diagrams that indicate the structural relationships.
(iii) Comparative case study that identifies the trends and dissimilarities among the selected cases (Steinhardt, 1986).

Together, these methods provide a framework for examining the architectural form of caisson ceilings in historical Chinese architecture.

2.2. Research workflow

The research process is divided into five steps. First, a set of case studies was identified according to specific criteria. Second, visual and architectural information were gathered from archival and published materials. Third, the visual data were represented in diagrams using architectural representation methods. Fourth, the diagrams were analyzed based on the formal indicators. Finally, the findings were compared between cases to discover compositional regularities.

2.3. Case study selection

The study used purposive sampling to select representative examples of caisson ceilings of traditional Chinese architecture. In architectural studies, purposive sampling is typically applied where a typological study and formal differentiation are the goals of the study, instead of statistical generalization. Five case studies were chosen as buildings that were historically prominent and represented various architectural situations. These are imperial ceremonial buildings, religious buildings, educational halls, ancestral halls, and pavilions. The following were the criteria used in the selection of the cases:

(i) historical value in the Chinese architectural heritage.
(ii) preservation condition with the ability to record the visual documentation reliably.
(iii) geometric clarity of the ceiling composition.
(iv) accessibility of architectural data and sources.
(v) representation of different architectural functions.

These were the criteria that ensured that the chosen examples were analytically clear and diverse in types, as in Table 1.

The chosen buildings present various setting functions but have similar architectural aspects that can be used to conduct formal analysis.

2.4. Data collection

2.4.1. Visual documentation

The primary data consisted of high-resolution interior photographs of the caisson ceiling. These pictures have been sourced from architectural archives, heritage documentation databases, academic books, and other museum resources, which are publicly available (Tables 2 and A1).

In order to make the photographs reliable, the following conditions were used to choose the photographs:

(i) orthogonal viewing orientation.
(ii) little photographic distortion.
(iii) perfect visibility of the structure layers and geometric figures.
(iv) sufficient architectural details.
(v) sufficient lighting conditions.

These criteria were intended to ensure that the graphic

Table 1. Characteristics of selected case studies

Case	Building	Location	Dynasty	Building type	Function	Ceiling geometry
C1	Hall of Supreme Harmony	Beijing	Ming (1368–1644)–Qing (1636–1912)	Imperial hall	Ceremonial	Square–octagonal–circular
C2	Foguang Temple Main Hall	Shanxi	Tang (618–907)	Buddhist temple	Religious	Square–octagonal
C3	Confucius Temple Dacheng Hall	Qufu	Ming	Educational hall	Ritual/educational	Square–circular
C4	Chen Clan Ancestral Hall	Guangzhou	Qing	Ancestral hall	Clan ritual	Orthogonal grid
C5	Pavilion of Prince Teng	Jiangxi	Ming reconstruction	Pavilion	Cultural pavilion	Octagonal radial

information forms a visual depiction of the building geometry of the ceilings. The images were chosen for their clear orthogonal views, visible structural layering, and geometric clarity for diagrammatic abstraction. Images were not meant to cover all typologies of caisson ceilings, but rather to find analytically suitable examples for comparative formal analysis.

2.4.2. Architectural documentation

Architectural documentation was used to supplement the photographic materials, namely:

(i) measured architectural drawings.
(ii) restoration and conservation reports.
(iii) publications about architectural surveys.
(iv) heritage conservation documentation.

Geometric proportions and structural relationships of the ceilings were verified using these materials.

2.5. Architectural representation and diagrammatic analysis

The main analytical technique used in this study is architecture representation. Representation methods enable simplified diagrams of a complex architectural form to be created that can display the relationships between structures and compositional hierarchy. For each case study, an analytical series of diagrams was created by using three phases of representation.

2.5.1. Geometric abstraction

Here, ornamental elements were eliminated in order to isolate the essential geometric structure of the composition of the ceiling. The diagrams identify basic geometrical forms, which include a square, an octagon, and a circle that encloses the ceiling structure.

2.5.2. Layer-depth mapping

This phase analyses the stratification of the ceiling. Caisson ceilings are normally made by a series of frames that are decreasing in size, such that they progress toward the middle of the ceiling in a vertical recession. The depth hierarchy can be analyzed after mapping of these layers (Steinhardt, 2014).

2.5.3. Central hierarchy analysis

The last phase is used to assess compositional centrality by determining how geometric contraction is drawn to a central panel that is dominant. This step assessed how the ceiling was hierarchically organized.

2.6. Formal framework of aesthetic evaluation

To evaluate the ceilings in a systematic way, a structured analytical framework was used with five indicators, as in Table 3.

These parameters are measurable parameters of comparison between the formal organization of various caisson ceilings.

2.7. Operational definitions and analytical criteria

To enhance analytical rigor and replicability, the five formal indicators were defined by criteria shown in Table 4. These were applied to classify each case and reduce interpretative subjectivity.

We adhered to these criteria for all cases through diagrammatic recording and verification of architectural drawings.

Table 2. Representative caisson ceilings in selected case studies

Case study	Location	Image and source	Description
C1: Hall of Supreme Harmony	Beijing	 Source: https://www.travelchinaguide.com/attraction/beijing/forbidden-city/caisson-ceiling.htm?	This imperial caisson ceiling contains a square-to-octagonal geometric composition surrounding a central dragon motif.
C2: Foguang Temple Main Hall	Shanxi	 Source: https://www.alamy.com/a-view-of-the-wooden-roof-of-a-hall-at-foguang-temple-also-known-as-the-buddha-light-temple-on-mountain-wutai-in-foguang-village-doucun-town-wutai-image263207336.html	The Tang-dynasty temple demonstrates an early example of a timber ceiling structure with hierarchical framing.

(*Cont'd...*)

Table 2. (*Continued*)

Case study	Location	Image and source	Description
C3: Confucius Temple Dacheng Hall	Qufu	 Source: https://www.alamy.com/the-interior-of-the-dacheng-hall-in-the-confucius-temple-in-qufu-shandong-province-image248338593.html	The ceremonial hall of the Confucius Temple complex contains symmetrical ceiling structures aligned with the ritual axis.

(*Cont'd...*)

Table 2. (***Continued***)

Case study	Location	Image and source	Description
C4: Chen Clan Ancestral Hall	Guangzhou	 Source: https://www.islamichinatravel.com/destination-guide/guangzhou/guangzhou-attractions/chen-clan-ancestral-hall/	This Qing-dynasty clan hall includes richly decorated coffered ceilings reflecting southern Chinese architectural traditions.
C5: Pavilion of Prince Teng	Jiangxi	 Source: https://www.chinadaily.com.cn/life/2011-06/27/content_12811869_9.htm	The pavilion structure features a radial geometric ceiling composition characteristic of pavilion-type architecture.

Table 3. Formal aesthetic evaluation indicators

Indicator	Description	Analytical purpose
Geometry	Primary geometric forms organizing the ceiling	Identify compositional order
Symmetry	Radial, bilateral, or axial symmetry	Assess visual balance
Layering	Number of structural layers	Evaluate spatial depth
Centrality	Degree of convergence toward the central panel	Identify focal emphasis
Hierarchy	Scale variation among structural elements	Determine spatial dominance

Table 4. Operational definitions of analytical indicators

Indicator	Definition	Measurement criteria
Geometry	Type and transformation of geometric forms	Number of transformation stages: low (1), medium (2), high (≥3)
Symmetry	Type of compositional symmetry	Radial (multi-axis), bilateral (single-axis), mixed
Layering	Number of structural tiers	Low (≤3), medium (4–5), high (≥6)
Centrality	Degree of convergence toward the center	Weak (diffuse), moderate (partial focus), strong (clear focal dominance)
Hierarchy	Scale variation across layers	Low (minimal variation), medium, high (clear dominance hierarchy)

2.8. Analytical dataset

A sample dataset was used to exemplify the implementation of the analytical framework. The dataset summarizes the formal properties of the chosen case studies, as shown in Table 5.

This dataset provides the empirical basis for the comparative analysis presented in Section 3.

2.9. Analytical reliability

The analysis involved several methodological procedures that were used to improve the reliability of the analysis.

First, the visual documentation was compared to architectural drawings and heritage documentation to determine the geometric accuracy. Second, the standardized representation conventions were used to create analytical diagrams so that they would be consistent across cases. Thirdly, the analysis indicators were pre-defined to minimize the interpretive bias (Steinhardt, 2019).

These procedures improve the transparency, reproducibility, and methodological rigor of the analysis of caisson ceiling structures.

3. Results

The analytical findings are reported according to the formal aesthetic indicators, which are set in the methodological framework. The analysis is based on the five aspects of architectural composition, namely geometric arrangement, organization of symmetry, depth of the structure in layers, central convergence, and hierarchical dominance.

Table 1 summarizes the selected cases, while Tables 2 and A1 provide the photographic documentation used for analysis. These images depict the initial architectural circumstances of the caisson ceilings chosen as case studies. On the basis of these photos and the additional architectural documentation, analytical diagrams were created to observe the structural and compositional arrangement of the ceilings.

Table 5. Formal characteristics of selected caisson ceilings

Case	Geometry	Symmetry	Layers	Centrality	Complexity level
C1	Complex polygonal	Radial	7	Strong	High
C2	Polygonal	Radial	6	Strong	High
C3	Square–circular	Bilateral	5	Moderate	Medium
C4	Orthogonal grid	Bilateral	4	Moderate	Medium
C5	Octagonal radial	Radial	3	Low	Low

Architectural representation and comparative analysis reveal compositional patterns across the selected case studies, as well as variations that affect building function and structural complexity.

3.1. Geometric configuration

This analysis of geometric abstraction shows that the caisson ceilings are organized with inbuilt geometric transformations. Analysis of the photo dataset (Figure 1) has suggested that a majority of ceilings are based on a square structural frame in correspondence with the architectural grid of the building. These square frames frequently become polygonal or circular toward the center of the ceiling.

The sequences of transformation derived from the architectural representation process are presented using the geometric abstraction diagrams (Figure 1). The diagrams abstract the ornamental surfaces of the ceilings to emphasize the underlying geometric structure.

The geometric configuration analysis is shown in Table 6. In C1, the Hall of Supreme Harmony, the square base frame transitions into an octagonal intermediate structure and then into a circular central panel. The same type of geometric sequence can be seen in Foguang Temple (C2), in which the polygonal frames are nested, forming a multi-layered geometric hierarchy.

The Confucius Temple Dacheng Hall (C3), on the other hand, displays a less complex square-circular conversion. The Chen Clan Ancestral Hall (C4) still has an orthogonal grid arrangement, but the pavilion ceiling (C5) has an octagonal radial arrangement of the pavilion architecture.

Table 6. Geometric configuration analysis

Case	Primary geometry	Transformation pattern	Structural complexity
C1	Square–octagon–circle	Multi-stage transformation	High
C2	Square–octagon	Nested polygonal transition	High
C3	Square–circle	Limited transformation	Medium
C4	Orthogonal grid	Minimal transformation	Medium
C5	Octagonal radial	Radial configuration	Low

In the selected cases, the imperial and religious examples employ more complex geometric transformation sequences than civic or clan buildings.

3.2. Symmetry organization

The compositional arrangement of caisson ceilings, as shown by symmetry analysis, suggests that the ceiling compositions are closely aligned with the architectural axes of the buildings. There are two main symmetry regimes, namely, radial and bilateral symmetry.

These patterns can be described using the symmetry diagrams (Figure 2), which plot the symmetry axes based on the ceiling structures that were identified in the photographic documentation.

Imperial and religious architecture are most evidently radial. Geometric modules of the Hall of Supreme

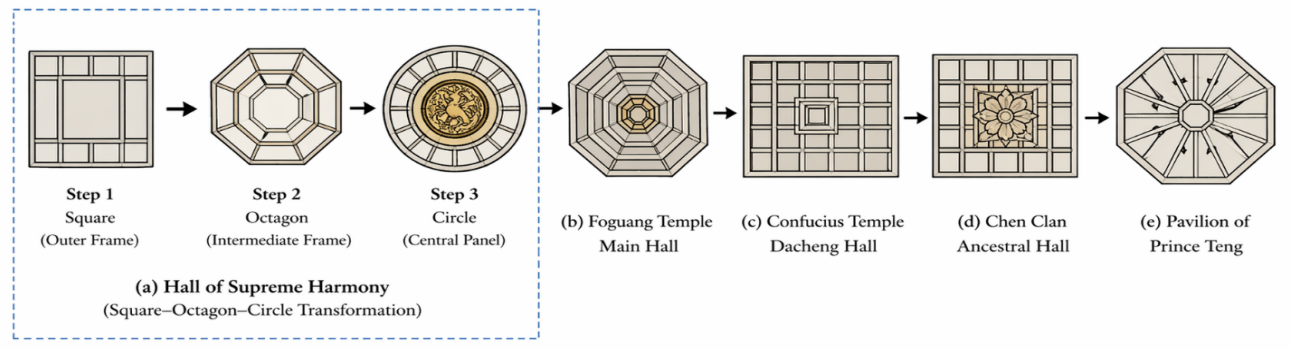


Figure 1. Geometric abstraction diagrams of caisson ceiling compositions. Arrows indicate the sequence of geometric transformation within each case, from base structural frame to central panel. (a) Hall of Supreme Harmony (square–octagon–circle transformation), (b) Foguang Temple, (c) Confucius Temple Dacheng Hall, (d) Chen Clan Ancestral Hall, (e) Pavilion of Prince Teng. Source: Authors' analytical diagrams based on the photographic documentation from the following sources: Travel China Guide, Getty Images, Picxy Archive, and Islamic China Travel (see Table A1 for complete source details and dates of access)
Note: Arrows indicate the sequence of geometric transformation or compositional abstraction for each case

Harmony (C1) and Foguang Temple (C2) radiate from, or converge toward, the central focal point. Such a structure creates the effect of a harmonious space composition with the emphasis on the ceremonial center of the interior.

The Confucius Temple Dacheng Hall (C3) and Chen Clan Ancestral Hall (C4) are bilaterally symmetrical. The ceiling composition in these instances is in line with the longitudinal axis of the hall, and this confirms the directional orientation of space construction.

Table 7 summarizes the symmetry characteristics. Radial symmetry can be seen once again in the pavilion ceiling (C5) because of its centralized space structure.

The results indicate that symmetry regimes correspond closely with the architectural organization of interior space.

3.3. Layered structural depth

Structural layering analysis has shown that caisson ceilings have different levels of vertical recession. There are three to seven structural layers in the selected cases.

The layer-depth diagrams (Figure 3) show the gradual contraction of the ceiling structures toward their focal panels, at their center. This stratification is applied in a way that creates a sense of architectural depth and spatial emphasis in the interior.

Table 7. Symmetry characteristics

Case	Symmetry type	Axis orientation	Spatial alignment
C1	Radial	Multi-axis	Imperial ceremonial axis
C2	Radial	Multi-axis	Temple ritual axis
C3	Bilateral	Longitudinal	Educational hall axis
C4	Bilateral	Longitudinal	Ancestral ritual axis
C5	Radial	Central	Pavilion center

Layer-depth characteristics are shown in Table 8. The most complex building systems in terms of layering are imperial and religious buildings. The Hall of Supreme Harmony (C1) was provided with seven hierarchical layers, progressively contracting toward a smaller central panel. There are six layers of geometric recession in Foguang Temple (C2).

The number of layers is lower in educational and ancestral buildings. The Confucius Temple (C3) has five layers, whereas the Chen Clan Ancestral Hall (C4) only has four layers. The simplest structure is the pavilion structure (C5), and it has three layers.

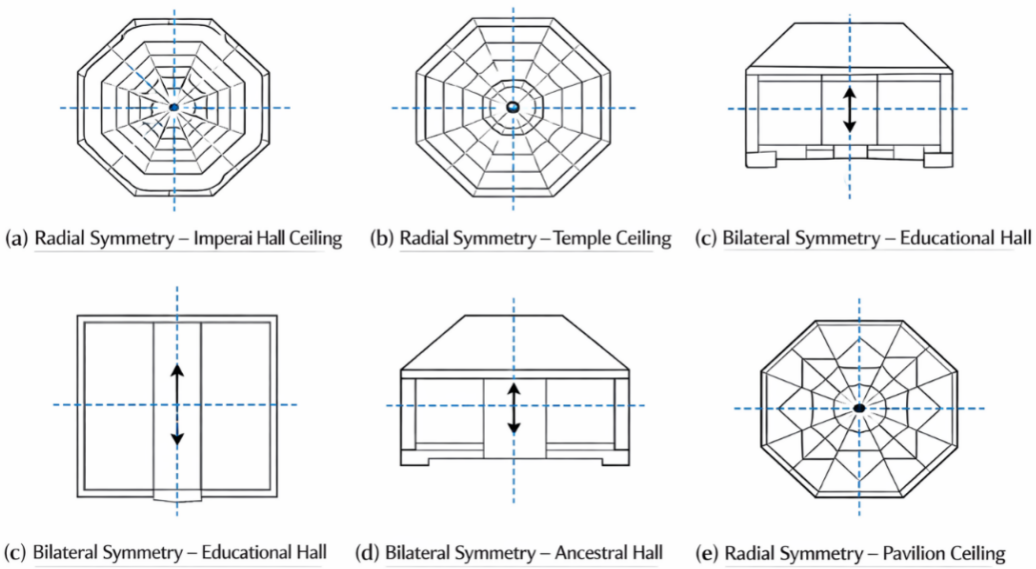


Figure 2. Symmetrical organization diagrams of caisson ceilings. (a) Radial symmetry: imperial hall. (b) Radial symmetry: temple ceiling. (c) Bilateral symmetry: educational hall. (d) Bilateral symmetry: ancestral hall. (e) Radial symmetry: pavilion structure. Source: Analytical diagrams by the authors based on documentation of archival photographs shown in Table A1.

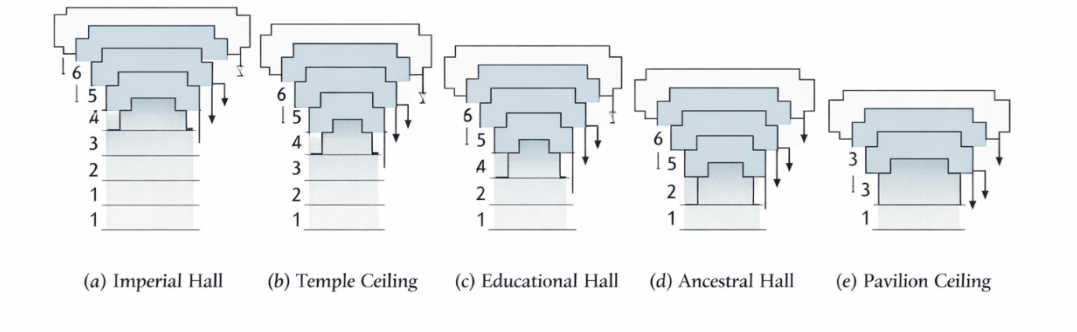


Figure 3. Layer-depth mapping of caisson ceiling structures. Source: The above data sources are the visual documentation and references to architecture as outlined in Table A1.

Table 8. Layer-depth characteristics

Case	Number of layers	Recession pattern	Depth intensity
C1	7	Multi-tiered	High
C2	6	Nested	High
C3	5	Gradual	Moderate
C4	4	Stepped	Moderate
C5	3	Simplified	Low

It appears that more structurally layered buildings tend to be more ceremonially important. This, however, is an observation as opposed to something verified independently through historical or structural analysis.

3.4. Central convergence

The central convergence analysis shows that caisson ceilings generally structure their arrangements in such a way that they have a major point of focus. The convergence is achieved by geometric contraction, scale contraction, and centrally oriented composition.

In the central convergence diagrams (Figure 4), the diagram shows the directional movement of the compositional elements to the major panel of the ceiling.

The strongest convergence occurs in the imperial and temple architecture. At the Hall of Supreme Harmony (C1), structural lines and decorative elements create concentric frames and focus the eye on the middle dragon motif. Foguang Temple (C2) shows a central hierarchy, which is less rich in details. Centrality evaluation is represented in Table 9. The Confucius Temple (C3) and Chen Clan Ancestral Hall (C4) have moderate convergence. In the pavilion structure (C5), the focus is less pronounced because the composition of the ceiling is simplified.

Table 9. Centrality evaluation

Case	Convergence strength	Focal panel size	Visual dominance
C1	Strong	Large	High
C2	Strong	Large	High
C3	Moderate	Medium	Medium
C4	Moderate	Medium	Medium
C5	Weak	Small	Low

The evaluation indicates that central convergence is one of the major organizing principles in caisson ceiling composition.

3.5. Comparative formal patterns

The cross-case comparison shows that there are certain compositional rules of caisson ceiling design.

It is possible to distinguish three architectural patterns:

(i) Geometric transformation toward central panels.
(ii) Aligning symmetry with architectural axes.
(iii) Enhancement of spatial emphasis through hierarchical layering.

As shown in Table 10, geometric complexity, strong central convergence, and a highly stratified structure appear to be more characteristic of imperial and religious buildings than of civic or clan buildings.

The comparative analysis suggests that several formal compositional characteristics recur across the selected examples. Within the scope of this study, these recurring patterns may be interpreted as a consistent architectural compositional system.

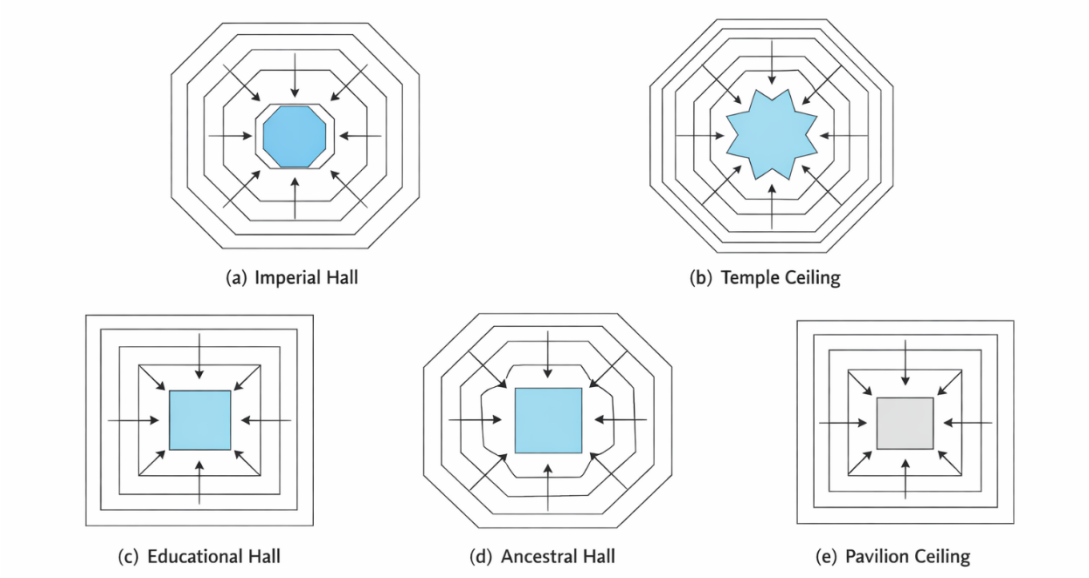


Figure 4. Central convergence and focal hierarchy diagrams. Source: Authors' analytical diagrams based on the photos of the cases.

Table 10. Comparative formal aesthetic evaluation

Case	Geometry	Symmetry	Layers	Centrality	Hierarchical dominance
C1	Complex	Radial	7	Strong	High
C2	Complex	Radial	6	Strong	High
C3	Moderate	Bilateral	5	Moderate	Medium
C4	Moderate	Bilateral	4	Moderate	Medium
C5	Simple	Radial	3	Weak	Low

4. Discussion

4.1. Formal composition and architectural order

Based on this research, it can be concluded that in the analyzed cases, there are recurring patterns in formal spatial organization in the form of caisson ceilings. While not definitive evidence that caisson ceilings are universally used as architectural systems, the findings indicate that they are used as compositional systems with formal organization that contributes to hierarchy and emphasis. The distinction is important, as the present study relies on a purposive sample and visual-formal analysis (Sun, 2023). The results are in line with previous research on Chinese architectural hierarchy (Steinhardt, 2019), but apply specifically to indoor ceiling structures.

Geometric abstraction analysis reveals that the compositional structure of caisson ceilings is generally developed through successive geometric transformations. The square frames used in conforming to the architectural grid of the building are gradually changed to polygonal or circular shapes towards the middle of the ceiling. This geometrical shrinkage gives a hierarchical flow that geometrically arranges the interior space and strengthens the spatial significance of the ceiling center (Turgay & Ünlü, 2025).

This form suggests that the caisson ceilings may function as architectural devices that structure the visual hierarchy in the interior spaces. Their compositional geometry contributes to the expression of architectural focus and space structure; however, they do more than serve decorative roles.

4.2. Association between ceiling composition and building function

Another comparative analysis shows that the complexity of caisson ceiling composition is related directly to the functional hierarchy of the buildings it is used in. The imperial and religious examples have the most geometric

complexity and structural stratification, whereas civic, ancestral, and pavilion structures have less complicated ones (Murphy *et al*., 2009).

As an illustration, the Hall of Supreme Harmony and the Main Hall of Foguang Temple have shown both multi-layered geometrical recession and strong central convergence. These characteristics correspond to the ceremonial significance of these buildings. In comparison, the Chen Clan Ancestral Hall and the Pavilion of Prince Teng have fewer layers of the structure and a less strong geometric transformation (Wang & Zakaria, 2025).

This association suggests that the design of caisson ceilings is an indication of larger hierarchies in architecture in the traditional Chinese building culture. The construction of structures that correlate with imperial power or religious importance is more richly composed with the ceiling to ensure the importance of space and the focus on ceremonies.

4.3. Symmetry and architectural spatial organization

The symmetry analysis also shows the relationship between the ceiling's composition and the space logic of the building. Radial symmetry is most frequently observed in imperial and temple architecture, where centralized space organization is organized to emphasize ceremonial space. Under such circumstances, the ceiling serves as a visual equivalent of the spatial center of the building.

On the contrary, bilateral symmetry prevails in the educational and ancestral halls where the architectural design is along a strong longitudinal line. This axis makes the ceiling symmetry align, which provides directional orientation to the interior space (Wright, 2018).

These results suggest that the composition of the ceiling is tightly interconnected with the larger space structure of the traditional Chinese architecture. The ceiling is not an isolated component, but it is also engaged in the architectural composition of the entire building.

4.4. Layered hierarchy and interior emphasis

The other important research result of the study is related to the hierarchical stratification of caisson ceilings. Each of the case studies has a range of structural layers between three and seven layers. Structures with greater ceremonial significance are more likely to have a stronger structural recession and more complicated geometric strata (Yan *et al*., 2025).

This stratification adds to the effect of depth and enhances the hierarchy of composition of the ceiling. The geometric frames gradually grow smaller towards the center in the process, thus creating a definite center of focus in the interior space created by the ceiling structure.

The findings therefore indicate that the caisson ceiling is not merely decorative, but an architectural device for organizing spatial hierarchy in the interior space.

4.5. Central convergence as a compositional tenet

The main convergence analysis affirms that caisson ceilings are in the selected cases structured in a way that the composition generally converges on a dominant central focal element, which is dominant. The ceiling structure is used to direct the composition to the central panel that serves as the focus of the interior of the composition through the use of geometric contraction and scale reduction.

Though the intensity of this convergence differs depending on the type of buildings, it still has a central focal element in all the case studies. The central convergence seems to be an important compositional principle found in the analyzed examples of caisson ceilings (J. Zhang, 2025).

This convergence is especially strong in the imperial halls and temples, in which the architectural space has a ceremonial meaning. The convergence is less strong in pavilions and clan buildings; however, it is also applied as an organizing principle.

4.6. Implications for traditional Chinese architecture

The research results of this study contribute to architectural scholarship regarding the analytical usefulness of interior ceiling systems in studying traditional Chinese architecture. Although a significant body of research has been conducted on structural systems, bracket sets, and roof construction, formal elements of interior composition, such as caisson ceilings, have received less systematic analysis.

Through the architectural representation and evaluation of formal aesthetics, the research proves that caisson ceilings have a coherent compositional logic. They are geometrically organized, symmetrical, and hierarchically stratified, which are significant to the architectural design practice of traditional Chinese buildings (D. Zhang, 2018).

In addition, the method of representation, which is used in this study, offers a valuable analytical model of other complex architectural elements. Architectural representation can bring to light structural relationships that might not be brought to the fore in photographic documentation alone, through the techniques of diagrammatic abstraction and comparative analysis.

4.7. Limitations

There are a number of limitations to this study. First, the number of cases is limited to five purposively chosen examples, which limits the ability to generalize the results. Second, the analysis relies primarily on visual data collection and diagrammatic interpretation, which could lead to interpretive bias, even with the use of standardized criteria. Third, the analysis does not include structural, historical, or ethnographic corroboration of the relationships. The inclusion of additional cases, digital modeling, and historical analysis should be considered in future studies to validate the results.

5. Conclusion

This paper analyzed the formal aesthetic structure of traditional Chinese caisson ceilings (*zaojing*) using architectural representation and comparative morphological analysis. Through five exemplary case studies, such as imperial structures, religious structures, educational structures, ancestral structures, and pavilion buildings, the research examined the modes of geometric configuration, symmetry regimes, hierarchical layering, and central convergence as elements that played a role in the compositional structure of interior architectural space.

The results indicate that, in addition to being used as decorative interior elements, caisson ceilings are, in the selected cases, also organized architectural systems. In the studied cases, the ceiling compositions are characterized by the presence of embedded geometry transformations that facilitate such a structural arrangement of the ceiling towards a centralized focal point. Square structural frames are usually converted to polygonal or circular framing that produces a geometric progression hierarchy, which supports the space emphasis in the interior.

Symmetry analysis also shows that the composition of the ceiling is very well aligned with the architectural structure of the building. In imperial and religious architecture, the imperial and religious examples are primarily characterized by radial symmetry, with centralized emphasis on space being related to ceremonial roles. By contrast, bilateral symmetry is also more prominently represented in educational and ancestral halls, as they are characterized by the directional movement of rituals and spatial organization in the buildings.

The discussion of the depth structure of the layers shows that vertical recession is another inherent feature of caisson ceilings. Structures having a higher ceremonial significance, including imperial halls and temples, were more likely to have more layers in their structure and geometric transformations. The effect of this layering is a great deal of architectural depth and holds the essential focus of the interior.

Central convergence analysis indicates that the compositional order of the caisson ceiling generally promotes architectural focus to the central panel that is dominant. Through geometric contraction and reduction of scale, the ceiling structure creates a proper focal hierarchy in the interior space. The intensity of this convergence differs by type of building, the strongest focus being shown by imperial and religious buildings.

The results in general indicate that the caisson ceiling can be seen as a systematically organized architectural element that helps to compose and coordinate the interior space hierarchy in traditional Chinese architecture. Their geometric organization, symmetry alignment, and hierarchical layering contribute to the visual and spatial elaboration of important interiors in traditional Chinese architecture.

The article places emphasis on the significance of architectural representation as a methodological tool for the historical analysis of architectural structures. Through the vehicle of diagrammatic abstraction and comparative visual analysis, one can view the complex architectural forms as a constitutive system of forms that do not have to be simply ornamental.

In general, the study contributes to architectural research by improving the understanding of the formal logic of caisson ceiling composition and offers a methodological approach to analyzing analogous interior architecture elements. Further studies could expand the typological sample and use digital recording or modeling to examine the geometry and structure of traditional architectural ceilings.

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Appendix

Table A1. Representative caisson ceilings from selected case studies

Case study	Location	Image source	Archive/ website	Access date	Description	Selection rationale
C1: Hall of Supreme Harmony	Beijing	https://www.travelchinaguide.com/attraction/beijing/forbidden-city/caisson-ceiling.htm	Travel China Guide	April 24, 2026	Imperial caisson ceiling showing square-to-octagonal-to-circular transformation with central dragon motif	Chosen for clear geometric transformation and ceremonial hierarchy
C2: Foguang Temple Main Hall	Shanxi	https://www.alamy.com/a-view-of-the-wooden-roof-of-a-hall-at-foguang-temple-also-known-as-the-buddha-light-temple-on-mountain-wutai-in-foguang-village-doucun-town-wutai-image263207336.html	Alamy Image Archive	April 24, 2026	Interior upward-looking view of the timber ceiling structure showing layered framing and preserved Tang-period roof organization.	Selected for its preserved Tang-period timber roof structure and visible hierarchical framing suitable for comparative formal analysis.
C3: Confucius Temple Dacheng Hall	Qufu	https://www.alamy.com/the-interior-of-the-dacheng-hall-in-the-confucius-temple-in-qufu-shandong-province-image248338593.html	Alamy Image Archive	May 19, 2026	Interior upward-looking view of the ceremonial hall ceiling showing symmetrical timber framing, decorative beam organization, and axial compositional alignment within the ritual interior space.	Selected for its visible interior ceiling composition, bilateral symmetry, and clear alignment with the ritual axis suitable for comparative formal analysis.
C4: Chen Clan Ancestral Hall	Guangzhou	https://www.islamichinatravel.com/destination-guide/guangzhou/guangzhou-attractions/chen-clan-ancestral-hall/	Islamic China Travel / Museum Archive	April 24, 2026	Decorative coffered ceiling with intricate carving and orthogonal grid composition	Chosen for orthogonal coffered ceiling composition
C5: Pavilion of Prince Teng	Jiangxi	https://www.chinadaily.com.cn/life/2011-06/27/content_12811869_9.htm	China Daily Architecture & Culture Archive	May 19, 2026	Interior upward-looking view of the pavilion ceiling showing radial geometric composition, centralized convergence, layered decorative organization, and intricate timber ceiling detailing characteristic of traditional Chinese pavilion architecture.	Selected for its clear radial ceiling geometry, central compositional hierarchy, and well-preserved interior ceiling structure suitable for comparative formal analysis.