Urban Contemplative Architecture Design through Light and Sound

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Abstract. This study aims to formulate the design factors for contemplative architecture in an urban context. The ability of architecture to influence the atmosphere and the experience of its users is the basis of research. Theoretical analysis is used to find the connection between elements that can trigger subjective properties to form a contemplative space both direct or indirectly. The quality of secular sacredness that is often associated with contemplative experiences has been elaborated as well. Secular sacred that does not depend on religious connotation and divinity are used to focus the attention solely on architectural elements in shaping one’s experience. The two main factors that shape architectural experience are light and sound. By exploring the characteristic and manipulation of light, sound and aural architecture, the feeling of sacredness can be created through spatial experience. By using the theory of contemplative space properties as the main theory, the theory of light and sound will work as supporting theory in formulating the design factors for contemplative architecture. The theory framework then is read on design project, to find how they work and what is missing. At the end, this study produces a prototype of contemplative architecture design for urban context through light and sound.

Keyword: contemplative architecture, secular sacred, light, sound

1. Introduction

As time progresses, the preference of the intimate atmospheric architecture has slowly decline with the rise of the instantly fulfilling visual architecture [1, p. 35]. This in turn, caused a shift in the balance between the intellectual and emotional stimulation people received, with many favoring the former [1, p. 27]. To return the balance and provide emotional stimulus back to an urban society, there need to be a specific area that can act as a catalyst towards emotional inducement. A contemplative space that provides experience that are intimate and slow behind the fast-paced lifestyle of the urban society. To balance out the banal and profane everyday urban space, the contemplative space needs to provide an experience that’s both contemplative and sacred.

Light has long been a huge factor in architecture and the art of shaping space with its power to produce scale, atmosphere, and rhythm [2, p. 24]. Used strategically, light could also produce more specific tasks, for instance to focus one’s attention to a single point. One could even say, with the source of natural light being from the sun, causes it to have a cosmic, ancient, primordial, or even
sacred quality to it [3, p. 2]. Therefore, architectures that are designed through the foundation and knowledge of light would be an architecture that calls for its visitors to subconsciously think about their place and being amidst the cosmos [3, p. 5].

Sound, just like light, is also one of the important spatial aspects in creating a contemplative and sacred architecture experience. The way light bounces of material and provides us with information, sound does the same and provides us with impressions of shapes and materials in their own way [4, p. 224]. The ability to process auditory cues produced by sound and architecture are universal and helps us in navigating and visualizing the external world without the use of eyes [5, p. 2].

This study seeks to find the relationship between the atmospheric characteristics of contemplative space with the architectural aspects of lighting and sound in order to create a design prototype for contemplative architecture.

2. Contemplative Space Design

Contemplative space according to Brian Corr is a spatial environment that provides one with the opportunity to experience a change in either psychologically, emotionally, or spiritually through the help of the different designed architectural elements [6, p. 9]. Corr's definition of contemplation space involves something secular, detached from the religious connotations that people normally associate with contemplation.

2.1. Elements and Properties of contemplative space

The characteristics of contemplation space, although widely seen as something that cannot be measured, have definable factors and qualities. These characteristics, according to Moir are divided into two categories: a) elements and b) properties. Architectural contemplative elements are components in space which with their relationships encourage feelings of daydreaming and contemplation, while contemplative properties are subjective qualities that are feelings or ambiances of a space that can enhance the experience of contemplation [7, p. 42].

The contemplative elements are contemplative characteristic that are physical. Space that can support the experience of contemplation will be created using the interaction and dynamics of these 3 elements: 1) centers that provides a specific position for the subject; 2) references that direct the focus and attention of the subject; 3) frames that physically limit the surrounding space.

The contemplative properties on the other hand, are subjective characteristics of contemplative space. Contemplative property is an important spatial quality in creating the atmosphere and ambience of a contemplative space. According to Moir there are seven contemplative properties, namely: 1) Imagability; 2) Inhability; 3) Tranquility; 4) Movement; 5) Detachment; 6) Security; and 7) Accessibility [7, pp. 45–72].

2.2. Architectural Lighting and Sound Aspects

With the help of the architectural aspects of lighting and sound, contemplative elements could be designed a specific way to enhance and create contemplative properties, enabling better environment for contemplation.

2.2.1. Architectural Lighting Aspects

The experiential quality of light, when combined with architecture can affect the atmosphere and feelings of visitors, making it one of the most important aspects of space building [2, p. 23]. Biologically, light also affects the hormonal activities within one’s body [2, p. 23]. Taking advantage of the relationship between light and shadow, architectural qualities that can direct movement and attention could be created to produce hierarchy and focal points [2, pp. 23–24]. Architecture’s role is to manipulate space to produce the best lighting effects for contemplation. According to Amour, there are four characteristics of light that can be manipulated to create certain spatial qualities, which are: reflection, diffusion, transmission, intensity [8, pp. 67–70]. Manipulation and design of architectural forms by taking into account the four characteristics of light will produce certain atmospheres.
Different from Amour who tries to find out the basic characteristics of light, Graves seeks to formulate the "language" of lighting that can contribute to creating an environment of secular sacred qualities. Graves categorizes the composition of lighting atmosphere into seven, namely: ethereality; sequence; veils of glass; dissolution; channelization; silent suffusion; and luminescence [9, pp. 32–34]. The composition of light above is an architectural design recommendation to create secular sacred quality on a space. Each composition, while creating different effects, together form a sacred atmosphere using the relationship of light, shadow, and architecture.

2.2.2. Architectural Sound Aspects
The identity of a space is strongly shaped by the aural quality of sound in architecture [10, p. 37]. This process happens on a physiological level, with auditory cues suggesting and providing the body with information of orientation and scale, adding complexity to an architectural experience [10, p. 37]. The direct relationship between sound and physical spatial properties according to Blesser consists of three aspects: geometry, material, and the acoustic results of both, reverberation time [5, p. 216]. Sound therefore affects the daily life of people subconsciously, be it the background of speech, the sounds of machines, the sound of movements, each city has a distinctive sound consisting of various sonic effects [11, p. 4]. Six effects of 66 sonic effects related to contemplative architecture are: attraction, cut-out, drone, filtration, imitation, and mask. The six sonic effects can be manipulated to create a desired perceptive environment.

3. Method
The main material in this study was obtained mainly from literature reviews of three main topics: 1) contemplative architecture, natural lighting in architecture, and 3) sound in architecture. The research process is then carried out by analyzing the relationship matrix between the elements and properties of contemplative space with light and aural strategies obtained through literature reviews. The matrix produces key parameters and indicators are checked on The Windhover Contemplative Center as a built contemplative space, then it can be used in generating design strategies for designing prototypes of contemplative urban space.

4. Result
The matrix shown below [fig. 1] are the relationship matrix of which contemplative elements creates a specific contemplative property with the help of lighting composition or sonic effects in contemplative architecture. Contemplative elements are shown in the left-most column, contemplative properties are show in the upper-most row, while lighting compositions and sonic effects are shown in-between the diagram with each color representing a specific contemplative element.

![Figure 1. Relationship matrix of light towards the elements and properties of contemplative space.](image)

From the previous diagram [fig. 1] it can be observed that Graves's theory of light composition is related to Moir's theory of contemplative elements and properties. The composition of light can be
implemented in the formation of contemplative elements so as to further strengthen the contemplative property that is formed. All Graves light compositions can be used in strengthening the properties of contemplative elements.

![Figure 2. Relationship matrix of sonic effects towards the properties of contemplative space. Source: Author, formulated from Moir’s Contemplative Space in Cities, and Blesser and Salter’s Spaces Speak, Are You Listening?](image)

For the relationship between sound theory and contemplative theory, physical contemplative elements cannot relate to sonic effects which influence the atmosphere and ambience. Therefore, only the direct relationship of sonic effects with contemplative properties of space can be seen. Depending on how you use existing sonic effects, different contemplative properties can be formed [fig. 2]. One sonic effect can also create more than one contemplative property. For example, the effect of imitation on natural sounds can create contemplative properties of tranquility and detachment.

5. Discussion

5.1. The Windhover Contemplative Center

The Windhover Contemplative Center [fig. 3] is a spiritual retreat on the Stanford campus with the aim of supporting self-renewal. During observation, contemplative elements are also present in the architecture to form contemplative property. The three elements are contained in the Windhover Contemplation Center: 1) There are chairs and benches acting as center for contemplation, 2) glass walls, rammed earth walls, and rows of bamboos acting as frames to create boundaries, and 3) both natural and artificial references such as greeneries and paintings acting as vocal points.

![Figure 3. Atmospheres in The Windhover Cont. Center. Source: Archdaily](image)

Light also plays a role in this contemplative architecture in strengthening the relationship between contemplative elements and the resulting contemplative property [fig. 3]. The following is an observation of how light affects elements and also the contemplative property of architecture:

- Channelization in this building contributes to deepening the quality of imageability and the inhability of buildings. Light channelization is focused on the reference in the form of a painting to increase the focus and attention of people to the reference point in the building, increasing the impression and imageability of the reference.
• The effect of light dissolution on this building helps in creating movement and tranquility properties. With the surrounding trees, the side lines of the leaves on the tree create the effect of light dissolution which has the quality of movement creating a calm and tranquil atmosphere.

• Simultaneously, sequences in the building creates movement and imageability. There are two sequence compositions in this building frame, the first is the repeating of the same pattern, creating rhythm and repetition, the second is a sequence consisting of openings and different types of lighting creating light choreography. Both sequences can produce imaginary movements and enhance imageability.

• The composition of ethereality creates a contemplative property of movement. The light and shadow produced by the roof that falls on the walls of the building become a scene or reference that can act as a reference point of thought, because the light and the shadow that changes with the passage of the sun according to time, the quality of movement are formed.

In addition to using light, the sound effects in this architecture also contribute to supporting the contemplative experience in this building [fig. 7]. The implementation of natural elements such as trees and water create sound effects that have contemplative properties. Here are some of the sonic effects used in this building:

• By using the fountain in the main gallery and courtyard, the sound produced by the water movement provides a background sound (drone effect) that creates inhability, imageability, detachment, and security properties.

• The building which is located adjacent to a natural oak forest, creates a natural filtration of outside sound. Filtration then creates tranquility and detachment.

• The existence of natural elements around this building also creates a setting that allows the atmosphere of sounds that exist in nature to form. Animals and insects can come around the area to create an imitation of the atmosphere that is similar to nature. This imitation creates a comfortable, tranquil, and detached atmosphere from the outside world.

By using the effects of light and sound that support the quality of contemplatives, a place that allows contemplative experiences to form. Observation of this precedent also shows that in addition to its core building, the environment around the building also contributes to the formation of a contemplative space, as in this precedent, the greening environment that visitors must pass through first prepares visitors to release the outside world and enter the contemplative space. This precedent study have confirmed the effects of light and sound in enhancing the contemplative properties of a space just as studied on the literatures used.

5.2. Design Strategy of Contemplative Elements

The presence of contemplative elements in design is one of the driving factors of contemplative experience. However, by designing good contemplative elements, the contemplative experience that occurs will be of higher quality. One of the strategies to make the center more comfortable to inhabit is to add a frame behind the center. This can create a feeling of security for the occupants. The existence of a frame behind the center makes for a more comfortable experience for contemplation.

For reference, there are so many elements around that if framed correctly can be a good reference point for visitors to contemplate. Therefore, if there are objects that could potentially be a reference, visitors need to be directed to look in that direction. One strategy in directing the view of visitors is the placement of centers that face the reference.

Frame on the other hand, is not limited to just the construction of a wall to create boundaries. In addition to the formation of walls as a boundary, there are several other strategies in forming frames [fig. 4] namely by: a) using trees that surround an area to strengthen the space, b) using elevation differences to separate two areas, and c) surrounding an area with body of water to separate it. The alternative strategies mentioned above create access separation but are still connected visually.
5.3. Design Strategy of Lighting Composition

Below [fig. 5] are some examples of strategies and design techniques that utilizes light effects in creating contemplative properties of space. There are strategies that can create two simultaneous effects such as the use of translucent glass in the creation of the veils of glass and silent suffusion. These strategies were obtained and formulated from precedent studies, but do not rule out the possibility of other design strategies as long as it still follows the guidelines from the literature review.

5.4. Design Strategy of Sonic Effects

Just as in the light effect strategy that produces contemplative properties, the sonic effects strategy mentioned below [fig. 6] is a strategy taken from precedent studies, therefore only a few sound techniques are written below. As with the light effect too, it is possible for other design strategies using sonic effects other than the one listed to create contemplative properties as long as they follow the guidelines from the literature review.

From table observations and strategy comparisons, lighting strategies tend to be more dominant and produce more contemplative properties than sonic effects. The design strategies for lighting effects are also much more diverse compared to sonic effects’ strategy. But that does not reduce the value of
sonic effects, because the existence of sonic effects can improve the quality of one's contemplative experience.

6. Conclusion
Contemplative elements are designed with light composition strategy and sonic effects to create the desired contemplative properties in the formation of contemplative space. In the process, it was found that the composition of light became more dominant in the design process than the sonic effects, which caused the sonic effects to be a supporting factor during design. However, being a supporting factor, sonic effects are still important in creating the contemplative properties of space. The light and sound design strategies used in this study are only alternatives, the possibilities and potential of other design strategies are always open and available. Apart from light and sound design strategy, there are many factors and architectural elements that can be explored and used as study guidelines for the formation of contemplative architecture. Based upon each individual, the experience of each subject towards the contemplative elements may differ, creating a sense of subjectivity on the study. This however could be a potential for further studies and development by involving visitors as respondent on each of their individual experiences among these elements for a more precise data.

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