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Space, time and light - Three forms of Light and space-forms in Asia

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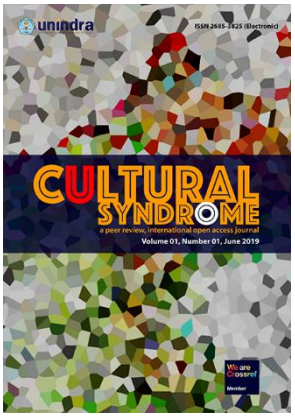

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Abstract. There are key 'forms' and intensities of natural light when discussed and presented as characteristic archetypical principles in key regions in Asia. Terms used to create certain 'patterned' outcomes in terms of the lit environment, and with regards to ancient to modern spaces in Asia are summated as 'dazzled, dappled and difused' light. These three intensities or descriptive terms reflect the multivaried climatic conditioned within the Asian region, which traverse the harshness of the tropical sun to the diffused dimness of the temperate climatic sites. Under regions of the tropics, the intensity and sunpath of the tropics are orchestrated by ancient manipulator-builders such as the case of concux temples of Angkor Wat, at the monumental scale and are discussed as organic and informal dappled sunpaths and gardens in the tropical villages and gardens of India and Malaysia. The diffused light stratagem is discussed with regards of the famous writing 'In praise of shadows. Modern cases are discussed that represent these three forms of light and its orchestration in space.

Keywords: dazzled, diffused, dappled, light, ancient, Asian

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Introduction

Light, in Asian architecture, is an agent of the manipulation and visualisation of time. Through manipulating light, space-time interactions in architecture is realised. The light that structures and simulates space-form, is a force that enable an orchestration of the space through interactions between environmental forces and the materiality of surfaces and structures in Asian architecture. This paper highlight three 'patterns' of light forces, the dazzled, diffused and the dappled which constitutes three subcategories

or intensities of light that give rise to particularities in interior space experience. The increasing gradations of daylight and sunlight interact with architectural elements such as walls, screens and artefacts to create the dynamic animation of surfaces, solids and structures. The paper highlights the three essential light intensities and how traditional architecture forms are manipulated, configured and shaped to enhance or elevate the power of space in architecture. As light makes the hidden becomes manifest, light becomes a tool and strategy towards the nature of space and a range or spectrum of spatial effects which are experientially unique to Asia.

Angkor, time and the piercing 'dazzled' light

Angkor Wat is a monument not only representing the peak of the nagara-based Khmer civilisation, but an attestment of how time is visualised through a distillation and manipulation of both light and water forces and hydraulic infrastructure. Spatial orientations and spatial configurations were designed not only to visualise water but light. The east-west alignment of the major monument suggests an innate awareness of the sunpath and cosmological forces. Such forces became part of the manipulation of sunlight which was held sacred meaning due to its alignment of form with the horizon and with directions where the zenith passage of the Sun at the particular altitude will rise or set.

Life-Force Symbiosis

While the link with water has been clearly defined by recent studies, the overall fusion of sun-light- matter in three-dimensional form and planning of the Angkor has been less discussed. Lingga is a symbolic object represent ing the sovereiginity of their priest-kings, within their complexes are representation of sublayers of devotion to the male and female forces of nature. These represent the primordial basis of kingship, reflecting the link between kings and markers of the forces of regeneration and prosperity in nature. The ability to regenerate and reproduce lies at the very basis of their belief systems. Hence the most common object found there was a carved stone lingga are found recurringly throughout the Angkor complex.

The prime objective of this paper is to express the effect of dazzled, dappled and diffused light manipulated in a space or structure reflecting the symbolic means articulating the sunpath and alignment of form or monument.

Methods

The methods explored in this paper mainly based on the descriptive analysis of natural light being perceived through visual observation to understand the characteristic of light being dappled, dazzled and diffused to enhance functionality of its structural and scene or phenomenon. An architectural analysis using images is provided to describe the lighting behaviour, characteristics and architectural details that influenced

the creation of the scene/phenomenon described. These observation will give a strategic setup for lighting visualisation to validate an analytical setup on what can be perceived and the objective of desired scene/phenomenon.

Result and Discussion

Through the examples of studies mentioned in this sections, demonstrates how the light being dazzled, dappled and diffused to communicate its purpose and to give to the observer an understanding of how the space is lit. Followed by discussion on how the perception of light being chanelled into the scene influenced by its culture and interplaying the light and shadow of contrast, appreciating the aesthetic details of its structural complexity and sacred phenomenon. In this section light being perceived with different characteristic, if light being distributed uniformly the efficacy from a square foot of sunlight will deliver a total of 500 lux through over an area of 180 sqft (Mardaljevic and Roy). With the intensity of light penetrated through at noon at the equinox, known as beam or dazzled light which direct the path of sunlight travelled deeper into the space and reflected to the floor of the room. The incidents of light penetrated through a beam angled could give evaluation on the temporal dynamics of sun exposure and the strategic opening and its shadow effect on the surrounding structure.

Lingga and Angkor Dazzled Light Through Mountain Temple-Form

The roofs of the Angkor Wat and Lingga temple were open to function as zenith tubes and the linga-yoni features were both part of zenith ritual complexes and practical in their ability to protect the temple floors during frequent rainstorms. Unfortunately, the majority of these linga-yoni pedestals have been knocked over, smashed, or otherwise removed by looters who sought the jewel boxes buried underneath them. Some have been put back in place by restorers, but many remain off to the side of looters' pits where they once stood (Barnhart and Powell).

Figure 1 A linga in the Bayon during zenith passage (photo by Barnhart and Powell)

In their current state of partial ruin, the temple roofs let in zenith passage sunlight in beams of jagged shapes that swept across the temple floor from west to east over a period of some 20 minutes shown in Figure 1. However, architectural features indicate that two levels of wooden ceilings spanned the interior roof cavity and logic would dictate that they had holes in their middles, creating a very controlled path for sunlight to enter the room below. Figure 2's cross diagram shows a temple in profile cross section. Zenith passage sunlight went first through the tube inside the capstone, then next to a wooden ceiling containing a jewel-studded box around a hole in its center. It was these jewels that drove looters to knock the capstones from the temple tops. Sunlight would be constricted sufficiently by these first two features, yet a third hole in a lower wooden ceiling situated atop the temple room's spring line would assure that only sunlight of exactly zenith passage could shine down into the usually dark inner chamber, illuminating the linga with absolutely no shadow and reflecting off of any water in the yoni. The effect in its pristine state would have been blindingly bright and have lasted only 3-5 minutes on the exact day of zenith passage.

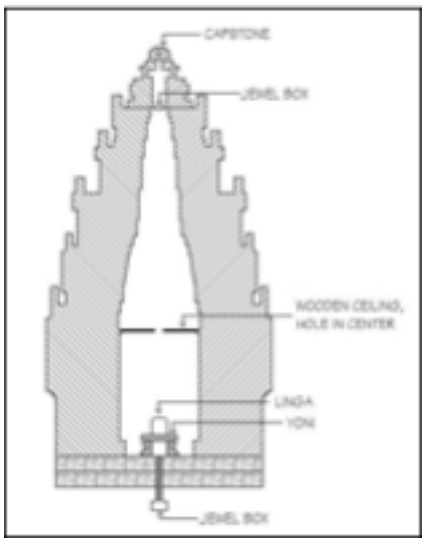

Figure 2 Cross section diagram of a typical temple in Angkor (drawing by Linda Hand)

Enhancement of Dappled Light with Metallic Surfaces

In many of Angkor's temple complexes, including the major complexes of Ta Prohm, Ta Keo, Angkor Wat, and Preah Khan, there was gold gilding all around the walls of the temple rooms, no doubt reflecting brilliantly when zenith passage light entered the room. The gilding was ripped out by the Thais who invaded from their new capital in Ayutthaya in the mid-14th century (Coe and Evans), but the places where it attached to the walls are still visible (Figure 2). Between the golden walls, the jewels, and the water in the yoni all reflecting, the light effect must have been spectacular. The moment of true zenith passage in the Bayon in 2010. a. light in the center of a yoni in an upper tower south of the central tower, b. light in the center of a tower in the central lower level, c. light striking the top of a linga in the centre of a lower level tower, d. light striking the top of a linga in a south side corridor below a tower, e. light coming from

above in a tower in the east side of the Bayon, f. close up of the light coming in the top of the central tower, g. Longer view of the light coming into the central tower, floor view of the light coming down on to the shrine in the central tower, and i. light hitting the floor in an upper tower south of the central tower (Figure 1).

The Dappled Light of the Tropics

Dappled light refers to:

The position of the sun which interacts with

1. The height of the tree canopy.
2. The shapes of the gaps which light is coming through (which tend to change frequently with the wind); and
3. The plane where the light is hitting.

The shapes are also elliptical in nature, meaning they elongate as they get further into the distance. Below is a photo of what dappled lightlooks like in life, along with a close-up. This was taken on a clear day, late in the morning. Warm, dappled light was shooting through the gaps in the leaves on the right-hand side. Goneng his famously known reminiscence of Terengganu, Malaysia, gives a brief and succinct phenomenological description of the nature of tropical light in the vernacular context of Terengganu in the earlier part of 1900s :

> *'… This is a hidden place, unknown to .. like most old suraus, it had an open apron, that you reached by going up few steps of its verandah, and inside it was all dark and quiet.*
>
> *A shaft of light shines perhaps from a break in the roof tiles and jujube leaves strewn about , plucked from its branches by powerful winds in the night, and a shadowy mosaic of the tree canopy, painting the front porch in gloom and arkening the ground and mottling the area around the koloh with sunlight (Goneng)*

The contrast and juxtaposition of darkness and light, shade and shaft, is what makes the dappled effects of tropical light. While such effects can also be achieved by artificial means, one posits that. Kent, describes well the dappling light of Indian gardens:

The shrines verdant setting with it's dappled crepuscular light filtering through the trees...

India's "sacred groves, "in her writings on the small forests or stands of trees set aside for a deity's exclusive use, which have attracted the attention of NGOs, botanists, specialists in traditional medicine, and anthropologists (Kent). Environmentalism disillusioned by the failures of massive state-sponsored solutions to ecological problems, hailed them as an exemplary form of traditional community resource management. For in spite of pressures to utilise their trees for fodder, housing, and firewood, the religious taboos surrounding sacred groves have led to the conservation of pockets of abundant flora in areas otherwise denuded by deforestation. Drawing on fieldwork conducted in

the southern Indian state of Tamil Nadu over seven years, Kent relooks at sacred groves and the meaning for the villagers who maintain them, and terms these as 'Sacred Groves and Local Gods' which traces a journey through Tamil Nadu, exploring how the localized meanings attached to forested shrines are changing under the impact of globalization and economic liberalization (Kent). Confounding simplistic representations of sacred groves as sites of a primitive form of nature worship, she argues how local practices and beliefs regarding sacred groves are at once more imaginative, dynamic, and pragmatic than previously thought. Rather than being ancient in origin, as has been asserted by other scholars, the religious beliefs, practices, and iconography found in sacred groves suggest origins in the politically de-centered eighteenth century, when the Tamil country was effectively ruled by local chieftains.

Space, Time and Diffuse Light – Japanese Space and Screens

Almodovar-Melendo and Cabeza-Lainez links cosmology and the gradation of light both in Japanese and Chinese traditions, in discussing The *Concept of Architectural Space. From Jiān in China to Ma in Japan,* they describe:

> *The term jiān characterizes the second level of composition; it consists of a parallelepiped space limited by pillars or walls. The jiān pictogram (間) is composed of a representation of the Sun or Moon seeping through a door. Thus, we can deduct etymologically that this architectural space metaphorically leads to the progress of the sun and the passage of time. Accordingly, naturally cycles are traditionally linked to human perception of space. It is interesting to note that in Chinese the netherworld received the name of yīnjiān or Space of the Yīn.*
>
> *In Japan, the same pictogram is used but the Japanese write it in the traditional Chinese () and they spell it ma. It also means "interval" or transitional space. In fact, a succession of transitional spaces configures the indoor–outdoor sequence. From the façade, a large eave or noki projects towards the outside. Behind the noki a gallery or engawa is located in such a way as to be closed in winter with shoji panels. Finally, a succession of interior spaces follows.*
>
> *This sequence of elements generates a typical gradation of light from the bright exterior to dark interiors, conditioning the way of perception and residence of the space. Inside rooms, the "void" characterized by the absence of light counterbalances with nature represented in interlocked exterior gardens. In this sense, Japanese architecture frequently uses gardens as a landscape background by means of the technique known as shakkei or "borrowed scenery"* (Almodovar-Melendo and Cabeza-Lainez)

Superfluous or redundant elements constitute a distraction in the meditative pursuit of the essence. Thus, the design of neutral spaces reflecting the aesthetic concepts of *wabi*, *sabi* and *shibui* is crucial to achieve a transcendent knowledge. *Wabi* refers to the elimination of everything superfluous. *Sabi* connects with the passage of time, which in

Japan has an aesthetic value, and *shibui* is related to abstraction. Therefore, Japanese neutral spaces invite us to experience the mystery of emptiness, to detach ourselves from the phenomenological world, while nature becomes a catalyst to achieve satori.

In the 1933 seminal book in Praise of Shadows is a 1933 book on Japanese aesthetics by Japanese writer Jun'Ichirō Tanizaki translated by Harper and Edward in 1977, both light and shadows find their centrepiece in the intellectual foundations of the Japanese aesthetic tradition, contrasting them broadly with the foundations of Western thought (Tanizaki). Tanizaki argues that Japanese society places value often on the negation of these objects: their "shadows." Forms and patterns of shadow, a kind of positive absence, are essential to Japanese figurations of beauty (Tanizaki). Tanizaki describes the perennial polarity that underlies the difference between Eastern and Western forms of aesthetics and argued how Asians had primordially lived with, and embraced, lives in reconciliations with the conditions and relative darkness and poverty. Says Tanizaki:

> '*Forced into close quarters with shadows, other visual fragmentations of objects, and the scarcity of commodities, they transformed these qualia into art and literature, which endure as cultural artifacts. Tanizaki argues that this tradition has made obvious how beauty always must emerge from reality, no matter how difficult. Even in the most impoverished and dire of circumstances, it is human nature to fashion what is available into objects that carry and transmit meaning'* (Tanizaki)

The centrality of origami paper, Tanizaki argues is a key pattern of archetype in Asia and is uniquely different from the printing paper of the West due to its malleability and capacity to absorb light. Origami paper thus, has the ability to mirror the foliage of the natural world, soundlessly accepting the transformations made to it by human hands (Tanizaki). Tanizaki suggests that the paper is crucial in Asian thought and the technology of a diffuse material as simple as paper, is always connected to human thought in Asia (Tanizaki). Tanizaki's other analyses, including those of architecture and the materiality of light is in stark contrast to the numerous artificial light sources across low ceilings as they eliminate shadows, Japanese buildings value shadows (Tanizaki). The Japanese room is a particular archetype that values the shadow as an object that is not to be eradicated but pushed to its margins and observed with respect to the objects casting it. Tanizaki's ' In praise of shadows' is shaped to counter how modernity obsessed with perfect light and thus 'the completion of domains of fact and knowledge, elucidating how subtlety, incompleteness, and mystery are equally important in the formations of beauty and of selfhood' (Tanizaki).

Beita and Fujii usefully summates the Asian light, space and the particularities of the Japan environment:

> *Harmonization between architecture and nature is one principle deeply rooted in traditional Japanese archi- tecture, influencing all aspects of space creation. Buildings are not seen as individual objects, but as part of the existing environment, resulting in the development of design principles which enhance these qualities. Although there are many components in traditional architecture which promote these principles, one of the most*

important ones is boundaries. Through the precise control of boundaries, a space can be given a new meaning and even perceived in a new manner. Traditional screen systems known in Japanese as 'shoji' give spaces the flexibility needed to adapt to a changing environment, given the inhabitants control of views, illumi- nation and ventilation (Beita and Fujii).

Figure 3 View of the garden from the tea master's seating position while at the same time directing the eye to a more important view

Boundaries, they discuss, add a frame to the world and thus the elements of interior walls and doors limits and cropping the exterior scenery to create a perfect view in the case of Japan's interiors. Through boundaries a designer can show and express his personal ideas as a living painting. In the 'Bosen' tearoom, boundaries play a big role in the perception of the space, by only showing the inhabitants a small portion of the garden. Furthermore, the creation of boundaries is not limited to the architecture but work together with other boundaries created by the garden. Directly in front of the veranda lies a rectangular shaped shrub which hides a large portion of the garden.

'The inhabitants are never given a full picture of the exterior but are left to wonder what exists outside. The final picture captures a beauty unique to each person, created on the moment according to the quality of light, boundaries and viewing position' (Zhao).

Both China and Japan sees the '.. space or room might be likened to an inkwash painting, the paper-paneled shoji being the expanses where the ink is the thinnest, and the alcove where it is the darkest. The mention it is like '…. *The secrets of shadows, our sensitive use of shadow and light... Where lays the key to this mystery? Ultimately, it is the magic of shadows. In the 'Bosen' tearoom the framed view was picked by the tea master to show a certain connection, which he could then show his guests as they enjoyed tea, Figure 3. Although different areas of the scene can be framed, by showing a controlled view of the ground, it provides enough*

information to know the surrounding conditions without seeing the entire scene. Each season can be experienced by simply seeing rain, leafs, or snow falling on the lower area of the view.

Conclusion

In Modern orchestrations designed by architects or designers, the purpose of chanelling light is to maximize views out for example to the sea, instead focuses more on the interior spaces and making the seascape a mere visual backdrop**.** It is also sometimes planned around several external courtyards, as these semi-outdoor elements work to bring light, airflow, and nature into the interior envieonment, resulting in a more introverted building. The precise definition by the glazed at the lower level and heavy concrete slab or structure above, the architectural expression of the interior spaces appears as a sculptural canopy floating above an undulating landscape. almost hidden within the site. This setting combines the dazzled, dappled and diffused in a distinctive articulation as the building is sometimes peppered with trees, helping to blend the design into the surrounding environment and embed the new intervention into the site. The harmonious marrieage of climate and sacred monuments through the observation of strategic study of light intensity and spiritual experience suggests sustainability establishment of traditional architecture.

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