A Space Reading on Light and Shadow
The Church of Light and Sancaklar Mosque, Ando and Arolat

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Abstract:

This study emphasizes the importance of using natural light and shadow in architecture, focusing on Tadao Ando's Church of Light and Emre Arolat's Sancaklar Mosque as examples. Both structures masterfully utilize light and shadow to deepen the spatial experience and foster an inner connection with users. The research comprehensively analyzes how light and shadow transform the role of architectural design and the perception of space through these two examples. Various criteria have been developed to determine the effects of light and shadow within spaces, along with methods for questioning the correct use of light and shadow in contemporary architecture. As a result, it is revealed that natural light and shadow are not merely aesthetic elements in architectural practice, but also significant tools that enrich spatial experience.

Keywords: Light-shadow, Natural light, Spatial analysis,Contemporary architecture, Religious space

1. Introduction

"No space, architecturally, is a space unless it has natural light."

Louis KAHN

Architecture, while being a discipline where tangible products are created, is also an art that finds meaning in the human mind through emotions and experiences. Pallasmaa (2016) states that the architecture of art has a structure that seeks answers to fundamental questions about human existence, emphasizing that it is impossible to conceive architecture purely as an intellectual endeavor without reflecting the human body and its movement within space. This search for meaning can evoke different experiences and, consequently, different emotions through the unity of space and time.

From the past to the present, with consideration of the differences in culture and belief systems, it is evident that the use of dynamic light has been prioritized in architectural designs, particularly in the context of sacred and worship spaces (Ciriani, 1991). "Light is the most effective element for creating mystery and fear, and it serves as a primary element in the creation of the divinity in religious structures" (Roth, 1993). Although the property of light that makes objects visible may seem like a simple physical outcome, its continuous transformation makes it impressive when considered within the framework of the relationship between space and humans. Indeed, Monet masterfully represented this transformation of light in his works. While light itself is invisible, its ability to make things visible, combined with its inherently dynamic nature, creates a perception of a

continuously changing structure in architectural spaces, particularly in those designated as sacred, such as a massive Gothic cathedral (Nietzsche, F. W., 1959). The human capacity to create a sense of space utilizes light - the fundamental material of architecture - to unveil emotions within people (Baeza, 2004). Based on the effects mentioned, this play of light and shadow in architectural spaces has been encouraging for conducting this research in the context of the continuous change within the space.

The primary aim of this study is to emphasize the importance of using natural light as a part of spatial organization in architectural design. In making this emphasis, the study aims to examine the spatial contributions that arise when natural light is included as a design criterion in spatial design, as well as to explore the forms of light and shadow usage. The selected structures for spatial analysis are the Church of Light designed by Tadao Ando in Japan and the Sancaklar Mosque designed by Emre Arolat in Turkey. The comparison between the chosen structures will be conducted in the context of evaluating the uses of light within these spaces.

2. The Effects of Light and Shadow on Space

According to Hançerlioğlu, who expresses that light has become a symbol of sanctity and inner enlightenment, the term "light" in metaphysics has been a concept used not only in the East but also in the West. Light has been employed to characterize the giver of mystical, divine, and universal knowledge (Hançerlioğlu, 1996).

The concept of "natural light," which is the subject of this research, finds its place within the relationship between space and time. As a concept within the variability of time, natural light affects the Earth at different angles and colors throughout the process from sunrise to sunset, creating a cycle of "seasons" that form a yearly rhythm. The change in position of the sun’s source, dependent on its physical orientations, leads to a continuous transformation of light and color values, revealing the effect of "time" in spatial shaping (Moazemi, 2013, p. 43). Kahn emphasizes the impact of light on architecture and the psychology of those perceiving it by posing the question, "What moods does light bring to your space from morning to evening, from one day to the next, from season to season, and throughout the years?" For Kahn, this concept holds such significance in space that he dramatically expresses the presence of light in space with the words, "The sunlight did not know what it was before it hit the wall" (Kahn, 1974). Regarding the interpretation of light by the experiencer, Kuban states that light exists in the space and defines it as an indispensable element and an inseparable part of life (Kuban, 1992). Lynch, while emphasizing the perception of space through visual senses, suggests that the way light is used in a space determines the character of the environment (Lynch, 1966). Based on the aforementioned effects, the play of light and shadow in architectural spaces, especially in sacred places, possesses a constitutive quality in the context of the continuous change of space.

It is possible to see in the historical readings of architecture that light serves as a metaphor for reaching the divine power in sacred spaces. The Hagia Sophia, built during the Roman Empire, is a powerful example of the relationship light establishes with divine power. According to Roth, the Hagia Sophia reflects an atmosphere where the light entering from the windows, combined with the bright reflections from the high domes and the flickering lights of lamps and candles, strives to bring together celestial and earthly elements while reflecting early Christian and Byzantine liturgy (Roth, 2000, pp. 350-351).

Religious structures that have developed as a cultural element have become significant features that best express each period, influenced by societal changes (Eliade, 2003). In sacred spaces, light can be described as a tool used not only to create a perception of space that enhances the feeling of worship and conveys the divine influence of God but also to form a volume where individuals can connect with themselves. When considered as a concept formed by the experiencer, the role of light comes to the forefront. The concept of "light management" emerges as a crucial aspect that must be mastered by spatial designers. One of the most effective examples of this subject is the Notre-Dame-du-Haut chapel in Ronchamp, France, designed by Le Corbusier, built in the early 1950s, which has inspired many architects. In this structure, there are intentionally designed bright points that exist in the relationship between the brightness of the exterior and the darkness of the interior (Figure 1). The appearance of these points within the accustomed darkness creates a simultaneous experience of mystery and awe for the experiencer. This perception is associated with the meticulous management of the concept of natural light as a designed perception (Millet, 1996).

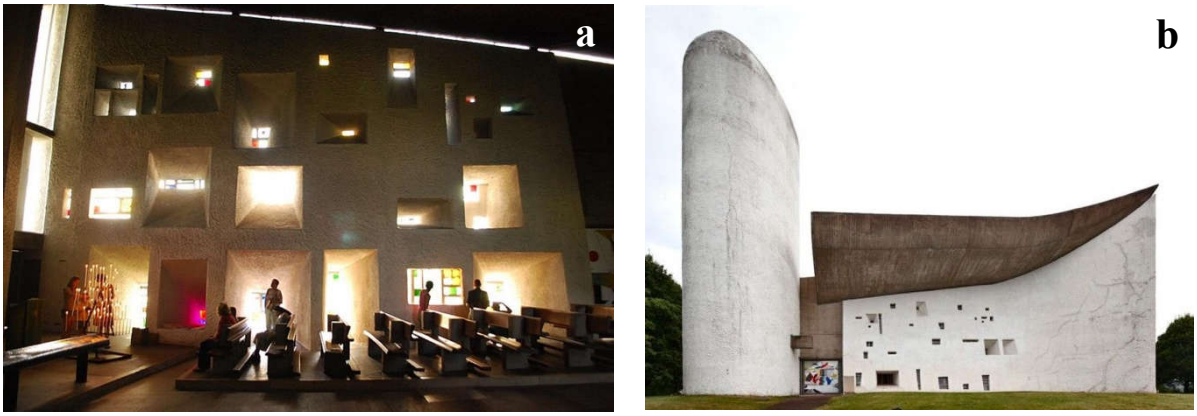

Figure 1. a) Interior photograph (Notre Dame Du Haut | Architectuul, 2015), b) Exterior photograph of the Notre-Dame du Haut (Notre Dame Du Haut | Architectuul, 2015)

When considering the effect of natural light in a space, the concept of shadow is also one of the perceptual tools that accompanies and shapes this effect. Pallasmaa expresses that light often gains meaning by creating shadows, stating, "*The greatest factor in the existence of light is shadow*" (Pallasmaa, 2005, p.39). As light reveals certain physical properties depending on its manner and intensity of entering a space, the effect of the shadows created by light is also a significant factor in defining the character of that space. While brightly experienced spaces evoke a sense of openness, dimly or shadowy designed spaces create a mysterious perception, which plays a crucial role in forming the character of the space itself. "*In architectural terms, the contrast between light and shadow defines surfaces and contributes to the characteristic nature of the space*" (Demers, 2016). The influence of architectural design criteria is vital in forming this characteristic structure. Le Corbusier draws attention to this responsibility within the discipline of architecture, mentioning that there is a conscious play between volume and light. Light is an essential concept in the process of seeing forms due to the natural structure of the eye. Shadows and points illuminated by light reveal the forms. Light and shadow exist as interconnected concepts on the surfaces of a space. Dynamic natural light allows for the perception of shadow through human experience and perception (Bilgi, A., 2007). The mentioned space,light and shadow relationship has been conceptualized in Figure 2.

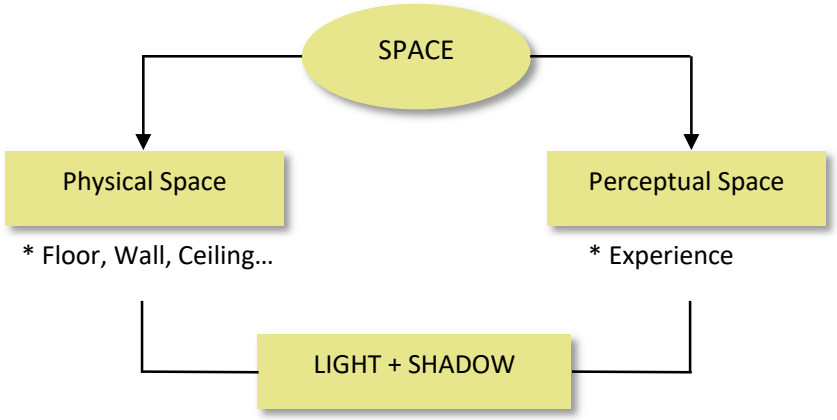

Figure 2. Elements of Architectural Space (This figure has been conceptualized by the author.)

In the dynamic relationship between time, space, and light, natural light, which enhances the quality of space, has undergone various transformations from the Egyptian pyramids built for sun worship to the present day. According to Baeza, the history of architecture, shaped by different understandings of light and the exploration thereof, is also the history of spatial formation; light is the most essential component necessary to comprehend spatial quality (Baeza, 1991). One of the most

prominent readings of the relationship between architecture and light can be made through the Parthenon, a Greek temple. Kahn interprets this space as the origin of architecture. After analyzing the structure-light relationship of the Parthenon, which he describes as a "space of the mind," Kahn stated that structure is the source of light (Kahn, 1968). The east-facing structure offers an impressive spatiality in terms of architectural space and light usage (Figure 3-a). The Pantheon, built by the Romans, is one of the most iconic examples to be given in the context of the architecture-light relationship. The oculus at the top of the dome was designed to admit light. Throughout the day, the structure is exposed to sunlight at different angles, creating various scenes in the interior through a moving light (Figure 3-b). Human visual perception experiences not just a single scene created by the moving light in the space, but the entire process as a whole. This dynamic nature of natural light possesses the ability to impart infinite meaning to space (Moazemi, 2013).

By the time of the Middle Ages, light and the values it symbolized were accentuated as manifestations of the divine, represented in structures. Spatial analyses of finished products highlight the basic texture created by materials like stone, lime, and mortar, which were essential in medieval architecture. Celestial representations formed through the use of light constituted the foundation of Gothic architecture. Brogan links the manner in which light is introduced into a space with worldly materialism. This approach, through the use of light and shadow in Gothic cathedrals, successfully creates a mysterious and poetic effect (Brogan, 1997).

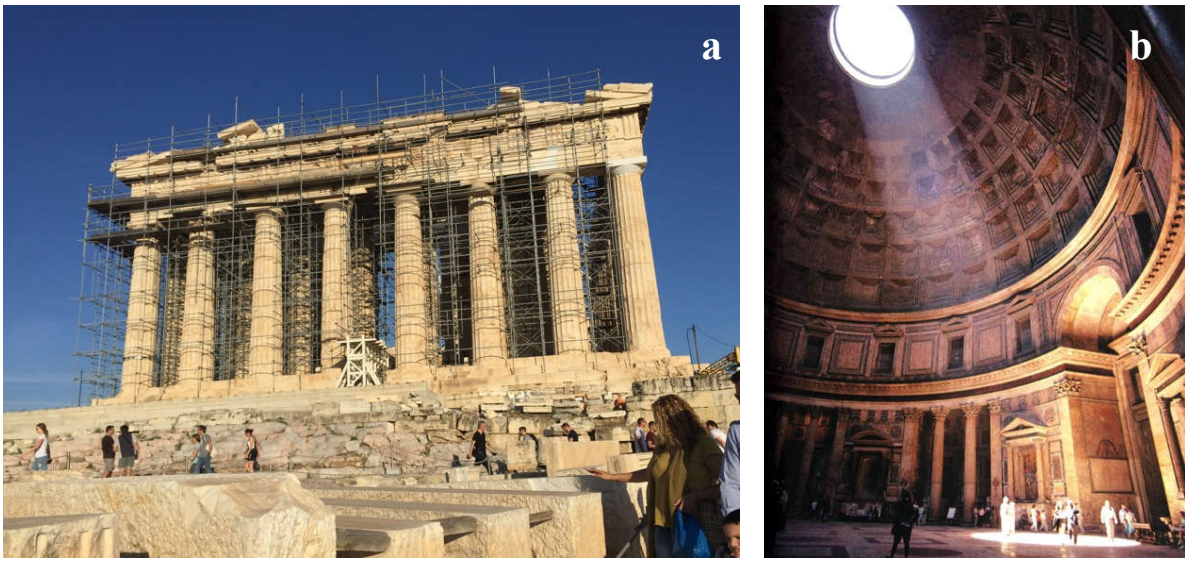

Figure 3. a) Parthenon Temple, Athens (The Author's Photo Archive), b) Pantheon Temple, Rome (Architectural Moleskine, 2010)

Louis Kahn, a modernist architect, also emphasizes the spiritual quality of space when discussing the relationship between light and space. Kahn, highlighting the significance of light in defining identity, expressed the vital role of light in architecture with the words, "No space, architecturally, is a space unless it has natural light" (Loud, 1989, p. 262). This approach, in a way, resulted in the creation of an identity through the use of light and space in the architect's works. Understanding the nature of light and employing it within the space greatly contributes to the formation of this characteristic image. While the accuracy and harmony of tangible elements such as structure, form, and volume in the building are fundamental criteria, integrating the nature of light into the design has necessitated perceiving light as a design criterion.

According to Kutlu, light, which plays a role in giving space a different perceptual character, is a tool that should be considered as an important design criterion (Kutlu, 2001). Altan, who states that spaces can be created and transformed through the use of light, suggests that it is possible to give new character and meaning to a space through reflections that highlight objects, alter textures, and emphasize spatial elements (Altan, 1983).

3. Material and Methods

In this study, the use of natural light and shadow in spatial design is examined and analyzed conceptually. Within the context of "A Spatial Reading on Light and Shadow," the Church of the Light, designed by Tadao Ando in Japan, and the Sancaklar Mosque, designed by Emre Arolat in Turkey, are selected as case studies. These two structures have been particularly influential for contemplating the relationship between light and architecture due to their ability to deepen the perception and experience of space, allowing users to form an inner connection with the environment through their use of light and shadow. Both spaces have been the subject of numerous scientific studies, received prestigious awards in the field of architecture, and gained national and international recognition and interest. These two places of worship, situated in different geographical locations and serving different religious beliefs, share common features: they are designed with modern architectural approaches and challenge traditional architectural understandings. For these reasons, these two spaces have been selected for analysis in this study.

The space reading method employed in this research is used to understand spaces and analyze the abstract and concrete data of the physical space. A spatial analysis enables us to comprehend, interpret, and gain knowledge about the identity of a place. Space readings offer a perspective on complex spatial problems (Yamu, 2014).

These selected structures for Space Reading were analyzed individually, and then the physical characteristics and the use of light and shadow in these structures were compared. In order to systematically compare the use of light and shadow in both structures, a framework was needed. At this point, the evaluation criteria obtained from the conceptual framework were determined. These criteria include the following elements:

Physical Identity of the Structure: This includes identity information related to the structure; data on the architect of the building, the location of construction, the year of construction, client information, intended use, materials used, architectural language, and the relationship between the structure and topography.

Use of Light and Shadow: The second section will establish a conceptual framework for discussing the effects of light and shadow on space. Criteria have been obtained to evaluate a space in the context of light and shadow using information distilled from these conceptual data. The goal is to assess the use of light and shadow in the structures examined in the spatial reading according to these established criteria. These criteria have made it possible to analyze the similarities and differences in the use of light and shadow between the two structures and to draw general conclusions from this analysis.

In the data collection process, information about both structures has been obtained from multiple sources. In the spatial reading section of the research, in addition to basic information about the selected structures, projects prepared by their architects (plans, sections, elevations), design approaches, and architectural details have been included. Interviews and writings in which architects share their views on the projects, books, theses, articles written about these structures, and current photographs have also been utilized in this section. Additionally, findings from books and articles on architectural history and theory, as well as studies addressing the Light Church and Sancaklar Mosque, have been referenced.

3.1. Space Readings

In this study, a comparative analysis is conducted between the Church of Light by Tadao Ando in Japan and the Sancaklar Mosque by Emre Arolat in Turkey within the scope of "A Spatial Reading on Light and Shadow." These two structures, though emerging from different geographies and faith traditions, share a common architectural focus on spatial clarity, introspection, and the expressive power of light. Both spaces exemplify how natural light and shadow can be intentionally used to enrich spatial experience and spiritual atmosphere. To provide a theoretical basis for this analysis, various scholars' perspectives on light and its spatial implications have been reviewed. A summary of these conceptual approaches is presented in Table 1, outlining how each theorist has contributed to the architectural understanding of light within space.

Table 1. Theorists and the Contexts of Light in Space.

Theorists	The Context of Light in Space
Kahn	Light Variability - Psychological Effect
Nietzsche	The Movement of Light – Formation of Different Perceptions
Lynch	Form of Light Usage – Character of the Environment
Roth	Light - Metaphor of Divine Power - Psychological Impact
Habibad	Light - Psychological Effect
Millet	Designed Perception
Pallasmaa	Light - Shadow Contrast Effect
Demers	Light - Shadow Contrast Effect
Bragon	Light - Shadow Poetic Effect

Note: This table has been conceptualized by the author.

Based on the theoretical background outlined in Table 1, the study identifies key criteria for evaluating how light and shadow are used in architectural spaces. These analytical dimensions are organized and presented in Table 2.

Table 2. Criteria for the Use of Light and Shadow.

1	The changing state of light throughout the day
2	The way light is used in space
3	The designed nature of the perception of light in space
4	The formation of the contrast relationship between light and shadow in space
5	The psychological effect of light in space

Note: This table has been conceptualized by the author.

3.1.1. Church of Light, Tadao Ando, Osaka

3.1.1.1. Tadao Ando's Architectural Philosophy

It is only natural for architectural designs to draw inspiration from the dynamic characteristics of the geographic locations they are situated in. Despite the numerous international projects he has undertaken, Tadao Ando's architectural philosophy remains deeply rooted in the cultural and natural dynamics of Japan. Striking a balance between traditional Japanese architecture and innovative approaches, Ando's works bear the imprints of both Eastern and Western cultures (Nussaume, 2009). Auping suggests that the time Ando spent in historical and religious spaces has left a profound mark on his psyche and is reflected in his architecture. This reflection has assisted Ando in forming a perception of his spiritual and physical environment (Ando & Auping, 2002).

When architects discuss the purpose of their designs, they often refer to their own architectural theory while emphasizing the richness that natural elements like light and air add to spaces. Ando, for instance, suggests that designs gain meaning by utilizing natural elements to reflect the passage of time and the changing seasons within spaces (Ando, 1982).

Tadao Ando stands out as an architect who utilizes natural light in a way that defines his architecture. In Ando's works, light serves a purpose beyond illumination. It is possible to establish a

connection between humans and nature, and to link landscape and architecture through the use of light. The material he frequently uses in his projects, concrete, helps to reveal properties such as light reflectivity and variability, becoming a common element in Ando's architecture (Ando, 1995).

Ando introduces the metaphor of a 'light-reflecting screen' for concrete surfaces, showcasing his architectural approach in terms of surfaces that reflect different aspects of light in varying seasons (Ando, 1980). In his spatial designs, bright and dark areas are not opposing elements for Ando but rather elements that should be considered together as a whole, used in balance and harmony. He emphasizes the need for darkness for the existence of light, and draws attention to the quantity of light and shadow used for balance and harmony. According to him, the balanced light-dark relationship that people experience in a space will allow them to feel the world more intensely (Ando, 1995). The perception of light in Ando's architecture is linked to a duality that can be perceived through shadow (Ando & Auping, 2002).

3.1.1.2. Church of Light, Osaka

Completed in 1989, the Church of Light is situated in a residential area 25 kilometers from the center of Osaka. Occupying a 113 square meter floor area, the rectangular structure measures approximately 18 meters by 6 meters and stands 7 meters tall.

Ando chose to use a side facade rather than a front facade for the entrance. When examining the site plan, it becomes evident that a raw concrete wall, angled 15 degrees from the main mass of the building, directs visitors to circulate around the courtyard before entering. A small, reflective pool provides access to the interior. As seen in Ando's other works, the entrance to the building carries a significant meaning. This meaning suggests a sense of difference and, simultaneously, a detachment from the external world as the initial stage of meditation.

Inside, the space exhibits a distinctly Japanese aesthetic, characterized by clean lines and simple details (Figure 4). The texture of the floor, dark beams, and wooden benches allow the materials to express themselves as they are. Ando's preference for wooden benches stems from his desire to incorporate natural materials, especially in interior spaces. By introducing nature into the interior through materials, Ando seeks to establish a connection between the interior and the exterior of his architecture. This connection can be interpreted as either bringing the outdoors inside or animating the interior with nature. Both interpretations highlight a duality between nature and architecture (Paiva, 2015)

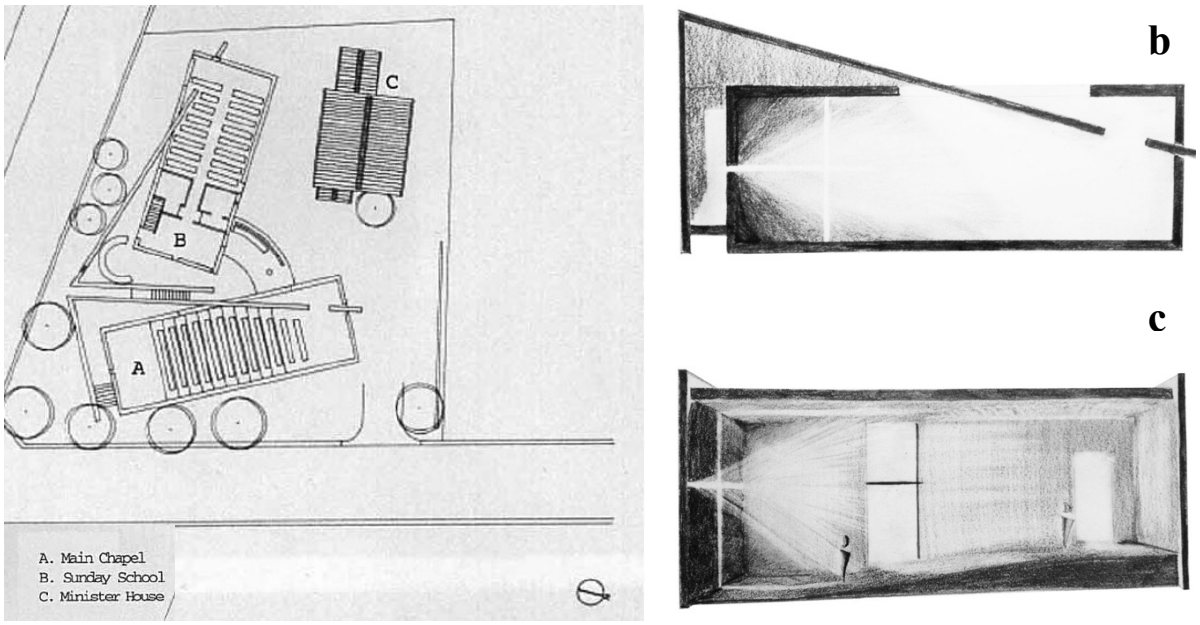

Figure 4. a) Site Plan of the Church of Light (Arhimanisharma, 2020), b,c) Church of Light, Sections (Arhimanisharma, 2020)

The cross-shaped opening in the main wall of the church, measuring 25 cm in width, serves as the only iconographic element within the interior of the building, etched into the raw concrete (Figure 5-a). Rather than positioning the altar wall to the typical East, Ando aligns it towards the Southeast, emphasizing the cross shape made of light (Schoof J., 2021). This alignment also enhances the contrast between light and shadow (Figure 5-b).

Ando incorporates the cross figure, associated with the concept of light, as a source of light within the structure. According to Paiva, the light emanating from the cross, which symbolically represents God's connection to nature, provides the sacredness needed for the church (Paiva, 2015).

The cross-shaped opening in the north wall and the window on the right wall facing east introduce natural light, also contributing to the creation of shadows. In this way, light not only makes the interior space visible but also creates an illusion of light space by linking the interior to the exterior through optical changes. The reflections of the cross shape that occur on the floor and ceiling throughout the day, influenced by the varying behaviors of light, add richness to the space (Özorhon, 2002). Erzen suggests that the light entering through the cross symbolizes infinity and emphasizes how the varying reflections of light throughout the day make the concrete wall surfaces seem immaterial (Figures 5). In this way, light helps define the interior as a surreal and spiritual space (Erzen, 2004).

According to Kroll, the simple interior design of the Church of Light provides users with secular awareness. He relates this simplicity to dualities such as solid-space, light-dark, and natural existence (Kroll, 2011). The changing light and dark areas throughout the day create a mysterious atmosphere in the space. The contrast achieved through this light-shadow interplay is interpreted as the concrete expression of divine power, creating both semantic and physical opposition (Salan, 2019). Plummer, on the other hand, draws attention to this contrast by noting how a dark shadow fills the space, obscuring it, while the way light enters prevents the connections between the walls from being visible, thereby damaging the solid reality and emphasizing the empty gaps (Plummer, 1997).

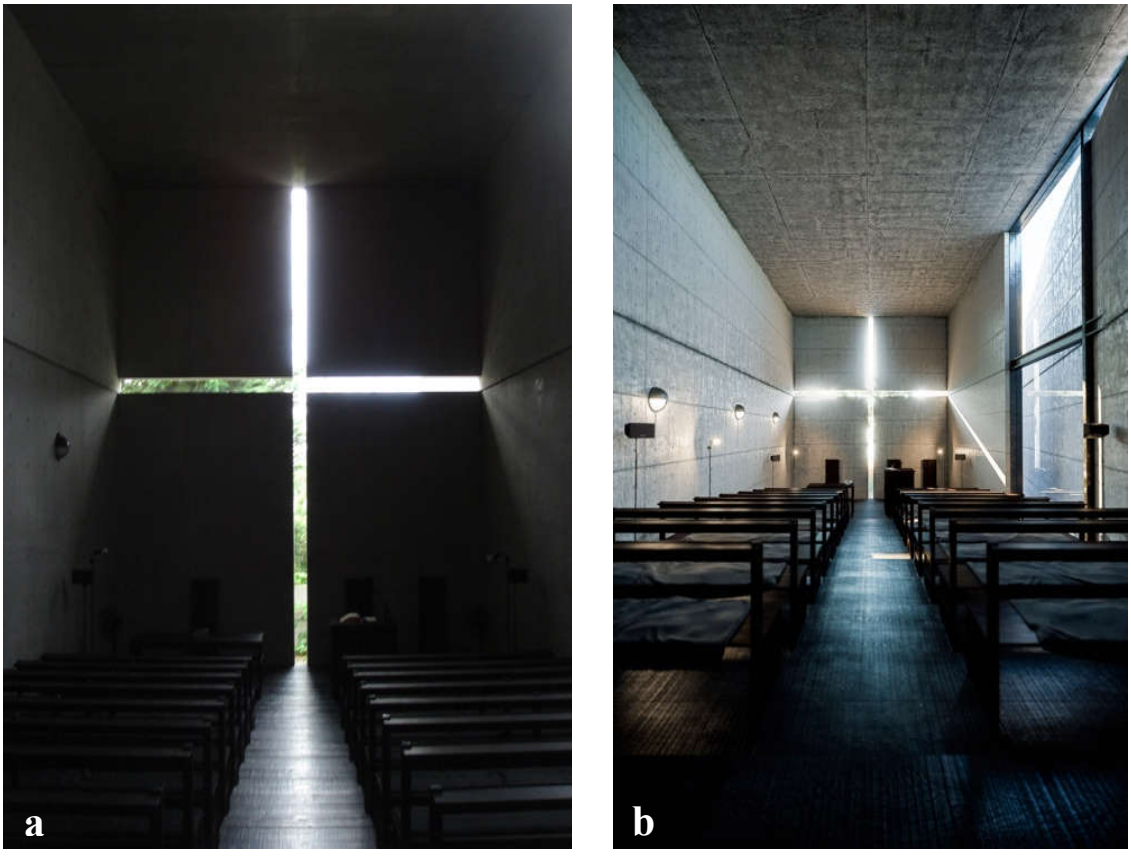

Figure 5. a) Church of Light, Interior (Arhimanisharma, 2020), b) Church of Light, Interior (Arhimanisharma, 2020)

Beyond form, Ando seeks to create an impact by reflecting a philosophical approach to space. The essential elements that constitute the spatial art he designed, integrated with nature, are material, simple geometry, nature, and light. In bringing together spatial geometry and light, he also draws from Buddhist philosophy and Japanese culture. The Church of Light, unified with nature, stimulates human thinking while considering light as a spiritual tool for vision (Çevik, 1999).

3.1.2. Sancaklar Mosque, Emre Arolat, Istanbul

Completed in 2013, the Sancaklar Mosque is located in Büyükçekmece, Istanbul, within a neighborhood of gated communities. Emre Arolat mentions that, while designing the Sancaklar Mosque, he focused on the essence of the religious space and deliberately avoided discussions surrounding traditional mosque forms. The design criteria prioritized physical and emotional gratification, with the mosque designed as a structure embedded in the terrain (URL-EAA).

At first glance, the Sancaklar Mosque complex reveals walls forming the courtyard boundary and a tall, rectangular prismatic stone minaret (Figure 6). The building is approached from the upper level, with steps parallel to the natural slope leading down to the mosque space at the lower level. Arolat describes the mosque space, reached via these steps, as a meditative area intended for prayer and solitude. Simplicity and humility are the key concepts the designer aimed to establish within the space (Arolat, 2018). The prayer hall was conceived as a cave-like area designed to be a place of solitude with God and was envisioned as a minimalist space free from ornamentation. The architect states that the only embellishment used in this space is “natural light” (URL-EAA). The primary materials for the surfaces are exposed concrete walls and natural stone.

Figure 6. Sancaklar Mosque (Arolat, n.d.)

The wall in the qibla direction is where the mihrab and minbar are located. A ceiling slit along this wall brings in natural light at different times of the day, creating a unique illumination for the prayer area (Figure 7). The slits and cracks in the exposed concrete wall emphasize the qibla direction (URL-EAA). Known as the “Light Wall,” the mihrab wall serves as a light source that illuminates the enclosed space. The light filtering through the slit at the junction of the wall and ceiling creates a striking interior atmosphere (Aktar, 2019).

The only adornment within the structure is the qibla wall, characterized by its slits and cracks illuminated by daylight, which varies according to the time of day. Additionally, the reflective black infinity wall bearing the Arabic letter “waw” is regarded as a particularly unique feature (Arolat, 2018).

Sancaklar Mosque is a structure worthy of being cited as an example in the context of designing unique architectures instead of traditional mosque typologies (Erdoğdu Erkarslan, 2014).

Figure 7. a,b) Sancaklar Mosque Site Plan and Sections (Arolat, n.d.)

In today's era, where constructing large and tall structures is regarded as a symbol of prestige, mosques are also being built with similar approaches. However, with its mass that does not impose itself and its structure embedded underground, Sancaklar Mosque stands apart from contemporary debates with its unique and thematic qualities (Parlak, 2019). One of the most distinctive features that make Sancaklar Mosque original is the use of natural light and the masterful way it is utilized (Figure 8). In his doctoral dissertation titled *The Shadow of Thought*, Thurell emphasizes that natural light is a symbolic element associated with sacred powers and highlights that the direct light filtering into the space through the slit in the ceiling is used to create a dramatic effect (Thurell, 1989).

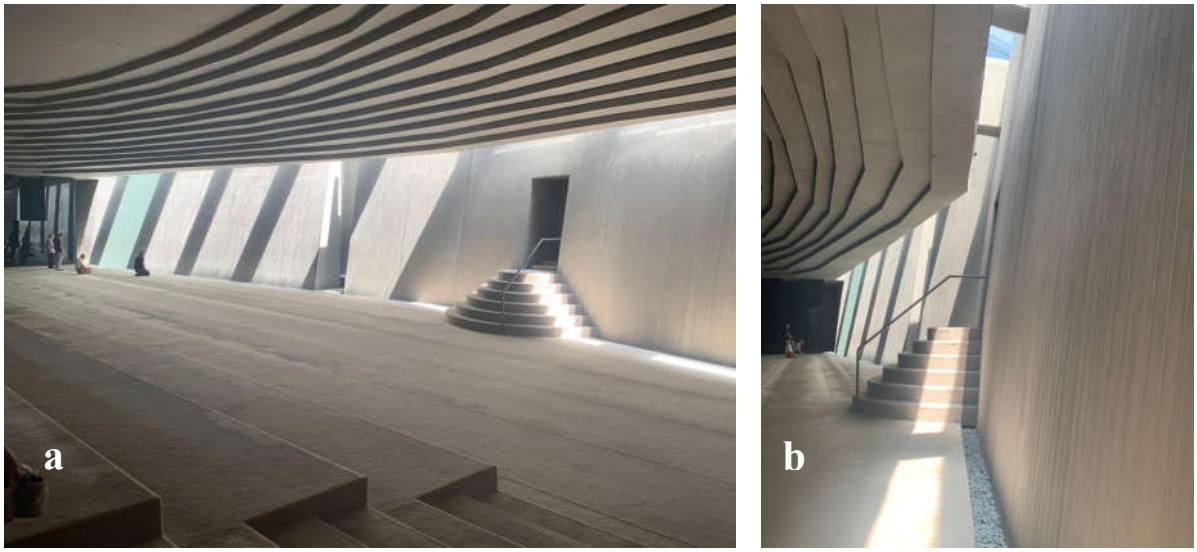

Figure 8. a) Sancaklar Mosque, Interior Photograph (From the Photograph Archive of Architect Esra Uçar Ercan), b) Qibla Wall - Natural Light Entry (From the Photograph Archive of Architect Esra Uçar Ercan)

4. Results

Tadao Ando's Church of Light and Emre Arolat's Sancaklar Mosque are two significant examples that highlight the potential of natural light in shaping spatial experience in modern architecture.

While both buildings embrace common elements such as the use of raw materials and the creation of space through minimalist forms, they offer unique spatial experiences by employing natural light through different strategies. Both architects have used natural light not only as a visual element but also as a tool that defines the spirit and meaning of the space.

The characteristics that define the physical identities of the structures examined in the spatial analysis, as well as their relationship with light and shadow, have been identified and summarized in Table 3. When looking at the differences in their physical identities, the most significant distinction between Ando's and Arolat's structures is the way they are perceived from the outside. When approaching the Church of Light as a pedestrian, the landscape elements, such as rocks and vegetation that serve to purify one before entering the worship space, reflect Japanese traditions and lead to a distinct geometric form. In contrast, the Sancaklar Mosque presents a space that is difficult to perceive from the outside, almost hidden below ground and blending into the topography. While there are topographical and landscape arrangements that prepare the visitor for entry into the space at the Sancaklar Mosque, its underground nature marks a volumetric difference, despite the similarities. The modernized stone minaret makes the Sancaklar Mosque visible and signals the presence of the space. These two buildings exhibit similarities in terms of their intended use and building materials.

Table 3. Analaysis Table. This table has been conceptualized by the author.

		Church of Light	**Sancaklar Mosque**	
				**Similarity Status**
Physical Identity of the Building	Architect	Tadao Ando	Emre Arolat	Different
	Location	Osaka, Japan	İstanbul, Türkiye	Different
	Year of Construction	1999	2012	Different
	Client	Church Administration	Sancaklar Foundation	Similar
	Purpose	Worship	Worship	Similar
	Building Materials	Exposed Concrete, Wood	Exposed Concrete, Natural Stone, Wood	Similar
	Architectural Language	Contemporary, Minimalist	Contemporary, Minimalist	Similar
	Building-Topography Relationship	Building on the Ground	Building Embedded Underground	Different

Light-Shade and Building Relationship	The State of Light in Transition	Light's change throughout the day reflects on the space	Light's change throughout the day reflects on the space	Similar
	Use of Light in Space	A window slot in the shape of a cross on the apse facade surface	A window slot on the qibla wall and ceiling plane surface	Similar
	Designed Nature	Designed during the project phase	Designed during the project phase	Similar
	Light-Shade Contrast	Light-Shade contrast is active in the space	Light-Shade contrast is active in the space	Similar
	Psychological Effect	Light as a spiritual visual tool	Mystical effect underground	Similar

Note. Image 1 from Tadao Ando: Master of light by Arhimanisharma, 2020.
Note. Image 2 from Sancaklar Mosque by Design Architecture Communication, n.d.

In the analysis, despite the geographical distance between the two worship spaces, one in Istanbul and the other in Osaka, strong similarities were found in the use of light and shadow within the space. In the spatial analysis section of this study, using theoretical frameworks, the similarities in the use of light and shadow in the two examined spaces have been identified as follows:

The state of light changing throughout the day*: In* both buildings, the state of light changing throughout the day physically occurs within the space. This creates different perceptions for users at different times of the day.

The way light is used in the space*:* In both buildings, the inclusion of light in the space occurs on surfaces that are the focal points of these worship spaces. Influenced by Japanese culture, Ando uses light as a geometric tool with his unique minimalist approach, while Arolat incorporates light into the space in a different way by creating his own architectural language. In the Church of Light, the cross-shaped slit on the apse, and in Sancaklar Mosque, the slit opened in the ceiling along the qibla wall, become geometries that form the dark and light surfaces inside the building.

The designed nature of light's perception in the space*:* In both buildings, the placement of light within the space was planned as a key determinant during the project phase, and its intended effect was designed. The way light is used as an active element in the building design has made light the most prominent feature in the identity of both spaces.

The formation of the light-shadow contrast relationship in the space*:* In both buildings, the contrast between light and shadow serves to strengthen the symbolic effect intended.

The psychological effect created by light in the space*:* According to the data obtained from the literature review, the psychological effects intended by the architects in the way they incorporated light into the space were also experienced by those who interacted with the spaces. In the Church of Light, the light-shadow lines emphasize the depth of the space, while in Sancaklar Mosque, the natural light entering the underground dark space creates a mystical atmosphere. In both buildings, light interacts with the geometric structure of the space, inviting users into a different experience of time and space. This interaction occurs in a more linear and controlled manner in Ando's buildings, while in Arolat's buildings, it carries a more organic and experimental character.

5. Discussion and Conclusion

The two worship spaces in question, despite their geographical distance—one in Istanbul and the other in Osaka—demonstrate volumetric presences where their functions are symbolized through light. These two buildings, which contain dark/shadowed areas and simultaneously establish a connection with the outside world through natural light as part of their design process, highlight the most significant commonality: the courage to offer a contemporary interpretation in architecture. It is believed that buildings like the Church of Light and Sancaklar Mosque have contributed to the rediscovery of the importance of natural light in contemporary architecture. However, when looking at

modern cities, it is evident that insufficient attention is paid to the effective use of natural light in spatial design. Processes and practices that prioritize artificial lighting in design tend to increase energy consumption and negatively affect the health of users. Standardized lighting systems, which are often applied in buildings where natural light is ignored, do not contribute to the unique character of these spaces. This situation leads to increased energy consumption and visual pollution in different types of buildings, such as residential, educational, commercial, religious structures, and public spaces.

In contemporary architectural practices, a holistic approach to incorporating natural light into buildings is thought to significantly influence the resulting spatial quality. Experts from various disciplines should collaborate across different scales, from urban planning to interior design. Architects, engineers, and lighting specialists should work together in synergy. The inclusion of natural light should be prioritized from the beginning of the design phase to ensure its most efficient use. The goal should be to create energy-efficient buildings by designing and implementing smart lighting systems that can automatically adjust to changes in the external environment.

As shown in the selected examples for spatial analysis, the relationship between humans and nature plays a key role in shaping the character of space designs. The use of natural light, alongside the selection of natural materials in the design phase, should serve as key elements in strengthening this connection. This study demonstrates that natural light is not only a visual element in architecture but also a tool that shapes spatial experiences, triggers emotional responses, and carries deep meanings. The examples of Ando and Arolat offer new perspectives on the use of natural light in modern architecture, providing inspiration for future research. In this context, buildings like the Church of Light and Sancaklar Mosque are significant examples that showcase the power and importance of light in architecture.

However, this study has some limitations. For instance, as it is based on only two buildings, the generalizability of the results is limited. Additionally, issues such as the use of natural light in different climates and geographical conditions, and the interaction of various materials with natural light, could be examined in greater detail. Future studies could focus on topics such as the use of natural light in different building types (residential, office, school, etc.), the symbolic meanings of natural light across various cultures, the effects of natural light on human health, and the impact of natural light on energy savings and sustainability. Furthermore, research could explore international standards and regulations related to the use of natural light.

The increased use of natural light in architectural design is not just an aesthetic choice but also an important step toward a sustainable future. The use of natural light reduces energy consumption, minimizes environmental impacts, and can have positive effects on human health. Therefore, architectural education, building regulations, and public policies should be restructured to emphasize the importance of natural light.

In conclusion, this study demonstrates that natural light plays a significant role in architectural design. It is concluded that, in order to design more sustainable and human-centered buildings, the importance of natural light must be rediscovered and further incorporated into spatial design in the future.

References

Aktar, E. B. (2019). *Search For Spatial Self Based on Multiple Sensation : An Application in Sancaklar Mosque* (M. Sc. Thesis). Yıldız Technical University, Institute of Science, Istanbul, Turkey.

Altan, İ. (1983). *Mimaride Işık-Gölge Ilişkilerinin Psikolojik Etkileri Üzerine Bir Araştırma* (M. Sc. Thesis). Yıldız Technical University, Institute of Science, Istanbul, Turkey.

Ando, T. (1980). *The Emotionally Made Architectural Spaces of Tadao Ando*. The Japan.

Ando, T. (1982). *From Self-enclosed Modern Architecture toward Universality*. Japan Architect.

Ando, T. (1995). *Tadao Ando: complete works*. Phaidon Press.

Ando, T. & Auping, M. (2002). *Seven interviews with Tadao Ando*. Modern Art Museum of Fort Worth

Arhimanisharma. (2020, August 4). *Tadao Ando: Master of light*. Ardetails. https://ardetails.home.blog/2020/08/04/tadao-ando-master-of-light/

Arolat, E. (2018). *Scent of the Trace*. ORO Editions.

Arolat, E. (n.d.). *Sancaklar Mosque*. Emre Arolat Architecture. Retrieved January 13, 2025, from https://emrearolat.com/project/sancaklar-mosque/

Bilgi, A. (2007). *İnsan-Mekan-Işık Etkileşimi ve Işığın Mekandaki Psikolojik Etkilerinin Değerlendirilmesi* (M. Sc. Thesis). Yıldız Technical University, Institute of Science, Istanbul, Turkey.

Baeza. (1991). Alberto Campo Baeza. *L'Architecture D'Aujord'hui*, 274.

Baeza, A. C. (2004). *Alberto Campo Baeza*. Electa Ed.

Brogan, J. (1997). Introduction. *Architectural Design*, 3-4.

Ciriani, H. (1991). Four lights. *L'Architecture D'Aujord'hui*, 274, 75-82.

Çevik, A. (1999). *Peter Eisenman-Tadao Ando: Doğu ve Batı Kültürlerinde Insan-Mekan-Doğa Ilişkileri.* Mimarlar Odası İzmir Şubesi Yayınları

Demers, C. (2016). Architectural lighting: Designing with light and space. Laurence King Publishing.

Eliade, M. (2003). *Dinsel Inançlar ve Düşünceler Tarihi (Vols. 1-3, A. Berktay, Trans.)*. Kabalcı Yayınevi.

Erdoğdu Erkarslan, Ö. (2014). *Sancaklar Camisi İdrak ve Teslimiyet*. Mimarlık Dergisi, 379, 18-22.

Erzen, J. N. (2004). *Tadao Ando's Architecture in The Light of Japanese Aesthetics*. Journal of the Faculty of Architecture, METU, Ankara, p. 78.

Hançerlioğlu, O. (1996). *Felsefe sözlüğü* (18th ed.). Remzi Kitabevi.

Kahn, L. I. (1974). Credo. *Architectural Design*, 5, 280.

Kahn, L. I. (1968). *Architecture: Silence and light* (D. B. Brownlee, Ed.). Guggenheim Museum.

Kroll, A. (2011). "AD Classics: Church of the Light / Tadao Ando Architect & Associates". *ArchDaily*. Retrieved May 27, 2024, from https://www.archdaily.com/101260/ad-classics-church-of-the-light-tadao-ando/

Kuban, D. (1992). *Mimarlık kavramları*. YEM Yayınları.

Kutlu, G. H. (2001). Çağdaş mimarlıkta ışık kullanımı: Kavramlar ve uygulamalar. *Ege Mimarlık*, 38-39, 14-17.

Loud, P. C. (Ed.). (1989). The art museums of Louis I. Kahn. Duke University Press.

Lynch, K. (1966). *Site planning*. The MIT Press.

Millet, M. S. (1996). *Light revealing architecture*. Van Nostrand Reinhold

Moazemi, S. (2013). *Işığın iç mekan biçimlendirmesindeki rolünü kapalıçarşı ve AVM'ler üzerinden karşılaştırılarak değerlendirilmesi* [Master's thesis, Hacettepe University].

Nietzsche, F. (1959). *The philosophy of art history* (H. Arnold, Trans.). Knopf.

Notre Dame Du Haut | Architectuul. (2015, 12 13). Retrieved 12 2024, from Architectuul: https://architectuul.com/architecture/notre-dame-du-haut

Nussaum, Y. (2009). *Tadao Ando*. Birkhauser.

Özorhon, İ. F. (2002). *Mimari mekan kimliğini belirleyen yönüyle doğal ışık* [Master's thesis, Istanbul Technical University].

Parlak, S. Ö. (2019). *İç mekan tasarımında metafor uygulamaları: Büyükçekmece Sancaklar Camii örneği* [Unpublished master's thesis, Beykent University].

Pallasmaa, J. (2005). The eyes of the skin: Architecture and the senses (2nd ed.). John Wiley & Sons. https://zuckermanhartung.org/wp-content/uploads/2022/08/pallasmaa_the-eyes-of-the-skin.pdf

Pallasmaa, J. (2016). *Tenin gözleri: Mimarlık ve duyular* (3rd ed., A. U. Kılıç, Trans.). YEM Yayınları.

Paiva, R. (2015). Light and shadow: The importance of light in the Church of Sta. Maria and the Church of Light, of Siza and Ando. *Bulletin of Portuguese/Japanese Studies*, 1.

Plummer, H. (1997). Building with light. *Architectural Design*, 3-4, 16-21.

Roth, L. M. (1993). *Understanding architecture*. Harper Collins Publishers.

Roth, L. M. (2000). *Mimarlığın öyküsü*. Kabalcı Yayınevi.

Salan, Z., & Gürani, F. Y. (2019). Kutsal mekanda ışığın tanrı metaforu. *Ç.Ü. Sosyal Bilimler Enstitüsü Dergisi*, 28(2), 18-30.

Schoof, J. (2021, September 9). Sensory Masterpiece: Church of the Light by Tadao Ando in Ibaraki (1991). Detail. Retrieved January 13, 2025, from https://www.detail.de/de_en/sensory-masterpiece-church-of-the-light-by-tadao-ando-in-ibaraki-1991

Thurell, S. (1989). *The shadow of a thought* [Doctoral thesis, Stockholm University].

URL-EAA Eşik belgeseli. (n.d.). *Eşik or 3. bölüm*. TRT2. Retrieved from https://www.trt2.com.tr/content/video/esik-or-3-bolum-7025677

Yamu, C. (2014). It is simply complex(ity): Modeling and simulation in the light of decision-making, emergent structures and a world of non-linearity. *disP - The Planning Review, 50*(4), 43–53. https://doi.org/10.1080/02513625.2014.1007662

Zeballos, C. (2010, September 27). *Light and the Pantheon*. Architectural Moleskine. Retrieved January 13, 2025, from http://architecturalmoleskine.blogspot.com/2010/09/light-and-pantheon.html