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The Importance of Light in Steven Holl's Perception of Form

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Abstract

The essential factor in the perception of form and space is light which enables the perception of the form or space, its colour, texture, material, that is, the whole. Daylight significantly affects the shaping of structures and the enrichment of sensory perception, psychologically and biologically. This article aims to examine the importance given by Steven Holl on the effects of natural light in the perception of the form. Within the scope of the study, through three different museum structures of Holl, functional and symbolic perception of the form and its contribution to the design were examined. Results show that in Steven Holl's design process, the inclusion of light in the building is an important design criterion that affects the form phenomenon and the perception of space. Contextually, it has been seen that it is dependent on the location, the angle of incidence of the sun's rays, and it reveals a sustainable design product because it saves energy.

Keywords: Form; Daylight; Perception; Steven Holl; Sustainability.

1. Introduction

When the change on the architectural form throughout history is investigated, light affects the structure in terms of visually and functionally. The existence of the light is the most crucial condition to comprehend the form, space and structure. According to Kuban (1974) existence of space appears with light. As an essential part of life, light is also indispensable to understand the attributes of the space. Light has a big impact on a perception of the individual and it is used by many designers throughout the architectural history. Steven Holl's designs, in the essence is composed by light. Holl uses daylight in his designs to create different ambients according to function of the space. He achieves this by adding the light indirectly in the space and controlling its reflection. Light is received indirectly by gaps on the double layered walls, windows, half transparent cloths and even by the materials on the horizontal surface.

Chernyshov (2008), indicates that Holl put importance to the light because of its effect on the perception and spatial experience. He states that Holl sees light not only physically but also as a great poetical and spiritual power. Alves (2009) remarks that in Holl's thoughts, light is an important contributor to understand the architectural quality of the space and makes the spaces visible. Structures of Holl aims to express, abstract concepts and perception and indicates the strongest expression method is light and shadow for this purpose.

Holl studies light and its effect on the space in his watercolor sketches and uses light for the perception of the space during nights. Holl achieves spatial effect with minimum natural light usage and uses shadows of the objects in the nature for his landscape designs. Affect of the natural light and shadow gives the design liveliness, energy and dynamism (Özorhon, 2002)

Yorgancıoğlu (2004) states that Holl uses tactical sensitivity of the form and space, also uses light poetically together with changing properties of the natural light. In Holl's phenomenological trials, the defining factor for the existence and the sensation of the depth of the space is light. Thanks to this, light inside the space creates artistic and aesthetic effects.

In this article, it is aimed to investigate the Steven Holl's thoughts on the importance of the natural light to perceive the form. In this context, functional and symbolic usage of the light for 3 different museum structure is investigated in terms of perception of the form and sustainable effect of the light for design.

2. Theoretical Background

2.1 Effect of Light on the Formation of the Architectural Form

Bacon (1974) states that there is a connection between architectural form, mass and space. Architectural form, texture, color, material, shadow and change of light are the attributes to reveal the space. Lowson indicates that existence of light is the most significant factor on the creation of the architectural form and perception of it. Light achieves the perception of the color, texture and material of the form (Lowson, 2003). According to Kuban (1992), light is an important part of the space to understand the attributes of the limited gap. Light also provides the connection between the structure, color, form and material. Çoban (1999), thinks that light and shadow affect the expression of the form and the mobility of the space. Good lighting of the space depends on the quality of the light not the amount of it.

Pallasmaa (2005), states that light gains meaning when it creates shadows. Due to this, biggest effect of light is the shadow. Light is accepted as an architectural factor historically. Gürel (2001) remarks that attributes like light inside the

space, darkness, spaciousness, dimness, focusing problem of the people and their anxiety, stress and tension are affected by light. Thus, light that are used for different purposes inside spaces has psychological effects.

In order to perceive and feel the effect of the space and to ability to see light has big impact. Light that is used inside the space also affects physical movements. According to Tezel (2007) diffusers with wide surface and light colors creates shadowless effects. This kind of spaces feels wide and comfortable. Not enough light or too much of it inside the space makes the actions like reading difficult. Allowing natural light into the space or avoiding it affects the design. Natural light affects the design, space, facade design, porousness, and structure rhythm. Functionally, there is a need of light in different levels inside the space. To create wanted effects, allowing light into the space affects the form. In different periods of architecture, using the water objects as mirrors, different properties of the light are benefited.

Özorhon (2002) states that, light functionally ensures us to understand the texture, volume, color, natural and real form of the objects inside the space. To understand our position, direct our movements and performing our routines inside the space, light has qualitative and quantitative effects.

2.2. Steven Holl and Daylight

Steven Holl whose form and space design depends on experience, uses light as an architectural object and material. As any experience is affected by light, Holl puts a lot of importance to usage of light. Light is not divided in perception of form. Thanks to this, light interacts with the shadow of a tree, shiny surfaces of concrete walls and the bodies. Holl is inspired by experientially and sensorial dimensions in his architecture and performs his designs that uses light and shadow significantly. According to Holl light that defines form has poetical value and enriches the space. Holl often uses light tricks as an expression method. The most effective way to visualize the phenomenological thoughts and architecture for Holl is to use the light (Chernyshov, 2008; Holl, 2000; Skandali, & Lambiri, 2018).

Holl uses modern styles and gives importance to handcraft in his designs. He uses fourth dimension often and striking effects of this in the space are shown by the reflection of light. In addition to the structural architecture, he also tends to the interior architecture as well to provide completeness. Structure as spatially product of many meanings layer (Gündüz, 2015). Steven Holl starts his design with watercolor sketches and three-dimensional drawings, carefully uses perceptive interactions of body and space and proper usage of light and materials in his projects that include the history of the city and the power of the modern scientific ways. In Holl's perspective, space is bound to be forgotten without the usage of light. The expression of the space is achieved by the reflection, refraction, lucency and opaqueness of the light. Light transits through the living spaces and makes the space ambiguous. This ambiguity is expressed by the effect of the light on a surface and showing the psychological and remarkable limits of the architecture. The transparency of the wall, reflection of the mirror, light beam and its interactions to an individual's life directs the perceptions (Holl, 2000).

Steven Holl uses daylight by passing it through certain filters to create different atmosphere according to the functionality inside the space. His material choice also decided by the effect of the light. Water objects are used to give the feeling of depth to the light in his designs. Artificial pools are placed between big and heavy forms to not allow the space to be stationary and the reflection from the water surface gains more meaning on the space. Holl shows the psychological limits of the architecture by the shadows that are created with a pool of light inside a space or on a surface (Özorhon, 2002; Holl, 2000; Medayese et al., 2019).

Experience is put on front in Holl's designs, he focuses on the texture of the material, details, and the effects of reflection of lights inside a space. This effect is shown by the tricks of light inside the space and its shadow to transfer the texture, smell, and architecture of the space (Kipnis, 2003).

In Holl's structures, diversity of the light that happens in different time of the day creates a special experience. Fluent spaces are dissolved by the effect of light and new spaces appears. By describing changing light forms positive effects are shown (Descottes, 2009).

Steven Holl thinks that functions of land and structure, daylight receiving angle, circulation and structure entrances position are the deciding factors for designs and believes location affects the architecture. In design process, he calculates the time of receiving daylight for the land and considers the reflections and refractions of the light by planning on the model to involve light in the process (Tezel, 2007). Holl tries to bring daylight where normally would not receive any. In his designs he always takes care to bring daylight without thinking about the purpose of the structure. Schoof states that, for Holl to understand how the time passes inside the space, a sunset need to be seen (Schoof, 2017).

2.3. Important Principles in Daylight Usage of Steven Holl

Usage of Daylight: The way of allowing daylight inside the space offers different meanings. The method to use the light directly affects the design. Holl uses the changing properties of daylight and its spatial effects. He uses light poetically, to control light reflections and structure them he does not use direct methods but prefer architectural objects to transfer the light to interior spaces. Using light creates plastic and artistic effects (Yorgancioğlu, 2004). Holl connects the resources of the natural and artificial lights and combine them with the geometry of the space (Descottes, 2009). Holl uses direct light functionally in his museum designs and indirect lights are used symbolically. Holl reflects the light from the colorful

areas or water surfaces to use the light symbolically and brings visual enrichment. By adding fully transparent surfaces, he collects daylight as much as possible for the interior spaces and use the light functionally (Tezel, 2007).

Effect of Light on Sustainability: Holl uses daylight for heating in winter and cooling for summer in his structures. In his designs by orientation, he takes advantage of the daylight. By receiving daylight from horizontally and vertically from the roof he creates visual effects for the users. Due to big gaps on structure fronts, he controls the light. In some structures, these gaps, performs the natural ventilation of the space and allow light reaching to landscape corridors (Amen, 2021). Holl uses daylight from the roof to creates warm atriums for the design taking place in cold environments (Tezel, 2007). In museums daylight is preferred to save from energy consumption. Because of this Holl prefers to distribute the light homogenously inside the space (Fiederer, 2016).

Form-Space Perception by Effect of Light: Holl, phenomenologically uses light for experience of the space. Light achieves depth of space and defining factor of the space. Holl thinks spaces shows poetical properties. Poems which have both existential and creative ways, are effective methods to express emotional and experimental intensity in architectural aspects. Holl, achieves this poetical spatiality by form, light and shadow (Yorgancioğlu, 2004). For instance, he uses light as a 'silent but dramatic surface' for museums and different unorganized exhibit rooms to show unique artistic items (Fiederer, 2016). The diversity of the exhibit differentiates by the light coming from the surface gaps inside the space. Light causes feel of motion inside the space. Due to this usage of light depending on the motion creates spatial perception. Holl focuses on experiential and poetic so according to Holl geometry of the form, material and experience of the light depends on the individual perception of the space (Kipnis, 2003).

3. Case Study

3.1. Material and Research Method

Material of the case study are the chosen museums of Steven Holl. To understand how Holl uses daylight, first effect of light on architectural form is investigated by literature works. Furthermore, principals of daylight usage on the structures of Steven Holl are specified. To better explain the principals of Holl on daylight usage; "**Usage of Daylight**", "**Effect of Light on Sustainability**" and "**Form-Space Perception by Effect of Light**"; three different museum structures has been chosen. Chosen museums are Kiasma Modern Art Museum, Nelson Atkins Art Museum and Nancy and Rich Kinder Museum. These museums are chosen based on them addressing wider user group, being most renown work of Holl, being built apart 10 years between and being competition projects. Museums are investigated by theoretical knowledge and visuals and analyzed by the principals of daylight usage and architectural plans. Findings form this analysis are shown in tables and present the results.

3.2. Kiasma Modern Art Museum

In 1992, after a competition between 516 projects, design of Holl is chosen for an art museum in Helsinki. Museum has collections, art exhibits, stage shows, conferences, seminars, workshop activities, dans and music events which opened to public in 1998. This museum is accepted as a masterpiece of Holl and receives the AIA Design award in 1998 (Sirel and Sirel, 2021) (Figure 1).

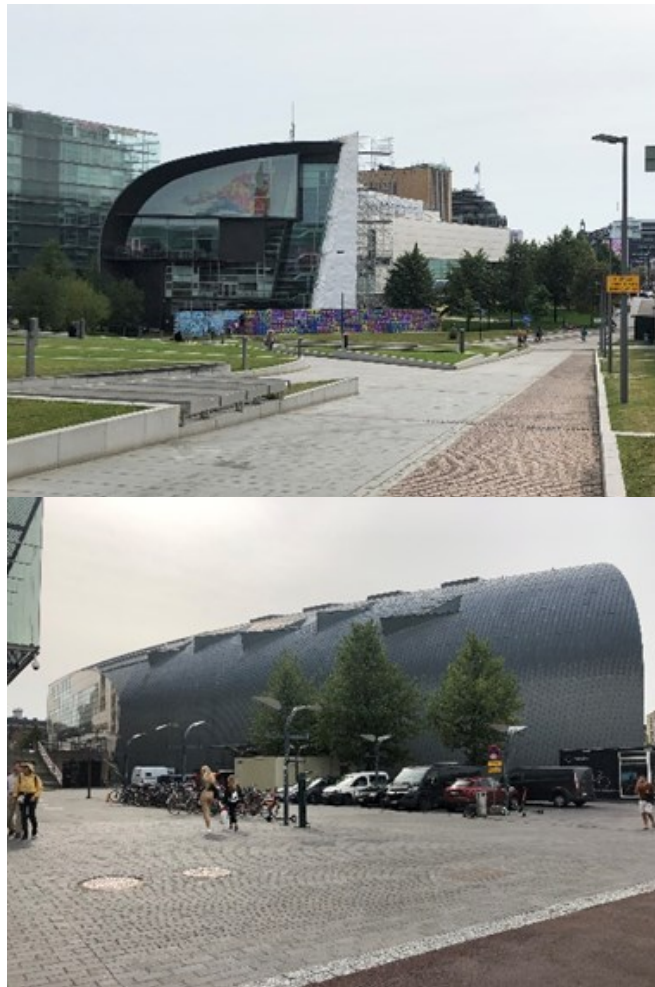


Figure 1. Kiasma Museum general view (Sirel, 2019)

It is placed in the hearth of Helsinki and one the center of the most important structures of the city. Museum is placed on the Töölö gulf and it being on the “ground” is the deciding factor of its form. Museum building is on a triangle island that reaches the Töölö Gulf and Park. Many of the important and architectural government and cultural structures are nearby such as Finland Parliamentary Building, Alvar Aalto Congress Building, Eliel Saarinen’s Helsinki Station (Table 1). This location helps the form of the structure getting shaped. Museum connects to the Congress Center with a cultural way, also connects to the natural view such as Töölö gulf naturally. West side of the structure is a linear mass and east side is a shape of arc. Two sides of the form connect on the north end and intersects with the fully reflective pool on the south side of the Töölö gulf (Fiederer, L., 2016, Sirel and Sirel, 2020), (Figure 2).

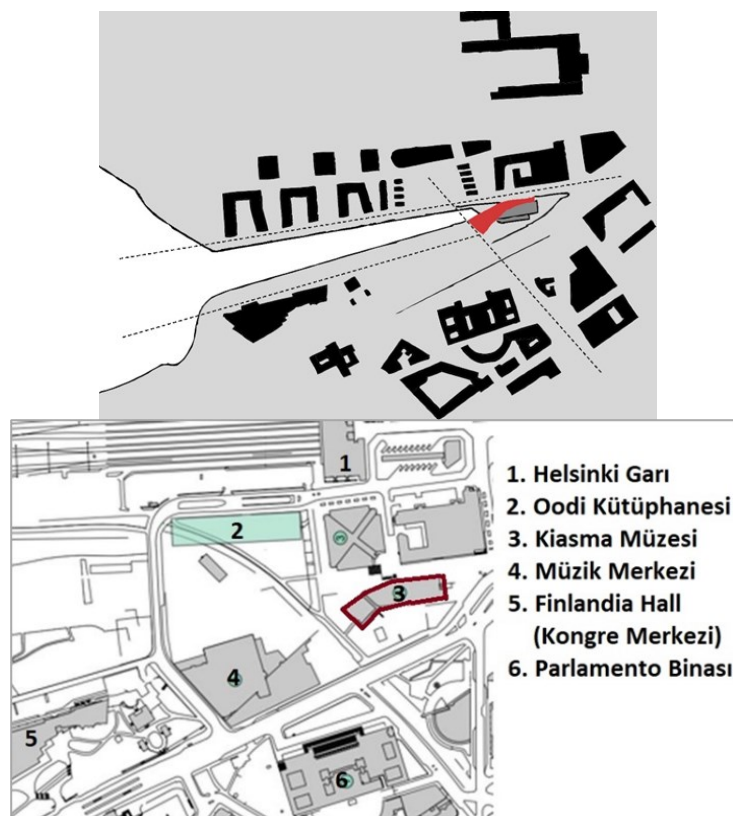


Figure 2. Kiasma Museum Location (Sirel, 2019)

“Chiasma”, in Greek derives from a word “χιασμος-khiasmos” meaning cross link, transit or change and root of it comes from letters “x” and “khi”. Ancient world defines the “khiasmos” thing that all part of it is connected to each other tightly and combines to a mirror symmetry. Holl also put the background of his project into connection part of this word and design the museum like two hand holding each other. Name of the project Chiasma later on adapted to Finnish and permanent name of the Museum becomes “Kiasma” (Sirel and Sirel, 2021).



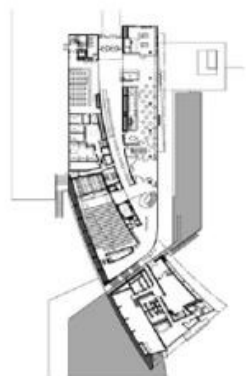

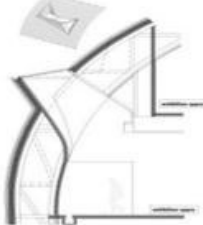


Kiasma modern art museum daylight usage principal are the followings:

Usage of Daylight: In architectural design of the Kiasma one of the critical aspects is usage of the light. When Holl design the arc shape building, more than form is considered. This arc shape form is designed in a way to catch the very low angled sunlight during long lasting winters of the country that is the in the top part of the northern hemisphere. Windows and gaps are designed which take advantage of often changing character of the daylight, thus creating unique visuals to the mass. Daylight coming from wide, shows difference due to angled surface of the building during the day (Bianchini, 2019). Most of the windows in Kiasma have the half transparent mirrors that distributes the light (Sirel and Sirel, 2021). Since exhibit areas does not require to be connected to outer world, just windows on the roof are used for daylight. Thanks to curved shape of the structure, it receives daylight directly and reflects it to the exhibit rooms. Lower room galleries receive indirect daylight from the transparent linear shaped surface of the front side of the building (Holl, 2000; Sirel, 2021). The most riveting part of the in the interior side of the building is where visitors enter the museum on the glass roofed lobby. Lobby is the entrance to the corridor with rotary stairs and curved ramp. According to Holl, galleries must be created by rectangular shaped areas which have curved valls (Table 1). These spaces looking ordinary, once light enters inside, creates visual and spatial experiences. Thanks to the effect of this light and the interconnections of unorganized formed spaces and dynamic inner circulations creates variety of spatial experiences (Fiederer, 2016). Thus, direct daylight is used functionally, and indirect daylight is used symbolically.

Effect of Light on Sustainability: Holl, in design of Kiasma, uses the orientation and daylight in utmost importance. Daylight is used in a way to be distributed homogenously inside the whole museum space to save from energy consumption (Fiederer, 2016). Horizontal daylights are received from the gaps that are located on the curved shape of the building. These windows are also used for natural ventilation and daylight connection to landscape corridors.

Form-Space Perception by Effect of Light: Holl uses light in the design of the Kiasma, as a factor to create the feeling of spatial depth and define the space. While creating the architectural form of the structure, for the purpose of reflecting very low angled daylight to the interior spaces during the winters, curved shapes and curved roof shell are used.

Table.1 Kiasma Modern Art Museum, Properties of Daylight (URL-3, Sirel, 2019)

Kiasma Modern Art Museum and Panoramic Visual			
			
Principals of Daylight Usage	Usage of Daylight	Light is received from directly and indirectly to be used functionally and symbolically.	 Views of Plans
	Effect of Light on Sustainability	Due to area receiving low amount of light, structure is designed to reflect the light and gaps are added to allow light inside constantly.	
	Form-Space perception by effect of light	Depth feeling of the space and definition of space is done by usage of light.	 Entrance Level Plan
 General View		 Daylight Detail	 Section
 Natural Lighting Methods			

3.3. Nelson Atkins Art Museum

Nelson Atkins Art Museum first opened in 1933 as 'William Rockhill Nelson Art Gallery' and 'Mary Atkins Fine Arts Museum' in the state of Kansas, USA. Beaux Arts architectural style is used for the design and a need for further expansion to the existent building appeared. For this purpose, a competition for the design started. In 2007, new structures named "Bloch Buildings" are constructed by Steven Holl Architects. With the new buildings, new galleries and warehouse areas are created for the further expanding collection of the museum (Arslan, Orhan and Disli, 2020).

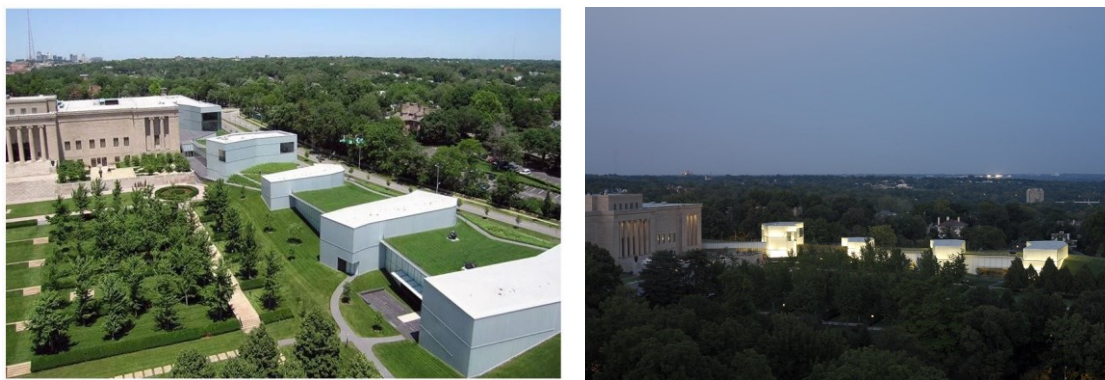


Figure 3. General View of the Nelson Atkins Art Museum (Ryan, 2008)

Bloch buildings are placed on the east side of the museum area according to the inclined area of the land, on a linear line. Majority of the needed are for the Bloch buildings are on the underground of the museum area. Bloch buildings are elevated gradually and thanks to the lenses underground galleries and lobbies are brightened by daylight (Reid, 2009), (Figure 3). Bloch buildings are designed with a contradictory way. Bloch buildings are multi surfaced forms. While existing building are covered with limestone and has a heavy frontside, front of Bloch Buildings has U shaped semitransparent mirror channels (Stephens, 2007) (Figure 4).

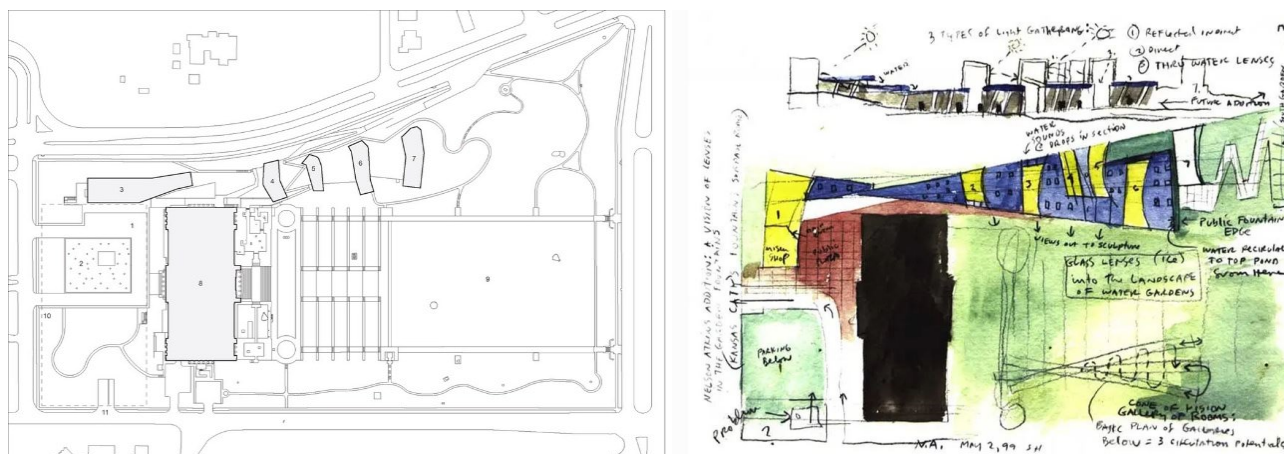


Figure 4. Nelson Atkins Art Museum Location (Bianchini, 2019)

Nelson Atkins Art Museum's daylight usage principals are the following:

Usage of Daylight: The movement between the circulation area on the land and the lenses of the Bloch Buildings that collect light, creates visual experiences for the visitors. Glass lenses gains the variety of light properties for the galleries. For the addition of new buildings to the museum, instead of adding massive mass, five connected structures are added to create contrast (Table 2). Lenses gives daylight during the day, and during night light in the gallery reflects to the sculpture garden. For the entrance, a lobby is designed with shiny and transparent mirror and transit to the galleries are achieved by ramps. Thanks to the lenses that are placed on the surface of the reflective pool parking area is brightened which connecting directly to the lobby (Tanyeli, 2002). In addition, shining light of the entrance reflects from the pool that is located on the front courtyard. Design expresses the physical existence. (Roginska-Niesluchowska, 2016)

Effect of Light on Sustainability: New structures has a sustainable concept, in which sculpture garden continues on the roof of galleries creating sculpture courts and also creates highly insulated green roofs to control rains (Ryan, 2008). In front of glass lenses, with the thought of lighting and ventilation a structure is designed. Curved lower surfaces reflect light on the galleries, hanger system contains both glasses and ventilation channels. Double glass gaps of the lenses, stores the air that is heated by the daylight and uses for the heating of the building on the winter season, for summer seasons the air is released outside. Optimum light levels for any art and media corporation and seasonal flexibility needs are achieved by computer-controlled screens and half transparent insulated materials that are placed on the glass gaps (Tanyeli, 2002; Ryan, 2008).

Form-Space Perception by the Effect of Light: Nelson Atkins Art Museum's five additional lenses creates very lively interaction between architecture and landscape with half transparency, opaqueness, tranquility, and energy. Half transparent multi layered glass levels of the lenses sometimes materialize the light like a block of ice, collects and

distributes them. During the day, galleries receive the light in different ways, on nights sculpture garden brightens with its own lights (URL-5). Holl combines the architecture with landscaping to create the experimental architectural form. "Experience", appears when people move inside space and time and once their perception changes. New additional structure combines with sculpture garden and enriches the experience of the people (Glassfabrik Lamberts, 2007). Transits of the museums do not overlap and placed in a way to see each other. Due to natural light, spaces are designed to allow different perspectives. Thanks to this, inside the space, different perspectives and experiences will occur (Çopur, 2018).

Table.2. Nelson Atkins Art Museum Daylight Properties (Ryan,2008; URL-4)

Nelson Atkins Art Museum and Panoramic View			
Principals of Daylight Usage	Usage of Daylight		Light is used indirectly inside the space symbolically.
	Effect of Light on Sustainability		Light that is heated by the daylight is stored to heat the building on winter and released on summer.
	Form-Space Perception by the Effect of Light		Half transparent glass layers of the structure receive light in different angles to create interactions on the perception of the space.
General View		Daylight Detail	Views of Plans
Natural Lighting Details		Section	Floor Plan

3.4. Nancy and Rich Kinder Museum

In 2011, Steven Holl Architects crew compete on the Renovation and Development Project and succeed to construct Nancy and Rich Kinder Building in 2020 in Houston. In the first stage of the competition, building is seen to be the part of the campus for Houston Fine Art Museum (Figure 5). The important factor is, moving the park areas underground and creating a pedestrian friendly area and for this concept, empty areas are created for outdoor gathering places. Structure

is placed in the center of important architectural symbols such as Caroline Wiess Law Building, Audrey Jones Beck Building, Cullen Sculpture Garden, Glassell Art School (Yukyung, 2021).



Figure 5. Nancy and Rich Kinder Museum General View (Url-7)

Steven Holl Architects leads the project which was the biggest North America cultural design. Seven garden that exist on the project, are on the entrance of the structure. From entering in any entrance, atrium that includes monumental, curved stairs is reached. Galleries on the structure constantly provides circulation on the space. Galleries creates openness feeling, in which circulation is intuitional. Gardens on the museum provides porousness throughout the structure. Old and new structures are combined to each other on horizontal level (Sitz, 2020), (Figure 6).

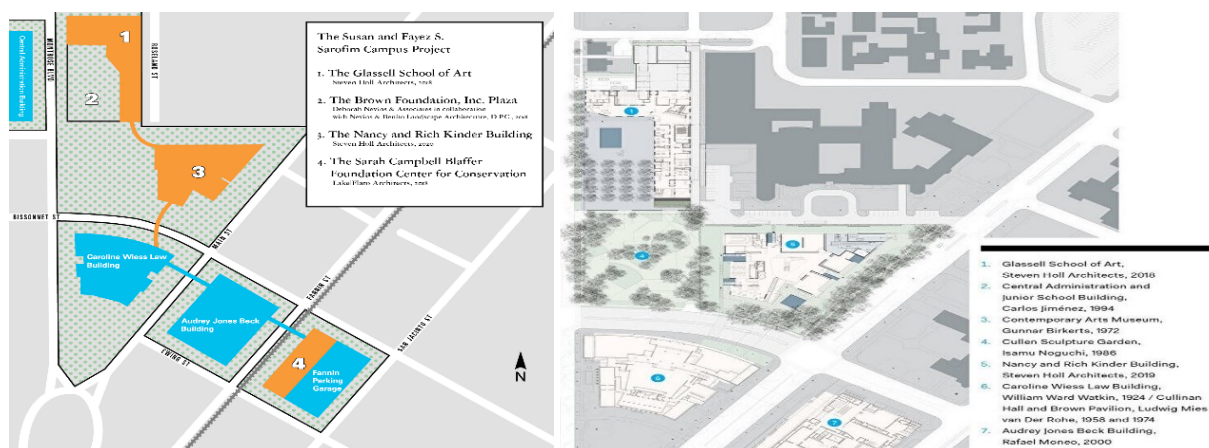


Figure 6. Nancy and Rich Kinder Museum Location (Url-7, Url-8)



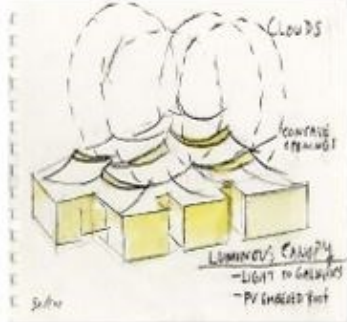
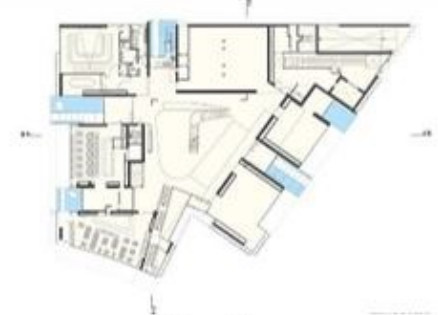

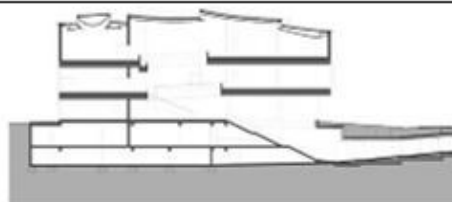
Nancy and Rich Kinder Museum's daylight usage principals:

Usage of Daylight: Light coming from the galleries on third floor of the structure, provides %16-20 light on the art area walls. Daylight measurements, achieves lighting and natural light integration. Exhibition of the art in a confident way is achieved by designing paneled roof system which consist of I shaped, curved, light steel beams which receive enough light. Light is collected on a canopy roof and received with a delicate measure and balance by the concave curves that are inspired by cloud circles and brings the geometry of the roof down. Lower sections of the curved ceiling collect the light and becomes the reflector for light (URL-6), (Table 3). Daylight is not mechanical and repetitive and has a fluency that shows the dynamism of the gallery. Curved light beams provides unity with flora and organic form of the water (Gibson, 2020).

Effect of Light on Sustainability: Half transparent and permanent front of the museum creates a confined light perception. While distributing the light inside also creates a shiny flash outside. White, curved surface of the front behaves like a curtain against threes on direct light and with indirect light reflection of green view and blue sky is achieved. Also pipes on the front provides ventilation. Ventilation on the front helps hot air to elevate passively and leave from the concrete walls by the glass tubes. Heat gain creates cold jacket effect around the structure (Yukyung, 2021).

Form-Space Perception by the Effect of Light: Structure is placed on high elevation and on the circulation way. Thanks to galleries constant circulation areas are created for visitors. In any way of the entrance to the structure, monumental, curved stairs cover the three floored area and reaches to the atrium. So, circulation is felt intuitually (Yukyung, 2021; Sitz, 2020).

Table.3 Nancy and Rich Kinder Museum Daylight Properties (Url-6, Url-7)

Nancy ve Rich Kinder Museum and Panoramic View			
Principals of Daylight Usage	Usage of Daylight	Light is used indirectly and symbolically inside the space.	
	Effect of Light on Sustainability	Glass tubes on the front reduces the sunlight energy by %70.	
	Form-Space Perception by the Effect of Light	Light from galleries and canopies achieves constant and intuitional circulation.	
			Views of Plans
			
General View		Daylight Details	Floor Plan
		Natural Lighting Details	
			Section

4. Findings

In this study, the way of using the daylight, effect of light on sustainability and perception of light on form and space are chosen for the analysis principals. Example structures are investigated based on these factors.

Sun that gives life to all organisms is the natural light source that keeps the continuity of all vital functions. When people designed the living spaces throughout the history, gaps are opened for functional needs. Designers who use natural daylight on their museum designs, highlight the 'effect and experience' subjects which is a functional property of the museums. Museum structures, beside every other function tries to leave positive-negative traces on minds of people and aims to give unique experience. In museum structures, understanding of shown works and achieving the emotional effects of space on the people requires the use of natural and artificial light. Natural light brings diversity of shadows on the works and creates dynamism while lighting the exhibit spaces homogenously. While form is configured, light is an effecting factor functionally and visually. Primary factor to understand the form and space is light. Light and shadows are effective to the movement of the space.

Steven Holl uses light as a material in his designs. Any spatial experience is affected by daylight so light is very crucial. Light defines the form and space and brings poetic meaning to the space. Holl filters the light according to the function he designs for the space, creates soft atmospheres, and makes material choice according to light. To use every experience of the effect of light he uses water objects. While he uses spatial effect of the reflected light from the water, also breaks the stationary and heavy effect of the mass. Fluency between spaces is achieved by light and circulation is provided intuitively inside the space.

Kiasma Modern Art Museum, Nelson Atkins Art Museum and Nancy and Rich Kinder Museum are analyzed in terms of the way of using the daylight, the effect of light on sustainability and form-space perception by the effects of light. Findings are represented on Table.4.

According to this, based on the need and the location of the space daylight is used in variety of different ways. For the places where low level of daylight is presented, gaps from the roof and other surfaces are used to receive daylight continuously and used to contribute to the sustainability by helping the heating and ventilation of the space. Holl thinks form and space perception is based on the experience and creates the circulation of the people by the direction of the light. Over the years, in his changing designs, besides the effect of light also spatial fluency achieves the intuitional orientation inside the space. While exemplary structures are placed in the center of the important architectural buildings, thanks to the variety usage of the lights these structures become the known factors for the people and contribute to the touristic publicity of the areas.

Table.4 Daylight Usage Principles of Kiasma Museum of Contemporary Art, Nelson Atkins Museum of Art, and Nancy and Rich Kinder Museum

MUSEUMS	Steven Holl's Principals on the Usage of Daylight					
	Usage of Daylight		Effects of Daylight on Sustainability		Form-Space Perception by the Effect of Light	
	Symbolical	Functional	Heating-Ventilation Usage	Continuous Usage of Daylight	Orientation by the Effect of Light	Intuitionial Circulation
Kiasma Modern Art Museum	✓	✓	-	✓	✓	-
Nelson Atkins Art Museum	✓	-	✓	-	✓	-
Nancy ve Rich Kinder Museum	✓	-	✓	✓	✓	✓

5. Results

Steven Holl gives a lot of importance to the light in his designs and sees the light as a defining factor of the space. Generally, he uses the natural light in the most influential ways and creates fluent spaces that gains meaning with the light. Holl, creates different and unique experiences in every hour of the day. Holl uses natural light as a design object and uses volume with a light to create architectural spaces to give unique properties of his designs. Holl achieves different meanings in the space with the form, angle, transparency, and the reflection of light.

Holl uses light for different purposes during the day and during the night for the perception of the space. He uses minimal lighting to achieve the wanted effect inside the space. Light and shadows causes the orientation inside the space. These light and shadows also bring dynamism, liveliness, and movement to the design.

As a result, Kiasma Modern Art Museum, Nelson Atkins Art Museum and Nancy and Rich Kinder Museum analysis shows that Holl uses light both horizontally and vertically on the form and the space to create soft and colorful ambientes. Direct daylight is used functionally while indirect light is used symbolically. Holl generally uses light symbolically for museum designs. Throughout the architectural process importance of the light for Holl does not change and becomes the most important material for designs.

Daylight other than the purpose lighting also used for ventilation, heating, and cooling systems as well. Daylight is used for heating on winter, while summer it is used for cooling. Gaps on the front of the structures creates natural ventilation and helps to bring light to the landscape corridors. While using light actively inside the space, contributes positively to the sustainability of the building. In museums, daylight is generally used for the saving on the energy consumption.

Architecture achieved by the form, space and light affects the daily experiences. Holl gives importance to the phenomenological experiences and uses light to achieve the feeling of depth of space, perception of the form and circulation. For this purpose, light is used poetically. Using light based on the movements, spatial perception is achieved. Holl designs his structures based on location and the angle of light affects the design.

Three examples for the analysis shows that daylight can be used for museum designs. When daylight is received correctly on the space, it brings creative effects to the works shown in the exhibits. Daylight received directly or indirectly makes people feel enlightenment and different experiences. Also, ventilation and heating, continuous lighting are useful properties to help the sustainability of the building. With the effect of light, inside the space is perceived with different experiences and intuitional circulation is achieved.

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Conflict of Interests

The authors declare no conflict of interest.

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