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Sunlight and atmosphere in the Ark of the Lord Church in Krakow

Światło słoneczne i atmosfera w kościele Arka Pana w Krakowie-Bieńczycach

Abstract

The article presents the relationship between sunlight and the atmosphere of the architecture of the Ark of the Lord Church in Krakow and outlines the history of this church. The research method was based on analysis of the design in the personal perceptual experience of the article's author. The article defines the 'atmosphere of architecture' concept that is adopted in the study. The relationship between sunlight and architecture was examined in terms of the exposure of the physical properties of architecture and the astrophysical nature of sunlight. The analysis confirmed the strict dependence between light and atmosphere in the Ark of the Lord Church: sunlight is a form-creating factor in architecture that is related not only to the use of translucent materials, but also to the shape and spatial structure of the massing of the church. This light is an effective means of building a sacred atmosphere.

Keywords: sunlight, architecture, interior, atmosphere of architecture, orchestration of sunlight, choreography of sunlight

Streszczenie

Tematem artykułu jest zależność między światłem słonecznym a atmosferą architektury w kościele Arka Pana Krakowie-Bieńczycach. Zauważono, że projekt kościoła oparty jest na idei światła słonecznego: starannie obmyślonych sposobach jego wprowadzania do konkretnych części wnętrza. Podstawą metody badania była analiza wnętrza w osobistym doświadczeniu percepcyjnym autorki. Określono przyjęte w badaniu znaczenie atmosfery architektury. Relacja światła słonecznego z architekturą została zbadana w aspekcie eksponowania właściwości fizycznych architektury i astrofizycznej natury światła słonecznego. Analiza potwierdziła ścisły związek światła i atmosfery w Arce Pana: światło jest formotwórczym czynnikiem architektury, wynikającym nie tylko z zastosowania materiałów przepuszczających światło, ale także z kształtu i struktury przestrzennej bryły kościoła. Światło to jest skutecznym środkiem budowania atmosfery sacrum.

Słowa kluczowe: światło słoneczne, architektura, wnętrze, atmosfera architektury, orkiestracja światła słonecznego, choreografia światła słonecznego

1. Experience

The reflection on the dependency between sunlight[1] and the atmosphere of the architecture within the Ark of the Lord Church in Krakow was borne out of the author's perceptual experiences during her visits to the church. At different times of day, sunlight tempered the darkness of the interior sufficiently enough for liturgy to take place. The atmosphere inside was conducive to prayer but was also refreshing and enlivening. A deeper analysis of the architecture of the interior made it possible to conclude that sunlight was an essential component of the atmosphere experienced within it – sunlight that was appropriately modified in relation to the architecture of the building.

The author assumed that the atmosphere of architecture is a physical property of an interior[2] that is essential to eliciting specific sensory experiences and states of mind within people [7]. In other words, it constitutes an interior's physical capacity to affect people and is the result of numerous components[3], among which light or a lack thereof plays an important role. In this way, architects 'treat' the atmosphere: objectivizing the atmosphere and treating it as a physical property of the interior facilitates its design so the end result is that it is subjectively perceived by users in the way the architect expected. Contemporary aesthetic reflection, undertaken by Gernot Böhme [1, 2][4] in particular, also supports treating the atmosphere of architecture in the category of the almost objective properties of architecture.

When looking at the problem from the perspective of the observable and experience able sunlight that operates within an interior, we can ask what kind of atmosphere and to what degree does it build the atmosphere within a given interior. Keeping in mind the impact of an interior on the individuals within it, the mutual exposure of the physical properties of architecture inside an interior (in front of an individual) and the astrophysical nature of sunlight [7] were assumed to be the criterion of assessing the relation between light and architecture in the aspect of atmosphere.

2. Outline of the history of the Ark of the Lord Church

The Church of the Mother of God, Queen of Poland, called the Ark of the Lord Church, was built in 1967–1977 in Bieńczyce, very close to Nowa Huta, on the initiative of Father

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1 According to the author, sunlight is a light whose source is the sun and that operates on Earth: during the day it is the light of the sun's rays, both directed and reflected from the sky, while at night the light of the sun is reflected off of the moon [7].

2 According to the author, an interior is an architectural, urban and even landscape interior; it is thus a term that is close to concepts such as "man's surroundings" or "man's environment" [7].

3 Apart from light it also includes the sonority of interiors and materials, temperature, the hardness and softness of materials, the smells of materials and the air in an interior. These components were written about by Peter Zumthor [8].

4 The concept of *quasi-objective atmospheres*, formulated by Gernot Böhme, was commented upon by Krystyna Wilkoszewska [10, pp. 20–23].

Józef Gorzelany. The architectural design was developed in 1965 by Wojciech Pietrzyk, while the structural design was by Jan Grabarski. Political restrictions caused the construction, which began two years after the completion of the design, to be carried out in stages over nine years. Difficulties caused by the authorities of the time were the result of not only general opposition to the construction of Catholic churches in a communist state, but also the fact that Nowa Huta was planned near Krakow as a model "city without God" – a manifestation of the triumph of communist ideology. The intervention of the Krakow metropolitan bishop Karol Wojtyła, who would later go on to become Pope, and the great involvement of Father Gorzelany along with the support of many foreign backers, were of great significance in obtaining a construction permit. In the political context of the time, the massing of the church was legible to the faithful, as it was meant to be a reference to Noah's Ark, protecting people from the deluge of atheism [12]. The association with a ship that ran aground (a tall plateau) went much further than simple ornamentation and became the basis for the original structural system of the massing and the idea of introducing light into the interior.

In architectural terms, the Ark of the Lord Church constitutes an example of late modernism in Poland and is a reference to the chapel in Ronchamp by Le Corbusier, although it is larger (it has a floor area of 1300 m^2) and is laid out on three levels [11]. The main nave is entered from the level of the plateau which surrounds the church, and which can be accessed by two extensive stairways from the southern and western sides (accessible from Obrońców Krzyża Street), as well as by a narrow circulation route from the north. Entrances to the Reconciliation Chapel and the Chapel of the Mother of God of Fatima, both of which are located at a lower level, are accessible directly from the level of Obrońców Krzyża Street.

The oval walls of the massing of the church, slightly slanted towards its centre, were built out of poured concrete and clad in round river stones (brought from mountain rivers by the residents involved in the construction). They were meant to be a reference to full sails blown by the wind. Irregularly shaped openings were left between the walls/sails. These walls support the roof, which extends beyond their outline, bent like a shell and covered in shingles.

The church does not feature a traditional bell tower; however, it does have an almost twenty-metre-tall concrete mast which fulfils a structural role within the building and is topped with a cross in a golden crown.

There is a total of seven entrances leading into the church from various sides. The entrance from the plateau on the northern side of the church, but from the direction of the western shift in the wall, is of particular significance. This entrance leads the visitor beneath a stained-glass window-like tower which symbolises the biblical Pillar of Fire, which led the Chosen People through the desert. The main altar extends towards the centre of the eastern part of the nave. It is from this side that a broad matroneum and choir gallery starts, providing the church with a third level and protruding outwards from the base of the buildings as if on a cantilever. The entrance to the choir gallery is located on the western side of the church, opposite the altar. Beneath the nave is the Chapel of the Mother of God of Fatima. Its space partially joins the space of the nave thanks to numerous openings: from the north it is the opening of the circulation route that connects both levels, in the area of the altar there are openings beneath the seven steps of the openwork stairs; from the south, a significant opening makes it possible to look into the nave from the lower chapel.



Fig. 1–3. The Ark of the Lord Church visible from the south (source: author's own archives)

Fig. 4. The Ark of the Lord Church visible from the northwest (Source: author's own archives)

3. The idea of light in the Ark of the Lord Church

Light, which has a particularly strong symbolism in Christian churches, became the basis for the idea behind the design of the Ark of the Lord Church and its orientation, the many different planned openings, its shape, structure and, finally, its materials. The massing of the church has a floor plan shaped like an elongated oval, resembling the outline of a ship with its prow facing the east. This orientation is continued in the interior of the nave and the chapels: the front of the altar and the spheres of the sacrum of the chapels are situated on the eastern side. The nave is illuminated by sunlight from practically all sides. The openings, however, were planned in such a manner that the cardinal directions do not always correspond to the direction of sunlight: 1) from the southern side, the nave is illuminated most intensely by light from the south, which enters through a high opening that has the shape of an arch and is located underneath the roof, and then by light from a small window in the southern wall near an opening in a structural beam that protrudes outside, as well as light from the east, which enters through an opening between two walls/sails; 2) eastern light enters the interior from the eastern side of the nave thanks to a glazed wall; 3) from the northern side, northern light

Fig. 5. Nave of the Ark of the Lord Church in the direction of the main altar (Source: author's own archives)

enters through a glazed wall at the level of the matroneum and the second glazing underneath it, and western light is captured by the tower of the Pillar of Fire in a shift in the massing that opens towards the west; 4) delicate western light enters the interior from the northern side of the nave thanks to an opening in the bottom which spans between the strongly bent arch of the wall/sail and the gentle arch of the base.

4. Methods of operating with sunlight within the interior the church

In the church we can see three basic types of operating with sunlight in an interior: light introduced directly from outside, reflected light and filtered light. Within each of these types we can find detailed methods of operating with light: carving[5], mirror reflecting, scattering – bending[6], scattering–slipping[7], as well as absorption [7].

During the day the interior of the nave is dominated by the form of a luminous arch between the wall and the ceiling on the southern and south-eastern side. This arch is created out of side light that is carved by the opening between a massive concrete wall and the roof; the light introduced in this manner easily slips across the bottom curvature of the roof and the translucent glass panes produce mirror-like reflections.

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5 According to the author, carving means limited by the dimensions of an opening; rays enter directly from the outside, which can be seen through the opening [7].

6 According to the author, scattering–bending means a sequence of scattering that breaks up the rays on a rough concave or convex surface [7].

7 According to the author, scattering–slipping means a sequence of scattering that breaks up the rays on a rough surface perpendicular or almost perpendicular to the opening [7].

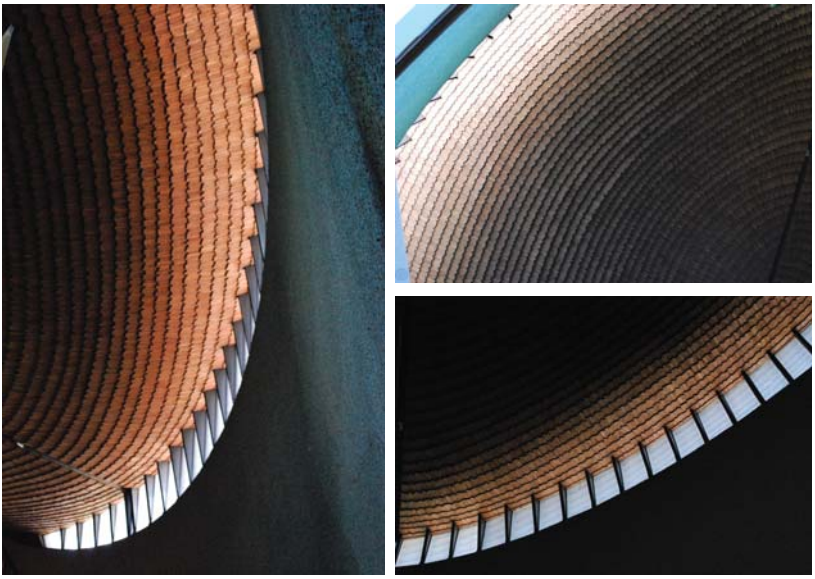


Fig. 6. Fragment of the southern side of the nave: a visible arch at the top of the wall, the carving, bending and slipping of sunlight (Source: author's own archives)

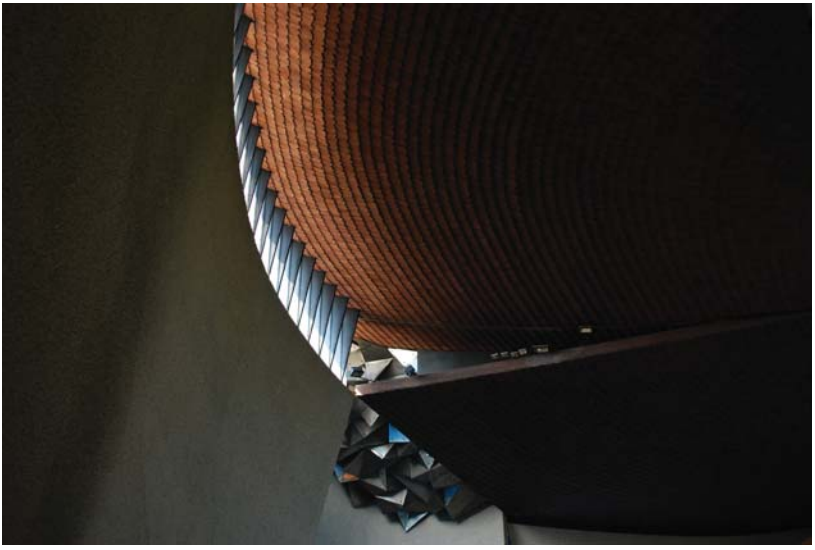


Fig. 7. Fragment of the southern side of the nave: a visible arch at the top of the wall, the carving, bending and slipping of sunlight (Source: author's own archives)

On the southern side of the nave the eastern vertical opening carves out an expressive slender triangle of dynamic light which slips across the curved wall and bends on its concave surface. This slipping light perfectly exposes the coarse texture of the concrete. The triangular lower part of the opening is equipped with a blue stained-glass window. This light thus tints the naturally grey concrete wall, in addition to casting blue reflections on other materials within

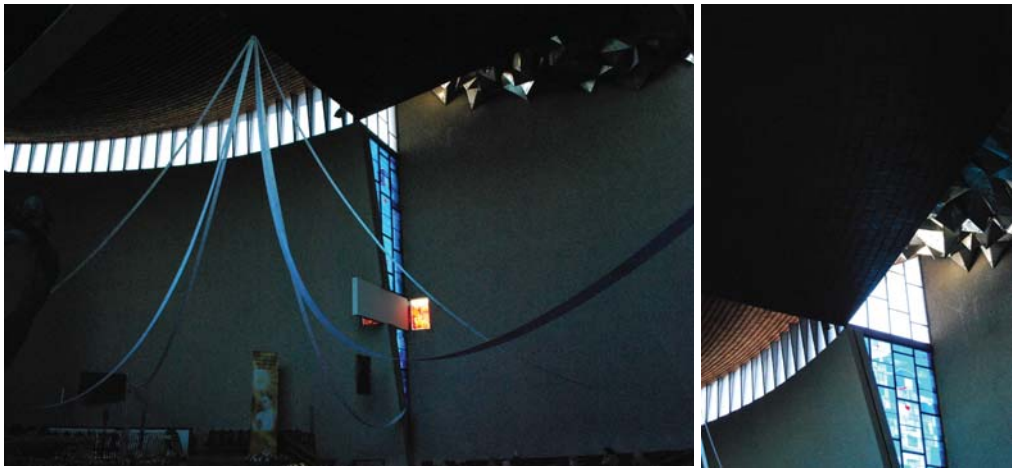


Fig. 8. Fragment of the southern side of the nave: a visible arch at the top of the wall, a slit in the ceiling, and the metal ceiling decoration (Source: author's own archives)

the nave. The upper part of the nave does not have stained-glass window and introduces more intense eastern light into the interior which slips across the expressive sculptural texture of the ceiling – a decoration of pyramidal shapes of polished metal. This light reflects numerous times on the irregular sharp surfaces, intensifying the illumination of the nave from the top with a flickering glow. A similar ceiling decoration is in the northern side of the nave, where it reflects the light of the Pillar of Fire and of the stained-glass windows from the east.

The casting of side light on the concave walls of the four concrete sails and its scattering through slipping and bending is used several times in the nave.

From the east, on the left side behind the altar, there is a wall that is completely filled with a stained-glass window, with a sharp angle at its top that is similar in form to a vertical triangle with an acute top angle. Stained-glass windows always cause walls to become filters which, by absorbing specific colours of the light spectrum, significantly reduce the intensity of light and give it a specific colour. In this case it is dynamic and changing eastern light from the side which, thanks to the stained-glass window, gains warm colour shades with a dominance of yellow greens, oranges, and ochre.

The largest openings are located on the northern side of the nave; this is justified as northern light enters through here and is dispersed in the blue sphere. However, on this side of the nave the interior is also illuminated with western light, filtered several times through the spatial stained-glass window of the tower of the Pillar of Fire, whose lower part (which features the entrance to the church) is built out of glass masonry units that are green in colour, while the upper part consists of shaped glass in the colours of fire: red, orange and yellow. The fiery colours of the stained-glass window are intensified by warm western light, which falls onto this structure without interference because of the shift in the massing that is open towards the west.

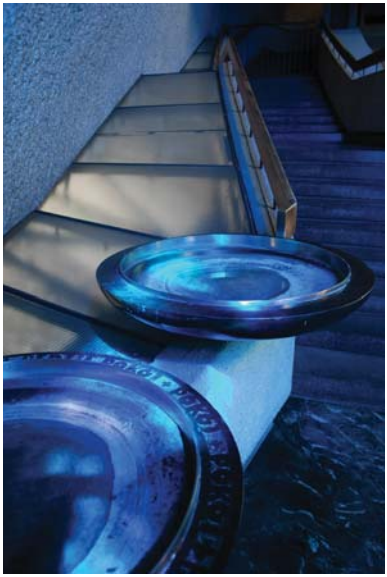
From this side of the nave there is a passage to the lower level of the Chapel of the Mother of God of Fatima, from which one can exit to a small square below the plateau. This exit is located in the completely glazed northern wall, which provides additional light to the chapel and the space of the stairs. This spatial structure of the massing causes the main nave to be

Fig. 9., 10. The stained-glass window-like tower which symbolises the biblical Pillar of Fire (Source: author's own archives)

Fig. 11. The open vertical space between the upper and lower level of the church, which makes it possible for the interior of the main nave to be entered by *lume di lume* from the lower chapel of the Mother of God of Fatima (Source: author's own archives)

penetrated by delicate sunlight from this bottom side, from the space of the chapel; this is *lume di lume*, secondary light, which comes from a neighbouring interior [6, 9]. In this case light comes from the lower chapel, which it enters through the northern wall (dispersed, static and permanent light) and through the southern wall (intense, dynamic and changing light), where the second entrance to the chapel is located. *Lume di lume* enters the nave, including from between the steps of the stairs which lead to the altar in the main nave, as well as from the southern opening that connects two of the church's levels.

Of particular note is the light that enters the interior from the back of the nave from the west. This is side light which enters the interior thanks to a glazed slit that winds along the arch between the western, strongly concave wall/sail and the gently curved base, upon which the stairs to the choir gallery are anchored. This delicate and warm light is never direct but enters the interior in a form that is scattered in numerous reflections. In addition, the panes of this



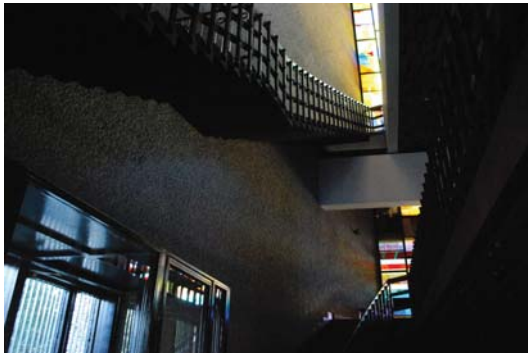


Fig. 12., 13. The side western light from below which enters the interior thanks to a glazed slit that winds along the arch between the western, strongly concave wall/sail and the gently curved base, upon which the stairs to the choir gallery are anchored (Source: author's own archives)

skylight are semi-translucent, which causes them to absorb some of the light. The light that does enter the interior and which is also reflected from the surface of the stone floor slips from the bottom towards the top along the coarse concrete surface of the curved wall, illuminating the space of the stairs to the choir gallery. This space is simultaneously illuminated and coloured in shades of blue thanks to the northern stained-glass window near the matroneum.

These methods of working with light in the interior of the Ark of the Lord Church are accompanied by others; for instance, the reflection of light off the smooth marble, glass,

Fig. 14. The reflection of light on the marble floor (Source: author's own archives)

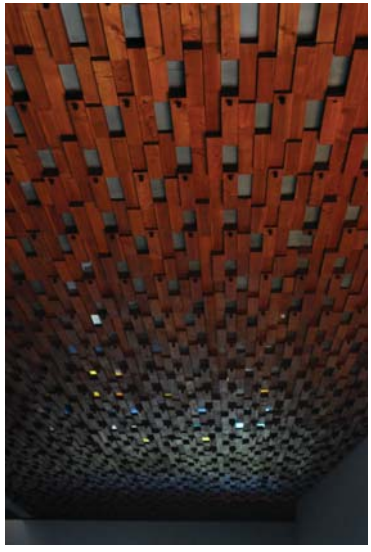


Fig. 15. The floor of the matroneum with small panes of glass placed between small boards (Source: author's own archives)

and metal materials, fittings and decorations. We can also mention the original concept of providing additional illumination to the space beneath the matroneum, both inside the church and outside of it, where the matroneum extends. The floor of the matroneum has small panes of glass that are placed between small boards; they create the illusion of a ship's deck with regularly spaced wooden boards, between which light shimmers as if reflected off water.

5. Exposing architecture with light

Thanks to its unique operation, Light in the Ark of the Lord Church expressively exposes the materiality of the interior, the structure of its surfaces, its massing and space, as well as the visual character of the shape of the interior and the atmospheric and projection capacity of its architecture[8].

The light quite strongly exposes the materiality of the architecture here: the Carrara marble of the main altar appears as a soft, milky white stone; the shingles on the ceiling become a relief in a red colour; the concrete walls/sails reveal their coarse texture, and the glass masonry is the massiveness and redness of the glass of the Pillar of Fire. Thanks to mirror-like reflections, the smoothness of the marbles and various metals – for instance the bowls of holy water – is exposed, while scattered reflections on the walls expose the coarseness of the concrete. Light also highlights the smoothness of the steel rings around the tabernacle and the coarseness of the tabernacle itself, which is made out of unpolished brass in the form of a sphere. In specific conditions sunlight can fall onto the "moonstone" in the wall of the tabernacle, causing it to sparkle [3, 5][9].

Thanks to sunlight, the interior gains visually in terms of the articulation of the concaveness of its walls/sails. In terms of highlighting the visual character of this interior, the most effective technique is the slipping of light across the various surfaces and curves of the massing, which attractively highlights the complex shape of the nave. This provides the effect of the interior's constraints being sprinkled with small parts of luminous matter (an illusion of the materialisation of light). The shape and convexity of the roof and the texture of the shingles are most strongly highlighted by the intense, dynamic and changing southern light from the side, which falls through the glazed arch underneath the roof. Exposure of the concavity of the walls/sails is obtained particularly thanks to the slipping of side light, which enters through the vertical slits between these walls. The gradation of light causes the interior to feature places which are covered in shadows that are only slightly tempered.

The slits are narrow enough to limit the visibility of the interior of the church. This effect is strengthened by the stained-glass windows in the glazed walls, as well as in the vertical openings.

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[8] Projection capacity is the ability of an interior to form projections (illusions and associations) in the human mind [7].

[9] According to macroscopic analysis, "Moonstone" is an aggregate of pyrite crystals glued to a fine crystalline concretion composed of the same material [5].

The light inside the church exposes the various structures of the filters, particularly the stained-glass windows that glow in the Pillar of Fire and are cooler from the north, with yellow colours from the east.

An individual who spends longer in the Ark of the Lord Church and carefully observes the interior is taken on a tour of its architecture by sunlight.

6. Architecture as an instrument of sunlight

The exposure of the interior as an instrument of light is equally rich. In this case, the astrophysical qualities of sunlight can be perceived thanks to the architecture. The architectural apparatus that is used to introduce light into the church simultaneously provides exposure of the sunlight's properties, primarily exposing the transcendental nature of this light as its source is always located outside of the interior. Sunlight, as if imprisoned in the architectural apparatus, clearly directs the attention of people inside the interior to outside of its bounds – towards the sun and its shining heavenly sphere. Simultaneously, thanks to the shape of the interior of the Ark of the Lord Church, the architecture exposes the local, geographic conditions of sunlight in a specific place (Bieńczyce), with its constant, uncontrolled changes that depend on the time of year, day, and the weather. Exposing it in human perception unites the interior with its place on Earth and the cosmos itself.

The Ark of the Lord Church, treated as an instrument of light, exposes the orchestration and choreography of light [7]. This orchestration is, in the author's view, the result of different forms of working with light in a single interior at the same time. As a result, the architecture primarily exposes the spatial character of sunlight scattered in the celestial sphere. The orchestration creates a new, coherent effect of a whole (the spatial character of light in the celestial sphere) out of a multitude of individual methods of introducing and modifying light – one that goes beyond the sum of its parts (similarly to the combination of sounds in an orchestra).

The choreography, in the author's opinion, is the result of working with light within an interior over time. It primarily exposes the slow change and movement of light in accordance with how the sun travels along its ecliptic. The direction of penetration and the intensity and colour of the light all change.

In the Lord's Ark Church, we can experience a full orchestration of light. From dawn until dusk, all of the tools that introduce light from every side of the interior and from the bottom are active, yet they have varying intensity at different moments. On a May morning the light enters from behind the altar with direct and warm rays, while the upper southern slit is still quite dim. In the noon hours the orchestration changes completely: an intense illumination of the arch beneath the roof takes place. The range of the light of the luminous arch increases during the autumn months and reaches its apogee in winter, while in the summer it is the weakest, when the noon rays produce an intense streak of sunlight. A different orchestration plays out at sunset, when the main instruments are quieter and the warm light of the Pillar of Fire from the left side of the altar and the reflected light of the west near the stairs to the gallery play out their solos.

In particular, choreography of light is made possible in this interior thanks to the opening beneath the roof as it has a relatively large outline from the south-east to the south. This outline makes it possible to expose the changes in the location of the sun throughout the day, as well as of the flow of time. The vertical openings from the east and the south create a specific choreography.

7. Atmosphere as the result of the mutual exposition of light and architecture

The combination of the expositions discussed above – of architecture and light – is essential to the perceptual experience. It is from this mutuality that the unique atmosphere of the Ark of the Lord Church originates. The exposition of the architecture and the nature of light that changes with time and the weather can easily elicit many different yet similar sensory experiences, feelings, and thoughts associated with the symbolic significance of light or the church–ship associations in individuals.

In the main nave there is an atmosphere of intimacy and clarity – of a spatial depth, a luminosity and isolation of the interior. Openings towards all the cardinal directions and the bending of light along the curvatures produces a dynamic and a tension that is stabilised in harmonious balance. However, the gradation of bent light on the curvatures reinforces an atmosphere of peace, quiet[4], and softness, easing the sharpness of the luminous openings and the sharp forms of the decoration of the ceiling. Thanks to this the atmosphere of this interior is soothing, refreshing, stimulating.

The atmosphere in the area around the altar achieves a particular dynamic harmony that extends along the directions: of direct rays of sunlight from the top right, scattered cool rays from the Bronisław Chromy's "From life to life" sculpture, warm rays from the east, from behind the altar, subtle rays from below – from the west. This atmosphere of a tense balance increases intimacy and focus. This tense focus can also be seen between the mystery and symbolism achieved by the luminous arch, the stream of light that falls onto the altar, and the clarity achieved by the visual articulation of the shape of the church.

The carving of light through the slits between the walls/sails has a telling symbolism. It brings to mind associations with cracks, of the cracking of a shell with light. The reflections on the marble also have their own symbolism: the white marble of the altar, the green marble of the floor, whose white veins suggest a tangled deep. The curved opening that introduces light underneath the roof provides the effect of a raised cover and the beam of light that falls from this opening onto the altar produces the effect of the connection between the Eucharist and Divine Light. Of note is the fact that in relation to the chapel in Ronchamp, where Le Corbusier also designed a narrow slit between the roof and the massive wall from the south, the similar slit in the Ark of the Lord Church is broader and illuminates the interior more intensely, causing a stronger effect of the roof being raised above the interior – of carving a luminous arch and a beam that falls onto the altar. From the symbolic significance created by light, the luminous arch underneath the roof affects the atmosphere of the interior the most. It has its own universal theological symbolism which connects with its perception in

the perspective of viewers inside the interior, within which it always has two of its endpoints raised upwards (it "smiles").

The scattered *lume di lume* has its own expressive symbolism within the interior, providing exposition of the structure and shape of the church. This light connects the three levels of the building, reinforcing the clarity and cohesion of the entire massing, in addition to providing a high projection capacity to the interior. The impression of the suspension of the zone of the altar in space and the associations that it brings add a lightness and spatiality to the atmosphere of the interior, in addition to eliciting feelings of the extraordinary, mysteriousness and dynamism. The expressiveness of the three levels of the church, articulated through light, also resembles the decks of a ship – the biblical Ark.

Limiting visibility of the interior of the church reinforces an atmosphere of the fencing off of the space of the sacred from its surroundings, and of a focus on prayer. As a result of the reflections and the filtering, the light brightens and slightly tempers the dark, thus increasing the intimacy and co-creating the theological purpose of the church. Sunlight in the interior of the Ark of the Lord Church co-creates an atmosphere of the sacred; it is conducive to awe associated with luminous illusions and the symbolism of light. The impressive, emotional and intellectual reception of the interior together form a single, coherent perceptual experience.

8. Conclusion

The author's analysis confirms the close relationship between sunlight and the atmosphere inside the Ark of the Lord Church in Krakow. This light, which is introduced into the church and modified inside thanks to a sort of architectural apparatus, creates a unique atmosphere in the interior. It is a form-creating element of architecture, associated not only with the materials that let either white or coloured light through, but also with the massing and structure of the three-level church, the shape of the space, and the constraints of the interior. Thanks to sunlight, the architecture of the interior is exposed in front of visitors in a specific manner. On the other hand, we can look at this architecture as an instrument of light which exposes the astrophysical nature of sunlight to man: its ceaseless, uncontrolled change and travel, as well as its scattering in the celestial sphere. The exposing of the transcendental nature of the cosmos and the identity of the specific site on which the Ark of the Lord Church stands is extraordinarily valuable to the atmosphere of the sacred. Thanks to light, the balance between the centripetal and centrifugal exposition of the interior becomes stabilised within the nave of the Ark of the Lord Church in the dynamics of time and weather. The openings towards the cardinal directions, the exposition of the visual character of the church, particularly thanks to the slipping of light across its curved surfaces, and at the same time the expression of the luminous arch produces a dynamic and tension that stabilises in the harmonic balance between clarity, intimacy and unreality. The significant constraining of the visibility of the surroundings, despite the illumination of the church, is conducive to focus on prayer. The analysis led to the conclusion that familiarity with the laws of physics that govern sunlight, as well as identifying the ways in which it operates in an interior through the use of architecture, increases the chance of obtaining a desired atmosphere.

References

[1] Böhme G., *Architektur und Atmosphöre*, Wilhelm Fink Verlag, München 2006.
[2] Böhme G., *Atmospheric Architectures. The Aesthetics of Felt Spaces*, Bloomsbury Academic, Bloomsbury 2017.
[3] Kordaszewski M, *„Arka Pana". Przewodnik. Historia i symbolika*, Wydawnictwo Benedyktynów, Kraków 1995.
[4] Plummer H. ,*The Architecture of Natural Light*, Thames & Hudson, London 2009.
[5] Rajchel J., *Kamienny Kraków*, UWND AGH, Kraków 2005.
[6] Scamozzi V., *L'Idea dell'Architettura Universale*, Venezia 1615.
[7] Stec B., *O Świetle we wnętrzu. Relacja między* światłem *słonecznym a architekturą w aspekcie atmosfery architektury*, Wydawnictwo Krakowskiej Akademii im. Andrzeja Frycza Modrzewskiego, Kraków 2017.
[8] Zumthor P., *Atmospheres. Architectural Environments. Surrounding Objects*, Birkhäuser, Basel-Boston-Berlin 2006.
[9] Borys A.M. ,*Lume di Lume. A Theory of Light and Its Effects*, "Journal of Architectural Education", 2004 Vol. 57, No 4.
[10] Wilkoszewska K., *Uwagi na marginesie książki Gernota Böhmego „Filozofia i estetyka przyrody"*, „Sztuka i filozofia" 2004, 24, 20–23.
[11] Smaga A. http://szlakmodernizmu.pl/szlak/baza-obiektow/arka-pana (access: August 2018).
[12] http://www.arkapana.pl (access: August 2018).

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