Light and color in architecture: a shared experience between Scandinavia and the Mediterranean

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ABSTRACT
Building design and the selection of spatial features defining the built environment, such as the choice of colors and the type of lighting used, are not simply processes of functional or aesthetic nature, but are deeply related to the experience and perception of users. The paper analyses diverse approaches to the use of natural light and colour in two very different geographical areas, Scandinavia and the Mediterranean, trying to identify reasons that lead people to prefer specific and unique light conditions instead of others. The critical analysis focuses on examples of architectures where the theme of colour and light is refined to fit a given cultural context, highlighting specificities and differences.

Keywords: Scandinavian Architecture, Daylight, Climate-adapted architecture

1. INTRODUCTION
The long history of the built environment shows that different cultures have given utterly different answers to the general need for a shield against climate and light. The dominant characteristics of traditional architectures are indeed, light aperture size and placement - together with multiple solutions to filter light, heat and wind passing through them. However, light is energy and creates colours but only cultural and social values, combined with daily experience, can assign value to a perceived reality. For example, the colour white can generate different vibrations and be associated with very different values when considered by a Lapp or by a Mediterranean, because of the differences in the experience of the two subjects.

Many authors described vernacular architecture as the result of characteristic climate and light conditions of a given place. [1] The building is interpreted as a mediator between the external climate and the comfortable man-made interior space. The envelope is nothing but a various and variable filter depending on the latitude, thus on the direction and intensity of the predominant type of light. In dry areas closer to the Equator the sun is almost vertical and the light
is the most intense. On the southern edge of the Mediterranean for example, old villages have adapted to the local harsh climate growing compact, with narrow, shadowed streets open only towards the blue sky above. Accordingly, traditional dwellings tend to minimize their footprint, vertically structured around a central space, often with a surrounding gallery that gives access to smaller internal rooms. Reflected light, bounced off the ground and surrounding surfaces, illuminates internal rooms through transitional spaces and compensates the screened sun beams. Closer to the poles instead, weather and sun altitude results in low intensity and high variability of natural light. The cool and weak Nordic light transforms buildings in devices to capture and multiply light in their interiors, where people spend most of their time. The same factors, the conscious use of light and colour, have been proven to be causative in modelling processes of modern and contemporary architectures. Thus, they have been extensively used as reading and interpretation tools. [2]

By comparing diverse approaches to use of natural light and colour in architecture in two very different geographical areas, Scandinavia and the Mediterranean, this paper aims at identifying physical and psychological mechanisms beyond preference for unique site-specific light conditions then traced back to peculiar architecture solutions, where the theme of colour and light is refined to fit a given cultural context.

2. LIGHT AND COLOR BETWEEN MEDITERRANEAN AND GREAT NORTH

In the Inuit languages there are dozens of ways to describe snow, almost as many as for naming ice, and many terms to describe the variations of white. For Mediterranean people it could appear bizarre and utterly incomprehensible because their experience of colour becomes extraordinary due to solar radiation and warmth, and the intense and persistent colours of their daily lives. However, for those accustomed to Arctic winter there are multiple types of snow and hundreds of shades of white. The white cold of the Finnish winter is very different from the strong and solar winter of the Mediterranean, with light, shadows and twilight defining its peculiar character.

Traditional costumes of Sami people are rich in vibrant colors. Bright red, blue and yellow are woven together generating that unique combination of shades that inspired the most delicate fabrics made famous worldwide by the Finnish firm Marimekko. Similarly, traditional Scandinavian wooden houses were painted with strong colours to be visible from a distance on the continuous white surface that defines the land and, often, even the northern sky.

In Finland, due to the even – in space and time – surrounding natural environment, public buildings being generally introverted because the external context is not of particular interest for most of the year. Indeed, public works of Alvar Aalto, Reima Pietila or Timo and Tuomo Suomalainen and many other Scandinavian masters of both modern and contemporary architecture are introverted and characterized by only a few openings towards an external landscape that produces few stimuli and transmits no information. Interiors instead are rich, colorful and precisely detailed.

Extreme example of this introverted architecture, the Temppeliaukio Kirkko (the Rock Church) in Helsinki, designed by architect brothers Suomalainen in 1968, is built inside of a massive block of natural granite and is barely visible from outside. Bare rock walls enclose the sacred circular space, naturally lit from above through 180 window panes, connecting the copper dome and the walls.

Indeed, the principle response of these inclusive architectures to their generic geophysical context is the use of
The instead site-specific low sunlight and variable sky. Their rich interiors are inextricably linked to the special Nordic light - grazing, modulated and always reflected – used by architects to manipulate surface and volumes. Alvar Aalto’s churches for example, have been often described as instruments of direct sunlighting [3], with precise lighting devices that aim at exploiting natural light at specific time of the day, emphasizing relevant sacred areas of the building.

Despite the indissoluble bond of light and architecture in Nordic countries, tourists’ experience of the Scandinavian reality is generally limited to a fleeting summer visit, when the ephemeral northern summer bursts with all its strength and vitality, as if the energy of nature, compressed during the long winter, came out at once. This transient condition, however, depicts only a partial view of a more complex reality, with peculiar light and colors that would not fairly describe the northern landscape for most of the year, captured instead in a thousand shades of a single snapshot.

Indeed, the big difference in terms of light between the Mediterranean and Scandinavia is mainly linked to the passage of time, that is, the addiction of our brain to a particular colouristic condition (or better, ‘un-colouristic’ condition in Scandinavia) and the reaction time of our brain to receive, decode and interpret visual information. As daylight deeply affects human beings, both physically and emotionally, the limited availability of solar radiation in winter - leading to a reduced production of serotonin by the human body – explains the reason why for example Finland has one of the highest suicide rates amongst European countries. [4] In Finnish, this effect on human behavior is defined by the term synkkyys, which describes the veiled melancholy typical of Finns and is linked to the northern winter, often characterized by temperatures below -30° C and blowing winds that force people to live mainly in confined spaces. There are only few daylight hours a day, with long shadows striating an otherwise even landscape, lacking sunlight for several weeks. The white of snow and sky is persistent, suffocating,
almost violent, thus generating a spasmodic, nearly physical desire for color. This condition is completely unknown in the Mediterranean, where winter is still full of shadows and colors, with direct solar radiation able to vitalize each and every scenario.

Similarly, the summer takes place very differently in the two contexts: short, impetuous, lively and colourful in Scandinavia; long, motionless and almost suspended in the Mediterranean. During the long and static Mediterranean summer the landscape tends to persist unchanged. The iconic image of the Mediterranean summer is indeed a scorching environment with vertical sun that forces people into the shadows, waiting for the heat grip to loosen. The silence is broken only by the tolling of a church bell, while the harsh sun produces sharp shadows and rich, vibrant colors. In this picture everything remains motionless, unchangeable like a painting with the background made of a crystal clear blue sky. Time passes slowly and shadows change with exasperating slowness (the azimuthal velocity of the sun is equal to few degrees per hour, between 15° and 35°, depending on time and latitude). This is a landscape of ‘suspended time’, where the ‘cardboard architectures’ of Alvaro Siza fit perfectly.

In Scandinavia the situation is completely different as there it is in winter that the daily experience becomes static. It is motionless and white. The oppressive white of the winter season steals colours from the northern people, forcing them to rebuild a new personal coloristic reality inside their own homes while generating love and desire for missing things, distant objects and experiences they have to wish and wait for. The *aurora borealis*, the magical light of polar nights, gives an idea of the missing colors of the Scandinavian winter. It is a continuously changing light that contains memories of red and blue, reminiscent of yellow and purple, but is never really able to produce these colors. The northern lights dance in the sky giving fragments of these colors, but never manage to fix any of
them permanently. There are shards of colour running after each other that are yet no more real than mere evocations. Colours that our eye sends to the brain and that immediately change and vanish, leaving no lasting traces in our minds. It is a story about something yet to come, something that is glimpsed only in realm of fantasy without ever materialising. The ice contains all these colours with a myriad of nuances that depend on the mode and speed of crystallisation, the amount of air in the solid mass, the curvature and thickness of the surfaces. There is no ice block equal to another and each ice crystal interferes with the light producing different effects. In a white environment, completely covered with snow, ice has an extraordinary colouristic power, able to evoke yellow, green, blue, purple and orange and fixing them in its transparent structure. The work of great Finnish artists and designers such as Tapio Wirkkala and Timo Sarpaneva has tried to recreate at least part of the experience related to colors of the transparency typical of Scandinavian countries. Similar to ice, glass objects created by these designers have curved moulded surfaces, are of variable thickness, incorporate air bubbles and can vibrate like ice when exposed to the right lighting conditions. The bursting Scandinavian summer seems to have the strength to dissolve these images and for a short period produces colours that hold every observer spellbound. However, it is nothing but a promise of love not kept, nourishing a mounting desire that cannot be satisfied. In summer, the Northern light constantly changes colours and clouds staining the sky, which then has no defined colour. It can be described as leaden, metallic or gray but permeated with a magical and vibrant light. In reality, the magical and vibrant light is that of the sun lighting up the landscape in a peculiar way which is completely unusual, incomprehensible and sometimes even embarrassing for a Mediterranean. Mediterranean people are used to blue skies and static sunshine, intelligible landscapes that the brain can easily and completely understand. In the great North there can instead be a leaden background and light beams filtering through the clouds that vigorously color fragments of landscape for just short intervals and in different ways. As for the dancing light of the aurora, the brain fails to fix those images that the eye transmits. It cannot fully decode the information before it changes again, as the colours never stay the same and the background produces a completely different light than that expected. Sometimes one even finds such a lighting condition in the Mediterranean, in moments preceding or following some summer storms: clouds chase one another; the background is leaden and light beams filter between them dancing on lawns and surfaces, constantly changing the landscape and its colours. In Mediterranean landscapes similar variations in climate (both thermal and luminous) are recreated in peculiar man-made spaces designed to filter and control natural environmental strengths, generating special light and temperature conditions: musharabia, umbraculo, porch, patio, the Mediterranean shutter - that is green or dark brown to limit the brightness of the almost violent external natural light and the thermal aggression of the direct solar radiation [5]. It is in these transitional spaces, where some of the light is held back, that visual qualities of Mediterranean architecture emerge and the interplay of light and darkness describes shape, position, texture and materiality of objects and surfaces. Besides light, colouristic vibration has been attempted by many architects in the Mediterranean who adopt solutions of blended colours, where the expression of single tones is cancelled while containing and conveying every colour. What is the colour of the seats in Parque Guell designed by the Catalan modernist Antoni Gaudi? All and none, because the surfaces are full of colours but none of them are dominant in our mind. Curved surfaces, concave or convex, interplay with solar radiation constantly producing different shades that fail to become memory, but only
evoke colours, feelings and magic.

3. CONCLUSIONS
The interplay of light and colour in architecture has been abundantly celebrated by architects and analysed by critics. The comparison between features of Scandinavian and Mediterranean architectures, developed from vernacular to contemporary examples, shows that spatial experience through light tends to emphasize the sense of moment and place. The strong contrast of light and shadow can define boundaries, like in several local versions of the Mediterranean transitional space; while the low, grazing Nordic light connects the rich inside to an even and motionless outside, bouncing off white and moulded surfaces of intimate spaces. [6]
However the ‘experience’ of architecture through light is not univocally given in a simple equation including geometry, climate and time. There is a more subtle variable: the subject who experience architecture. This is because light and colour convey both measurable and sensuous information that continuously evolve with the development of cultural contexts, making the experience of architecture instantaneous and the connection to the place simultaneous.

REFERENCES