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# The Visual Translation of Faint Light: The Refinement of Color in Krøyer's Paintings and Its Contemporary Implications for Light Therapy

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**Abstract:** As a central figure of the Skagen School, P.S. Krøyer has long been classified within the tradition of Nordic Impressionist atmospheric painting. While much research has focused on describing the poetic quality and blue-tinged twilight of his works, few studies have offered empirical interpretations from the intersecting dimensions of paint materials, visual physiology, and the perception of life. Drawing on the research paradigm of *The Alchemy of Color: Natural Light, Color, and the Transformation of Life Energy in Sorolla's Use of Complementary Colors*, and grounded in Hering's theory of antagonistic colors and Chevreul's theory of simultaneous contrast, this paper combines findings from the Danish Institute for Heritage Science's Raman spectroscopy and SEM-EDS analyses of Krøyer's pigments [1] to propose "chromatic maceration"—a concept distinct from Sorolla's "alchemy of color": Sorolla relied on the intense direct sunlight of the Mediterranean, a lead white base, and the juxtaposition of complementary colors to generate an outward burst of vital energy through retinal vibrations; Krøyer, on the other hand, takes Skagen's "Blue Hour"—the diffused twilight of Northern Europe—as his light source model. Using zinc white as a base and cobalt blue as the dominant palette, he dissolves and infuses complementary colors into a unified field of blue-gray tones, thereby softening the direct confrontation between warm and cool color blocks. Through a gentle and sustained visual immersion, he generates a sense of life that settles inward and evokes silent empathy. In the contemporary visual environment dominated by digital media, scholars have already recognized the "color malnutrition" caused by screen lighting. This paper further proposes another significant visual symptom of the digital age—light violence: short videos and electronic screens with high brightness, high saturation, and strong contrast continuously stimulate the optic nerves, leading to sensory overexcitement and mental exhaustion. Sorolla's spectrum of intense light offers a path to repairing color deficiencies, while Krøyer's aesthetics of subtle light refinement provide a healing solution to resist overstimulation and rebuild the perceptual connection between humans and diffused, soft light.

**Keywords:** Krøyer; Blue Hour; color refinement; diffused natural light; implicit complementary colors; light and color therapy; Sorolla.

## 1. Introduction: Two Paths in Plein Air Painting—From the Alchemy of Bright Light to the Infusion of Subtle Light

Plein air painting was a significant visual practice in Europe during the second half of the 19th century. Scholars typically place Sorolla and Krøyer within the context of Impressionist plein air sketching, broadly summarizing their work as "capturing the fleeting changes of natural light." However, the natural environments they faced, their choice of materials, their color logic, and their artistic aspirations actually form a set of highly compelling contrasts: Sorolla was rooted on the Mediterranean coast of Valencia, pursuing the scorching, sharply defined direct sunlight of midday and using the juxtaposition of complementary colors to create intense visual vibrations; Krøyer, having long resided on the coast of Skagen, Denmark, repeatedly gazed upon the "blue hour" under the midnight sun—that transitional period after the sun has dipped below the horizon but before night has fully fallen, when the air is filled with moisture and the light is diffused. There is no clear division of light and shadow between sky, land, and sea; the warm and cool spectra blend gently, and the boundary between day and night dissolves into the mist.

Sorolla's approach to color can be summarized as "color alchemy": by juxtaposing highly saturated complementary colors and employing the sharp highlights produced by lead white, he refines the energy of nature's intense light spectrum within the painting, enabling the viewer to experience a life force that surges outward with fervor [2]. This research framework is built upon three dimensions: empirical study of pigment materials, visual translation of the natural spectrum, and the mutual validation of visual perception and the philosophy of life, ultimately extending to a reflection on contemporary light environments. While this paradigm is equally applicable to Krøyer's research, Sorolla's conclusions cannot be directly applied to it. Krøyer does not seek the collision and explosion of intense light; his work is not a violent "alchemical reaction," but rather a slow, continuous permeation and sedimentation—what this paper terms "color refinement."

A review of existing research on Krøyer shows that, at the art-historical level, studies have largely focused on the social interactions, rural themes, and poetic twilight of the Skagen School;[7] at the material level, there are only a few scattered records of pigment analysis, and the selection of materials, optical environments, complementary color mechanisms, and perceptions of life have not yet been linked into a complete chain of argumentation; comparative studies have mostly consisted of general, horizontal listings of Impressionist

painters, lacking a systematic parallel dialogue with Sorolla's system. At the same time, critiques of contemporary visual culture largely continue to discuss blue light from screens and spectral deficiencies—what the reference study refers to as "color malnutrition"—while overlooking the visual exhaustion caused by the ceaseless stimulation of highly saturated, intense light from digital media. If Sorolla has filled the gap in our understanding of the high-intensity light spectrum, then Krøyer's value lies in unlocking the long-neglected spectrum of faint light, offering a serene perceptual alternative to our overstimulated visual systems.

This paper follows the argumentative structure of "Natural Spectrum — Pigment Material — Visual Perception Mechanisms — Expression of Life — Contemporary Reflection," first reconstructing the unique optical characteristics of Skagen's "Blue Moment," then analyzing the material logic of Krøyer's color palette based on pigment testing data, and subsequently distinguishing the perceptual mechanism of his "complementary color immersion" from Sorolla's "vibrating juxtaposition of complementary colors," elucidating the inward-converging empathy for life within the image, and finally concludes with a reflection on contemporary digital light violence, discussing the therapeutic value of colors in dim light.

## 2. The Visual Interpretation of Diffuse Spectra: The Blue Hour and Krøyer's Choice of Pigments

Skagen is located at the northern tip of the Jutland Peninsula, the tip of Denmark's landmass jutting into the North Sea. Surrounded by the sea on three sides and rich in moisture, its high latitude in Northern Europe gives rise to the unique phenomenon of the midnight sun. The "blue hour" here differs from a typical twilight: the sun has already sunk below the horizon, and no direct sunlight reaches the ground; all light passes through multiple layers of scattering by the atmosphere and sea fog, creating low-contrast, evenly diffused light. At this moment, the sky, the sea, and the sandy beach share a continuous spectrum of blue, cyan, and violet; warm tones are enveloped and infused by the reflections of the cool surroundings, and nature itself does not provide the kind of lighting conditions found in the Mediterranean, where warm and cool tones stand in stark contrast. Light is not a concentrated spot but is diffused throughout the air, becoming the medium that envelops both people and scenery; time is no longer a fleeting moment of intense light, but rather a slow, lingering, and blurred flow of psychological time. All of Krøyer's works depicting "blue moments" are based on long-term observations of this local optical reality; he did not subjectively cast a blue filter over his paintings, but rather sought to translate this unique diffuse spectrum itself.

Pigment analyses of Krøyer's works conducted in 2017 by the Danish Institute for Heritage Science using Raman, SEM-EDS, and HPLC clearly revealed a shift in his material strategy: after 1886, Krøyer gradually replaced traditional lead white with zinc white [1]. Lead white, with its high refractive index and strong covering power, could create sharp, bright highlights—perfectly suited to Sorolla's need to capture direct sunlight; zinc white, on the other hand, features soft, diffused light, resulting in highlights that are neither harsh nor glaring, with layers of color that are hazy and translucent. This naturally complements the texture of diffused light from sea fog and serves as the material foundation for the hazy, airy quality of Krøyer's paintings. In terms of pigment selection, he used cobalt blue as his primary blue, rarely employing highly saturated ultramarine; he deliberately restrained the use of highly saturated warm colors such as cadmium orange and cinnabar, rarely applying intense blocks of warm color directly, and instead relied more on harmonious, low-saturation mixed colors to achieve tonal transitions.

His palette is a model of diffused spectral immersion, rather than Sorolla's model of compressed spectral light. Sorolla actively divides color blocks, relying on separated complementary colors to create contrast; Krøyer, on the other hand, seeks mutual permeation and fusion between layers of pigment, with the entire composition unified by a consistent blue-gray tone and a deliberate reduction of light-dark contrast. In his masterpiece *A Summer Night at Skagen: The Artist's Wife and Dog on the Shore* (1892), the sea and sky merge into a continuous expanse of cobalt blue–gray-violet, with no clear demarcation between light and shadow; Mary's pale yellow long dress is one of the few warm tones in the painting, yet this warm hue does not clash head-on with the blue; instead, it is gradually permeated by the cool reflections of the sea and sky, and its saturation is diluted by the surrounding colors. The zinc white ground imparts a hazy, airy veil to the painting, simulating the visual effect of moisture suspended by the sea breeze. In another work, *Summer Night on Skagen's South Beach: Anna Ancher and Marie Krøyer* (1893), the beach is no longer the dazzling warm-orange sand seen in Sorolla's works, but rather a pale beige with blue-gray reflections. The intrinsic colors of objects are redefined by the ambient diffused light, and the contours of the figures gradually dissolve into the boundaries of the beach and the sea; the color spectrum of the entire composition is continuous, gentle, and devoid of abrupt changes.

In short, Krøyer's painting strategy can be summarized as follows: a predominance of dark tones, with light, localized areas of high saturation; an emphasis on the diffusion of reflected light, with minimal harsh juxtaposition of complementary colors. The choice of pigments was not merely a matter of aesthetic preference, but rather a material selection designed to adapt to the diffuse spectrum of Skagen's "blue hour"; the qualities of light took precedence over formal color, determining the structure of the palette.

## 3. From Pigment Infusion to Serene Empathy: Dissolved Complementary Colors and an Inward Sense of Life

Chevreul's law of simultaneous contrast and Hering's theory of antagonistic colors served as the common color principles for 19th-century plein air painters.[3,4] Both Sorolla and Krøyer understood the visual effects of complementary colors, yet their approaches to using them took completely opposite directions. Sorolla treated complementary colors as independent color blocks, physically juxtaposing and directly opposing them on the canvas: Blue and orange, yellow and purple are arranged separately; the retina simultaneously receives two sets of antagonistic stimuli, and the superimposed neural signals resonate, producing an outward-bursting, pulsating halo—what Sorolla termed "visual respiration" in his treatise. The alternation of warm and cool tones generates intense visual excitement, with vitality gushing outward [2].

Krøyer did not fail to understand complementary colors, nor did he abandon strong complementary contrasts; rather, he dissolved them and concealed them within the layers of color, replacing confrontation with permeation. The antagonistic relationship between blue and orange, and yellow and purple, is no longer directly presented on adjacent color blocks but is transformed into a subtle logic of reflected light: The shadows of the warm-colored dresses conceal blue-purple reflections, while the cool-colored sea and gaps in the sky harbor faint orange-yellow undertones. Complementary colors are no longer opposing forces that stimulate the eye; instead, they interpenetrate and neutralize one another within the same tonal field. The intensity of their antagonistic stimulation is greatly diminished, preventing violent retinal vibrations and replacing them with a slow, sustained, and uniform sense of chromatic immersion. The viewer's gaze does not jump back and forth between starkly contrasting blocks of warm and cool colors, but rather descends gently along a continuous, soft palette of blue-gray tones—a visual stillness that stands in contrast to Sorolla's "visual breathing."

This perceptual mechanism directly shapes two entirely different modes of perceiving life. The figures in Sorolla's paintings are bathed in direct sunlight; their bodies absorb the intense light, and their vitality is ignited by the sun. His subjects often include running, playing in the water, and bathing; their postures are outwardly expressive, and humans and nature are in a passionate embrace and fusion, with life energy radiating outward. In Krøyer's paintings, figures are immersed in the diffused twilight glow, their postures reserved and tranquil: strolling along the seashore, chatting with friends, sitting quietly at rest, or fishermen pausing silently in the night. People are no longer recipients of intense light but rather participants in a realm of soft light, their individuality gradually dissolving into the vast, hazy natural landscape of the Nordic coast. His paintings lack the carnival-like exuberance of life; instead, they convey a quiet empathy, tinged with a faint melancholy in the face of twilight, the passage of time, and the alternation of day and night.

The figures standing in *Summer Night Beach* do not engage in intense interaction with the sea or the twilight; rather, they embody a quiet acceptance and coexistence. His brushwork further enhances this immersive effect: Krøyer rarely employed Sorola's broad, sweeping strokes that deliberately segmented color blocks; instead, his brushstrokes tended toward blending and transition, gently smoothing out contour boundaries to simulate the flow of mist and moisture in the air. The boundaries between the figures and their surroundings gradually blur, creating a visual metaphor for how individual lives no longer assert themselves outwardly but instead open up to nature and return to tranquility. Sorolla's light illuminates the body and awakens vitality; Krøyer's light is a gentle glow that envelops, embraces, and soothes the human spirit.

## 4. Light Violence in the Digital Age: Contemporary Healing Insights from Krøyer's Spectrum of Faint Light

Modern artificial light sources and blue light from screens can cause "color malnutrition"—the light spectra we encounter daily are incomplete, and without the long-term nourishment of a full, natural, high-intensity light spectrum, our visual perception becomes impoverished[5]. While this assessment remains valid, the visual predicament of the digital age has another dimension: to capture attention, short videos, smartphone interfaces, and electronic screens universally employ color schemes characterized by high brightness, high saturation, and high contrast, constantly generating brief, intense bursts of light stimulation. This ceaseless visual bombardment is what this article terms "light violence." It is not a lack of color, but rather an overload of color stimuli that continuously keeps the visual nerves in a state of arousal, leading to sustained sensory overexcitement and ultimately resulting in mental exhaustion and heightened anxiety.

Sorolla's aesthetics of intense light address the issue of spectral deficiency, guiding us back to the complete natural light of midday to remedy "color malnutrition"; Krøyer's color refinement responds precisely to the sensory exhaustion caused by "light violence," offering us a perceptual framework for "soft-light colors." Soft-light colors do not seek instant impact or stark contrasts; instead, they capture diffused light that is sustained, gradual, and blurred at the edges, respecting the natural state of light as it scatters and slowly permeates, and rejecting the standardized, high-saturation color paradigms of digital media. Krøyer's paintings are, in themselves, perceptible fields of soft light: here, the eye need not constantly jump or chase sharp contrasts; the gaze can unfold slowly, and the nerves can relax from a state of constant overstimulation.

The value of this "faint light" aesthetic can be extended to multiple contemporary fields of practice. In architectural and interior lighting design, the long-standing design orientation has been to maximize natural light and pursue bright, direct sunlight; however, Krøyer reminds us that low-contrast, soft, diffused natural light also possesses significant psychological value. The concept of soft lighting in contemporary Nordic architecture resonates with Krøyer's visual explorations across time and space. In the field of visual media, the creative inertia of UI design, short videos, and new media imagery—which relentlessly pushes saturation and contrast to the limit—deserves reflection. Visual culture is not defined solely by eye-catching, intense light; it also requires visual spaces characterized by soft light, low contrast, and minimal stimulation. On the level of visual psychological healing, existing research has confirmed that low-contrast, soft-colored environments can alleviate anxiety[6]; Krøyer's "Blue Hour" paintings provide a classic example of precisely this kind of dimly lit chromatic field.

Of course, soft, subdued colors do not negate the value of intense light. Sorolla and Krøyer are not mutually exclusive choices but rather two complementary paths that plein air painting has bestowed upon contemporary visual culture: we must both embrace the intense light of midday to fill in the gaps in the spectrum and learn to find peace in the soft glow of twilight, soothing our senses—which have been continuously stimulated by intense light—through the immersive, gentle hues.

## 5. Conclusion

Taking "color refinement" as its core concept and drawing on the interdisciplinary research framework of Sorolla's color alchemy, this paper reinterprets Krøyer's "Blue Moment" paintings from five dimensions—material substance, natural optics, mechanisms of visual perception, expression of life,

and contemporary critique—thereby clarifying the two distinct paths of plein air painting represented by Krøyer and Sorolla.

First, at the material and optical levels, Krøyer's zinc white ground and restrained cobalt blue palette were not merely stylistic choices but rather a visual translation of the diffuse spectrum of Skagen's "Blue Moment"—distinct from Sorolla's capture of the spectrum of intense, direct Mediterranean sunlight. Second, at the level of color mechanisms, Krøyer did not abandon complementary colors; rather, he transformed their relationship from confrontational juxtaposition to implicit permeation. The antagonistic stimulation was attenuated, creating a perceptual experience of "visual stillness" and generating an inward-turning, silent, and empathetic perception of life—in contrast to Sorolla's outward-bursting vital vibrations. Third, at the level of contemporary value, beyond the concept of "color malnutrition," this paper raises the issue of "light violence" in digital media, explores the healing potential of Krøyer's spectrum of twilight light, proposes an aesthetic direction for twilight colors, and expands the boundaries of contemporary interpretations of plein air painting.

What Krøyer left to posterity was never a simple formula for blue-toned color schemes, but rather an alternative visual approach to the relationship between humanity and nature: humans do not only experience moments of being ignited by sunlight and blooming outward; there are also moments of quiet stillness, gently coexisting with time and nature amidst the diffused twilight. At a time when contemporary visual culture as a whole pursues intense light, stimulation, and fleeting visual impact, Krøyer's refined use of color reminds us to recognize the power of soft light.

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