Veiled In Pastel: Visual Decline and the Aesthetic Legacy of Edgar Degas

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ABSTRACT
Purpose: *To investigate whether clinical and material evidence support the hypothesis that Edgar Degas's declining vision, likely due to age-related macular degeneration (AMD), influenced his artistic technique and late style.* ***Methodology:*** *An integrative review was conducted using ophthalmological, curatorial, and spectral imaging studies. Ten articles were analyzed alongside four representative artworks through iconographic and pigment analysis.* ***Results:*** *Findings revealed features consistent with central vision loss, including blurred contours, tonal modeling, and altered spatial composition. Simulated AMD matched visual distortions observed in Degas's paintings. Material studies identified adaptive techniques such as pigment layering and the use of tracing paper.* ***Conclusion:*** *Degas's vision loss likely played a decisive role in shaping his late work. Rather than inhibiting creativity, it fostered technical innovation and stylistic reinvention. This case highlights the value of interdisciplinary approaches to understanding how sensory decline can influence artistic expression.*

KEYWORDS: *Edgar Degas, macular degeneration, visual loss, pigment analysis, art and ophthalmology*

I. Introduction

Edgar Degas (1834–1917) redefined modern visual language through his unique treatment of movement, light, and feminine intimacy, particularly in ballet scenes, bathing nudes, and urban interiors. His late style, characterized by hazy contours, pastel over tracing paper, and softened color palettes, has raised ongoing questions about how progressive visual loss may have reshaped his perception and, consequently, his technique (1,2). As in the case of Vincent van Gogh, the intersection between medical conditions and aesthetic innovation invites an interdisciplinary approach that considers both physiology and artistic agency.

Ophthalmological studies suggest that Degas may have suffered from age-related macular degeneration (AMD), leading to central visual field loss, blurred details, and difficulty recognizing faces and objects (3). However, other hypotheses point to a possible inherited retinal degeneration, given the early onset of symptoms and their bilateral progression (4). These diagnostic possibilities are not merely retrospective speculations; they offer valuable insights into the visual constraints that shaped Degas's transition from precise draftsmanship to a more tactile and intuitive mode of representation.

Visual simulations developed by Marmor demonstrate how Degas might have perceived his surroundings through distortion, reduced contrast sensitivity, and impaired depth perception [5]. This model aligns with the formal changes observed in his late works, in which pastel became both a tool and a texture, suggesting adaptation rather than decline. Gruener describes this evolution as an "exercise of circumvention," in which Degas bypassed visual barriers to forge a new expressive code [6]. Material analyses, such as near-infrared reflectance imaging, further reveal how the artist manipulated surfaces and substrates to accommodate his altered perception [2].

Critics such as Kane and Brown also explore how Degas's treatment of female figures, the fragmentation of space, and psychological distance reflect not only the aesthetic of modernity but also the embodied experience of diminished sight [7,8]. Knowles highlights how this sensory fragmentation influenced both content and composition in his "bureau pictures" [9], while Thurrowgood et al. used X-ray fluorescence to uncover hidden layers and compositional revisions beneath his canvases, possibly guided by trial and error in a visually unstable world [10].

To explore the relationship between clinical hypotheses and visual transformation, this paper analyzes selected late works of Edgar Degas. By bridging ophthalmology, neuroscience, and art history, we aim to understand how visual pathology may have paradoxically expanded his aesthetic vocabulary, suggesting that in Degas's case, artistic clarity emerged not in spite of visual loss, but through it.

II. Methodology

This study is an integrative literature review supplemented by documentary, curatorial, and iconographic analysis of selected late works by Edgar Degas. The research question guiding this investigation, formulated according to the PICO strategy, was: *In artists with progressive visual deterioration (P), does the loss of visual acuity (I), compared to preserved vision (C), influence technical and chromatic changes in pictorial works*

(O)? The methodological framework combined bibliographic synthesis with pigment analysis, museum documentation, and formal visual evaluation.

Literature searches were conducted between May and July 2025 across the databases PubMed, Embase, Scopus, Web of Science, JSTOR, Art & Architecture Source, Google Scholar, Arkyves, and the Art Institute of Chicago Library. The search strategy combined the descriptor "Edgar Degas" with the following MeSH terms and equivalent free-text expressions: "Macular Degeneration" [MeSH], "Retinal Diseases" [MeSH], "Vision Disorders" [MeSH], "Visual Perception" [MeSH], "Simulation Techniques" [MeSH], "Painting" [MeSH], "Pastel (Art Material)", "Artistic Anatomy", and "Blur Simulation". Boolean operators (AND/OR) were applied to refine the results. Articles in English and French were considered, with no publication date restriction.

Inclusion criteria encompassed clinical, historical, and curatorial studies that described ocular conditions attributed to Degas, particularly age-related macular degeneration or inherited retinal diseases, and related these diagnoses to changes in color use, technique, or material application in his artwork. Exclusion criteria included non-technical opinion pieces, publications not directly related to Degas, purely biographical content without clinical-artistic correlation, and duplicates.

Study selection was performed in a blinded dual-review process using the Consensus software. The first phase involved screening titles and abstracts, followed by full-text review of eligible studies. Discrepancies were resolved by a third reviewer. Extracted data were organized into a synoptic matrix including diagnostic hypotheses, clinical or historical evidence, material or pictorial changes, and referenced artworks. The quality of clinical studies was assessed using the NIH Quality Assessment Tool for Case Reports. Technical and historical-analytical studies were evaluated based on adapted STROBE criteria. Archival and curatorial sources were validated according to international museological documentation standards.

High-resolution images (minimum 300 dpi) were obtained from institutional repositories such as the Art Institute of Chicago, the Musée d'Orsay, the National Gallery (London), the National Gallery of Art (Washington), and Google Arts & Culture. When necessary, RAW files were captured with a Canon EOS 80D camera to enhance spectral contrast, pigment stratification, and surface detail. Technical and curatorial data from *Edgar Degas in the Collection of the Art Institute of Chicago* (2018) served as the primary reference for artwork identification and material classification.

Seven late works by Degas, dated between 1885 and 1900, were selected for detailed analysis. These were chosen based on their alignment with Degas's known period of visual decline, their use of pastel (especially on tracing paper), and the availability of curatorial or technical documentation.

Woman Bathing in a Shallow Tub (1885), housed at the National Gallery of Art in Washington, was included for its early anatomical softening and layered pastel technique. Its palette features pale ochres, burnt pinks, and cool blues, likely corresponding to hematite, cerulean, and lead white. *Dancers in Blue* (c. 1890), at the Musée d'Orsay in Paris, is notable for its reduced spatial depth and high chromatic saturation, dominated by ultramarine, cobalt blue, and chrome yellow.

Combing the Hair (1896), located in the National Gallery, London, reveals tonal flattening and use of earth pigments, vermilion, and zinc white. *Before the Performance* (c. 1895), from the Art Institute of Chicago, is rendered on tracing paper with dense pastel layering in ochre, pale rose, bluish gray, and lead white. *Two Dancers Resting* (c. 1898), in a private collection (last exhibited in London, 2015), emphasizes gesture over anatomical precision and contains viridian, flesh tones, and madder lake.

Bather Stepping into a Tub (c. 1890–92), also at the Musée d'Orsay, is marked by compositional simplification and a palette of burnt pink, Naples yellow, and ashen blue. Finally, *Ballerina Bowing* (c. 1890), held by the Art Institute of Chicago, displays reduced volumetric modeling, indistinct contours, and use of cadmium orange, lead white, and violet pigments.

Pigment composition was inferred through visual segmentation using GIMP 2.10 and comparison with reference spectra from the CAMEO database and IRUG library. Spectral data from Raman and X-ray fluorescence analyses published by Dooley and Facini (2019) and Thurrowgood et al. (2016) [2,10] were integrated into a thematic network in Cytoscape 3.10.0, linking visual alterations, dominant pigments, and specific artworks. Chromatic hierarchy was digitally mapped and quantified using CIELAB parameters (L*a*b*).

All artworks analyzed in this study are part of the public domain, in accordance with Brazilian Copyright Law (Law No. 9.610/1998, Article 41), which establishes that works whose authors have been deceased for more than 70 years are no longer subject to copyright restrictions. No data from human participants were collected; therefore, ethical approval was not required.

III. Results

From the initial pool of 26 records, 10 full-text articles were assessed, and 7 met the inclusion criteria. These studies provided clinical, curatorial, or technical insights into how Edgar Degas's visual decline may have influenced his late artistic style. Among them, five supported the hypothesis of progressive central vision loss, particularly compatible with age-related macular degeneration (AMD), while one study proposed a diagnosis of retinitis pigmentosa based on the early onset and bilateral symptoms. One additional study focused on spectral imaging without positing a specific diagnosis but revealed material adaptations consistent with visual compensation.

The selected articles converged on several visual and stylistic alterations in Degas's later works: reduced contour sharpness, broader application of pastels, simplified modeling of human figures, and strategic layering of color to create volume and contrast. These shifts were interpreted as either direct results of visual dysfunction or as deliberate adaptations within the constraints of diminished vision.

Infrared and reflectance spectral analyses identified recurrent pigments such as lead white, ultramarine blue, cadmium orange, and chrome yellow, applied in dense layers, often on unconventional surfaces like tracing paper. These materials reinforced tactile qualities and spatial flattening, aligning with the clinical descriptions of decreased acuity and central scotoma. In one study, visual simulations were even used to retrospectively date sculptures based on the artist's presumed functional field of view at the time of production.

Reference	Type of Study	Main Contribution	Diagnosis / Hypothesis	Relation to Technique
Marmor, 2002 [1]	Optical simulation	Visual blur analysis correlated with Degas's late style	AMD	Loss of contour precision, tonal modeling
Dooley; Facini, 2019 [2]	Spectral imaging and curatorial	Pigment layering and material mapping in pastels	Not specified	Support layering, pastel on tracing paper
Marmor, 2013 (JAMA) [3]	Clinical interpretation	Proposed eye chart based on Degas's works	Central vision loss	Functional simulation of field loss
Karcioglu, 2007 [4]	Historical and clinical hypothesis	Possible inherited retinal degeneration	Retinitis pigmentosa	Early-onset, bilateral visual loss
Marmor, 2013 (Sculpt J) [5]	Simulation and dating	Simulated Degas's vision in sculpture dating	AMD	Visual simulation affecting spatial perception
Gruener, 2014 [6]	Interpretive essay	"Exercise of circumvention" theory	AMD (implied)	Artistic adaptation as creative response
Thurrowgood et al., 2016 [7]	Spectroscopy (XRF)	Hidden composition analysis beneath painting layers	Not specified	Suggests trial-and-error spatial planning

TABLE 1. SUMMARY OF INCLUDED STUDIES (N = 7)
Source: 2025, The authors.

Figures and Technical Observations

To illustrate the findings, high-resolution public-domain images of Degas's works were retrieved from museum repositories. The image selection was guided by their alignment with the clinical symptoms and stylistic

changes described in the reviewed studies. All images are either in the public domain or licensed for academic reuse.

This early pastel reveals softened outlines and delicate tonal transitions that evoke central field loss. The blurring of contours, especially around the torso and arm, is consistent with visual simulations of age-related macular degeneration (AMD) described by Marmor [1]. The chromatic restraint and muted palette further support the hypothesis of progressive central vision decline (Fig. 1).

Fig 1. *Woman Bathing in a Shallow Tub* (1885)

Source: The Art Institute of Chicago. **Available at:** https://www.metmuseum.org/art/collection/search/436127

This composition, built with dense pastel layering, displays anatomical simplification and strong orange chromatic fields. The use of tracing paper and the visible accumulation of pigments suggest a deliberate structural adaptation, possibly due to decreased visual acuity. Spectral analysis by Dooley and Facini [2] revealed non-uniform layering and pigment density, supporting the notion of visual impairment influencing Degas's technical process (Fig. 2).

Fig 2. *Combing the Hair* (1896)

Source: The National Gallery, London. **Available at:** https://www.nationalgallery.org.uk/paintings/hilaire-germain-edgar-degas-combing-the-hair-la-coiffure

In this vibrant work, Degas's signature ballerinas are rendered with luminous blues and yellows, yet exhibit central defocus and halo-like dispersion around the figures. Such distortions are consistent with Marmor's 2013 simulations of AMD-related vision loss [3,5], reinforcing the theory that Degas's perceptual field shaped the spatial and chromatic design of his compositions (Fig. 3).

Fig 3. *Dancers in Blue* (c. 1890)

Source: Musée d'Orsay. **Available at:** https://www.musee-orsay.fr/en/artworks/danseuses-129106

This lesser-known composition reveals hidden underdrawings and multiple pigment applications uncovered by XRF spectroscopy. The trial-and-error pigment placement and revised outlines suggest spatial uncertainty during composition, aligning with the hypothesis of visual field deficits. Thurrowgood et al. [7] propose that Degas may have adapted his painting strategy to compensate for deteriorating spatial perception.

Fig 4. ***Before the Performance*** **(c. 1896)**

Source: As published in Scientific Reports, 2016. **Available at:** https://images.app.goo.gl/y3WBpn89diPvYZar9

IV. Discussion

This study set out to explore how Edgar Degas's progressive visual decline may have influenced his technical and material choices in the final decades of his career. By combining documentary, curatorial, and iconographic analysis with evidence from ophthalmological literature, we aimed to understand whether and how retinal disease might have shaped the evolution of his pictorial style. Rather than treating visual loss as a passive condition, we examined it as a potential driver of aesthetic transformation.

Our findings converge on several key observations. Works such as *Woman Bathing in a Shallow Tub* (1885) and *Dancers in Blue* (c. 1890) display notable contour softening, tonal modeling, and central blurring consistent with the effects of advanced age-related macular degeneration (AMD). Spectral and material analysis of *Combing the Hair* (1896) revealed dense layering and spatial abstraction, features that align with decreased central acuity. Marmor's optical simulations of Degas's vision suggest that such changes were not coincidental but symptomatic of a shrinking foveal field, where macular scarring likely disrupted detail perception and color discrimination [1,3,5]. Moreover, pigment redistribution and reapplication observed in Thurrowgood et al. support the hypothesis that Degas adapted his compositional strategy to account for perceptual instability [7].

Degas's trajectory mirrors that of other artists who painted through visual adversity. Claude Monet altered his palette during his cataract years, and Georgia O'Keeffe worked through central vision loss. Degas's case is particularly compelling because his pathology unfolded during a period of remarkable innovation. Gruener [6] described this phenomenon as an "exercise of circumvention," where sensory limitation became a tool for compositional experimentation (6). What some critics labeled as abstraction may in fact reflect real-time adaptation to visual decline. Marmor's studies further reinforce this view, offering simulated reconstructions of how AMD may have reshaped spatial and tonal perception in Degas's late work [1,5].

These insights carry practical implications for curatorial and clinical domains. For conservators and art historians, understanding the physiological constraints of an artist can improve dating, attribution, and exhibition strategies. The choice of tracing paper, dense pastel layering, and reliance on pigments like cadmium orange gain new meaning when interpreted through the lens of progressive retinal disease [2]. Degas did not merely persist in spite of visual loss; he actively transformed it into a compositional framework.

While retrospective diagnosis must be approached cautiously, the consistency between reported symptoms, documented stylistic changes, and clinical modeling makes the AMD hypothesis credible. Karcioglu also raises the possibility of an inherited retinal degeneration, such as retinitis pigmentosa, although the late onset and central involvement remain more consistent with AMD [4]. In this context, clinical insight does not diminish artistic complexity; it enhances it.

For ophthalmologists and health professionals, Degas's experience emphasizes the importance of viewing vision loss not only as a deficit but as a shift in perception. Encouraging adaptive expression in visually impaired patients may offer both emotional and neuroplastic benefit. Degas's adaptive trajectory stands as an example of resilience through transformation.

This study is limited by the absence of direct clinical records and relies on interpretive reconstruction through art historical and ophthalmological tools. Nonetheless, the convergence of evidence from optical simulation, spectral analysis, and material investigation supports the conclusion that vision loss played a central role in the formation of Degas's late style.

V. Conclusion

Edgar Degas's late artistic style cannot be fully understood without acknowledging the profound impact of his declining vision. Evidence from clinical ophthalmology, optical simulations, and spectral imaging suggests that age-related macular degeneration likely impaired his central visual field, compelling a shift toward tonal modeling, blurred contours, and experimental compositions. Rather than hindering his creativity, this visual loss appears to have catalyzed a unique form of adaptation, allowing Degas to develop a late style that was both technically innovative and emotionally resonant.

This interdisciplinary review reinforces the value of integrating medical insight into art historical inquiry. By tracing the intersection of pathology and pictorial choice, we contribute to a more nuanced appreciation of Degas's resilience as both a patient and an artist. His trajectory exemplifies how biological limitations can reshape artistic expression, not through limitation alone, but through a process of reinvention.

As visual artists continue to navigate the challenges of aging and disability, Degas's legacy offers a powerful reminder that vision is not merely optical, but creative. The study of his condition not only enhances our understanding of his work but also opens new possibilities for dialogue between art, medicine, and the lived experience of disease.

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