



## Simulations of Ailing Artists' Eyes Yield New Insights on Style

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For Claude Monet, 1912-22 was a watershed decade. He was perhaps the most successful artist of his time, and his genius had already assured him a place in history.

But as he aged, his painting noticeably lost subtlety. Brush strokes became bolder, and colors strikingly blue, orange or brown. His images lost detail and flowed into one another. His days as an avant-garde rebel had long passed, but some critics would later wonder whether the Impressionist was suddenly trying to become an abstract expressionist.

What has long been known about Monet's later years is that he suffered from cataracts and that his eyesight worsened so much that he painted from memory. He acknowledged to an interviewer that he was "trusting solely to the labels on the tubes of paint and to the force of habit."

Now, thanks to modern digital techniques, scientists and critics can have a better idea how cataracts changed what Monet saw. This year, an ophthalmologist at Stanford, Michael F. Marmor, described in The Archives of Ophthalmology creating computer simulations of Monet's world as his lenses yellowed, blurring vision and turning patterns of color and light into muddy, unfocused, yellow-green inkblots.

Although it is impossible to know how Monet wanted his canvases to look, Dr. Marmor's research suggests that understanding physical infirmity can help assess his work. Whatever Monet intended, his eyes provided little help. "He couldn't judge what he was seeing or see what he was painting," Dr. Marmor said. "It is a mystery how he worked."

Monet was not alone. France in the late 19th and early 20th centuries embraced an astonishing number of important artists who battled serious physical shortcomings -- sometimes for decades. Edgar Degas, known for his paintings of nudes and ballet dancers, suffered retinal disease, probably macular degeneration, for nearly half his life. When he died in 1917, his colleague Pierre Auguste Renoir said, "It is fortunate for him ... any conceivable death is better than living the way he was."

Renoir suffered painful rheumatoid arthritis for more than 30 years, continuing to paint as assistants inserted brushes between his gnarled fingers.


Mary Cassatt, like Monet, had cataracts. Camille Pissarro had a malfunctioning tear duct. Seizures and other nervous disorders tortured and ultimately destroyed Vincent van Gogh.

Over the years, Dr. Marmor and other scientists have studied artists for insights into physical condition's influences on style and perception. "It made it difficult for them to judge if their art was accomplishing what they intended," Dr. Marmor said.

For some, disease ended careers. Cataract surgery was possible in the early 1900s, but it did not always work.

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"I look forward with horror to utter darkness," Cassatt wrote in 1919, fearing that an operation on her left eye would be "as great a failure as the last one." It was, and she stopped painting.

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Renoir had his first arthritis attack in 1888, and over time his fine motor skills were compromised. For the rest of his life, arthritis progressively deformed his hands and swelled his joints. "It is so painful to see him in the morning," wrote Julie Manet, a niece of Edouard Manet. "He does not have the strength to turn a doorknob."

A Renoir biographer, the art historian Barbara Ehrlich White, wrote in an e-mail message: "Because of his physical disabilities," Renoir "had to change, to become less detailed and freer. He continued to paint until the day he died, but because of his handicap, his later work could not approach the brilliance of his earlier paintings."

For artists with eye problems, it is perhaps surprising that infirmities did not change their styles more radically. A key, some experts said, might be that although artists' perceptions might be influenced by physical limitations, they are also informed by what the artists know and what they want to do.

"Most of us are into quick snapshots," said John Elderfield, chief curator of painting and sculpture at the Museum of Modern Art. "But the ability to translate visual memory into a different medium is another thing altogether. Monet had been painting for 50 years when he had cataracts. Of course he painted from memory. He painted from memory all his life."

It is easy to see a stylistic contrast. On the fifth floor of the Museum of Modern Art, a three-canvas set of Monet's water lilies spreads across a gallery wall in dazzling homage to the artist at the height of his brilliance. Off to one side is a painting of the Japanese bridge at Giverny from the early '20s, when Monet's cataracts were at their worst. It is a disturbing mix of dark reds and browns, much darker than the water lilies, yet just as compelling, perhaps, in its brooding intensity.

Monet, terrified by Cassatt's example, put off surgery, but finally had a successful operation on one eye in 1923. His last paintings before his death three years later harked to his earlier work. He also destroyed many cataract-period canvases, but it is unclear whether they surprised him. He had ruined paintings at other times in fits of pique.

Degas first noticed eye problems as a national guardsman in the Franco-Prussian War in 1870-71, when he could not aim his rifle because of a blind spot in his right eye. By 1890, his left eye also began to deteriorate. Light dazzled him. He tried to use peripheral vision to compensate for his loss of central vision.

Dr. Marmor used computer simulations to gauge the problem. Retinal disease, unlike cataracts, does not cause major difficulties with color perception. But Degas had blurred vision, affecting his ability to perceive form and line.

An ophthalmologist in Toledo, Ohio, Dr. James G. Ravin, who has collaborated with Dr. Marmor in the past, suggested that Degas's return to pastels and his interest in sculpture might have arisen from seeking an easier-to-control medium.

The simulations showed that the draftsmanship became less detailed and the shadowing coarsened as Degas's sight deteriorated. Even so, Dr. Marmor said, his work would have looked smoother to him than it actually was.

An art historian and a Degas scholar who taught at Columbia, Theodore F. Reff, wrote in an e-mail interview that retinal disease was a factor in Degas's late style. "Bitterness and growing isolation," caused, in part, by the infirmity, may have led him "to paint and draw and sculpt more brusquely and summarily," Mr. Reff said. But eye disease in no way compromised his art, he added. "What his draftsmanship lost in fullness of realistic description and refinement of execution, it gained in grandeur and expression."

Pissarro, who in his last 15 years suffered chronic infection of the tear sac in his right eye, had difficulty painting outdoors, particularly in winter.

"But there is a certain element of 'I'm not going to stop what I want to do,'" said a great-grandson of the artist, Joachim Pissarro, an art historian at Hunter College. "You don't want to over-analyze the impact."

Indeed, Pissarro's late cityscapes of Rouen and Paris, regarded as masterpieces, were painted from indoors behind a window to protect his eyes.

The idea that disease and its consequences might lead an artist down fruitful paths has prompted great interest in van Gogh. His suicide at 37 followed seizures and nervous distress variously attributed to epilepsy, bipolarity, schizophrenia and substance abuse.

Dr. Marmor rejected speculation that van Gogh's affinity for yellow in his paintings came from "yellow vision," caused by taking digitalis to treat supposed epilepsy. "He could not have taken enough of it to have that effect," Dr. Marmor said. "It's too toxic. He loved yellow throughout his career."

A biochemist at the University of Kansas, Wilfred N. Arnold, also dismissed theories that "madness" made for a better artist. Dr. Arnold has suggested that van Gogh suffered a congenital liver-centered metabolic disease, acute intermittent porphyria, that can provoke episodic derangement, depression, hallucinations, disability and abdominal distress. Between crises, van Gogh behaved normally and painted spectacularly, Dr. Arnold said, but when he had a crisis, he courted death.

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