

Solving art's mysteries: New technology visualizes how Matisse changed 'Bathers'

July 12 2010, By Megan Fellman

Henri Matisse was a painter of vivid colors. From 1913 to 1917, however, he radically changed his style and palette. Collaborators from Northwestern University and The Art Institute of Chicago bring this home with a fascinating scientific deconstruction of Matisse's famous painting "Bathers by a River." The artist had tamped down earlier layers of pinks, greens and blues into a somber palette of mottled grays punctuated with some pinks and greens.

"Matisse: Radical Invention, 1913 - 1917," opening July 18 at the Museum of Modern [Art](#) (MoMA) in New York and recently on exhibit at the Art Institute, focuses on this critical period of experimentation and is much inspired by "Bathers by a River," which the artist said was one of the five most pivotal works of his career. In reworking this painting and many others, Matisse left a bounty of tantalizing clues for art historians and conservation scientists interested in learning more about his new methods and intentions.

The show's curators, Stephanie D'Alessandro of the Art Institute and John Elderfield of MoMA, along with colleagues in conservation and conservation science had many questions about "Bathers" -- one of Matisse's largest works -- and its many states of evolution. To help bring the May 1913 state of the painting to color from an old black-and-white photograph, they turned to Aggelos Katsaggelos and Sotirios Tsiftaris, two Northwestern professors who are experts in image and video processing.

[Art and Science Collide in Revealing Matisse Exhibit](#) from [Northwestern News](#) on [Vimeo](#).

The engineers collaborated for two years with an Art Institute team led by D'Alessandro and Francesca Casadio, the Andrew W. Mellon Senior Conservation Scientist, to reconstruct the palette of the May 1913 canvas of "Bathers" documented that year by photographer Eugčne Druet. The project is part of a long-term collaboration between Northwestern and the Art Institute focusing on scientific research in the field of art conservation.

The resulting colorized photo, which is part of the exhibition and accompanying catalog, shows what "Bathers" may have looked like in November 1913 when the photograph was taken. (Matisse likely completed the painting in 1917.) The image provides insights into Matisse's working methods, offering a way to better understand the painting's evolution.

"What had once been an idyllic, pastel-colored work was now cool and reductive, dramatically transformed by new methods of abstracting and building and paring down form through the use of gray and black," writes D'Alessandro in the exhibition catalog.

The colors of "Bathers" changed yet again from the 1913 state to another state of the painting in 1916, which retains the four abstract figures but changes the background to a palette of black, white, green and grayish blue in a rhythmic pattern of vertical bands.

Working closely with the Art Institute team, Katsaggelos and Tsiftaris developed new imaging technology specifically for this project that enabled them to colorize Druet's black-and-white archival photograph of the painting. They used information still preserved on the surface of the finished painting and from microscopic samples mounted as cross

sections to help determine how to accurately propagate the color throughout the photograph.

The colorized photo shows Matisse in 1913 changed the layers of pinks, greens and blues seen in states of the painting starting in 1909 into a palette of mottled grays with some pinks and greens.

"It was challenging to figure out where color was needed," said Katsaggelos, professor of electrical engineering and computer science at the McCormick School of Engineering and Applied Science, "but we all are quite confident in the image's final colors."

"We first developed an algorithm to correlate information between the final state of the painting and the black-and-white photograph," he explained. "This guided us in determining both the areas where color was needed in the photograph and the choice of color for each area, what we call color hints. Our colleagues at the Art Institute assisted us in further refining our color choices. We then developed a second algorithm that propagated each color hint throughout its area, colorizing the whole image."

"This was an extraordinary project that many people contributed to -- curators, conservators, conservation scientists and the wildly imaginative scientists we worked with, like Aggelos and Sotos," said D'Alessandro, the Gary C. and Frances Comer Curator of Modern Art at the Art Institute. "We couldn't have done this project without one another."

In addition to "Bathers by a River," the Matisse show includes nearly 120 paintings, sculptures, etchings and drawings selected by D'Alessandro and Elderfield, Chief Curator Emeritus of Painting and Sculpture at MoMA.

Colorization has been a topic of interest in computer science for the past

30 years but only now is being applied to art. With the success of the Matisse colorization project, Elderfield has recruited Katsaggelos and Tsaftaris to do something similar for a future MoMA exhibit of the work of Willem de Kooning.

"The Matisse project is just the tip of the iceberg," Katsaggelos said. "This technology represents a new intersection of art and science that is very exciting."

Katsaggelos and Tsaftaris' colorization technology and similar techniques extend beyond art applications to colorizing old movies, television shows and photographs, as well as to colorizing new animated movies. (Tsaftaris is a research assistant professor of electrical engineering and computer science.)

Researchers from Northwestern and the Art Institute have been working together to solve mysteries from the museum's collection since 2003 when the Art Institute hired its first conservation scientist (Francesca Casadio) and established a scientific laboratory.

"The Matisse project is yet another success story," Casadio said. "It represents a new paradigm that couples excellence in science and technology with challenging new problems in art history and art conservation. The building of bridges across disciplines and across the city enables a new kind of art history that uses materials clues within art objects as primary sources of art historical information in a completely innovative and often revelatory way."

Research teams, often tapping different experts at Northwestern and the Art Institute, have turned up significant clues as to how many Art Institute masterpieces were made. Prior to the Matisse work, researchers uncovered the sources of coloration of an ancient jade sculpture called "The Kneeling Figure," the reasons a dramatic sky disappeared from

Winslow Homer's watercolor "For to be a Farmer's Boy," the culprits (burning coal and light exposure) behind the faded brilliance of Georges-Pierre Seurat's oil painting "A Sunday on La Grande Jatte" and the provenance of a number of modern bronze sculptures, including a Picasso.

The partnership is the nation's first multi-year collaboration in conservation science to involve an art [museum](#) and a university and is supported by the Andrew W. Mellon Foundation.

Provided by Northwestern University

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