

We can see the true face of Van Eyck Lamb of God after latest restoration

Enlarge / The central *Adoration of the Mystic Lamb* panel. The groupings of figures are, from top left anti-clockwise: the male martyrs, the pagan writers and Jewish prophets, the male saints, and the female martyrs.

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Over the last eight years, conservationists have been meticulously restoring the famed Ghent altarpiece housed in Belgium's St Bavo's Cathedral. With the help of several advanced imaging techniques, they've been able to identify where overpainting from earlier restorations obscured the original work. Researchers at the University of Antwerp and the National Gallery of Art in Washington, DC, have published a new paper in the journal *Science Advances* demonstrating how combining different techniques greatly improved their analysis, revealing previously unknown revisions to the Lamb of God figure in the inner central panel.

The *Ghent Altarpiece*—aka the *Adoration of the Mystic Lamb*—is a 15th-century polyptych attributed to brothers Hubert and Jan van Eyck. Originally consisting of 12 panels, the altarpiece features two “wings” of four panels each, painted on both sides. Those wings were opened on church feast days so

congregants could view the interior four central panels. The inner upper register features Christ the King, the Virgin Mary, and John the Baptist, flanked by the outer panels depicting angels and the figures of Adam and Eve. The inner lower register depicts John the Baptist and St. John the Evangelist. The *Adoration of the Lamb* comprises the center panel, featuring the Lamb of God standing on an altar in a meadow surrounded by angels, with groups of martyrs, saints, and prophets congregating around the altar.

The first significant restoration was done in 1550 to repair damage from an earlier cleaning. It was cleaned again in 1662 by the Flemish painter Antoon van den Heuvel. After the altarpiece was damaged while being stored in Austrian mines during World War II, another restoration was done in the 1950s, making use of X-ray radiography (XRR) to aid in those efforts. Specifically, the researchers imaged tiny paint samples from the cross-section of the altarpiece, yielding useful information about areas that had been over-painted during the earlier restoration, obscuring the original Eyckian work—including the Lamb's head.

Artists of this period would prepare an oak panel with a layer of chalk mixed with a binding agent like glue. The artist would then sketch the image they wished to paint on that layer in black before sealing the surface with a translucent primer (typically drying oil tinged with lead white, chalk, carbon black, or earth pigments). Then the artist would apply a layer (or more) of variously colored paints to define the underdrawing. Finally, the artist would paint the finer details and add the richest colors. A year or so later, once the paint had fully dried, the artist would apply a final varnish layer.

According to the authors of the new paper in *Science Advances*, the techniques available at the time were not sufficient to precisely localize all of the overpainting because of the frequent use of lead white paint. It just wasn't possible to

achieve the necessary level of chemical contrast. In such cases, “conservators and curators err on the side of caution, choosing to leave areas of possible overpaint in place until further research provides definitive evidence of their origin,” they wrote. So the 1950 restoration only removed the overpainting from the area surrounding the lamb’s head. This revealed the original gilded rays and ears of the original Eyckian lamb, while keeping the overpainted ears.

Restorative powers

Most recently, the Museum of Fine Arts in Ghent began restoring the altarpiece in October 2012, allowing the public to view the process from behind a glass screen as conservators from the Royal Institute for Cultural Heritage worked on individual panels. Restoration of the eight outer panels was completed in 2016, and the five lower panels were restored over the next three years.

This most recent restoration also produced a series of high-resolution images of the various panels using different imaging techniques. As we reported last year, those images in turn formed the basis for an investigation into applying AI analysis to the altarpiece images by researchers at Duke University, the National Gallery, and University College London. That team published a paper in 2019 demonstrating that its techniques could make imaging the altarpiece’s two-sided painted panel easier.

The fact that the wing panels are painted on both sides posed a unique challenge for conventional X-ray analysis. X-rays penetrate so deeply that it can be difficult to determine which content applies to which side of the panel, since “all of the images are visibly overlaid or ‘blended’ together,” the authors wrote. They developed a deep neural-network algorithm to study mixed X-ray images containing features from the front and back of the painting’s double-sided panels. They

successfully applied their technique to X-ray images of the Adam and Eve wing panels to deconstruct that data into two clear images, significantly improving on the performance achieved by prior methods.

- Left: color image after the 1950s treatment. The ears of the Eyckian Lamb were revealed after removal of the 16th-century overpaint obscuring the background. Right: color image after the 2019 treatment that removed all of the 16th century overpaint, revealing the face of the Eyckian Lamb. The dotted lines indicate the outline of the head before removal of 16th-century overpaint.

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- Left: colorized composite elemental map showing distribution of gold, mercury, and lead. Right: composite false-color infrared reflectance image shows underdrawn lines indicating facial features.

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- Upper left: color image before removal of all 16th-century overpaint. Upper right: color image after removal of all 16th-century overpaint. Lower left: false-color infrared reflectance image reveals underdrawing lines. Lower right: map derived from processing the infrared reflectance image cube showing the initial lamb with a slightly sagging back, more rounded hindquarters, and a smaller tail.

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- The MA-XRF instrument during experiments in the central panel.
- The MA-XRF instrument during experiments on the central panel.
- Near-infrared reflectance imaging spectroscopy set up.

Meanwhile, Geert Van der Snickt and colleagues at the University of Antwerp were using macroscopic X-ray fluorescence (MA-XRF) imaging, combined with other traditional

methods (including XRR and infrared reflectance reflectography, or IRR) on the four inner central panels to determine the full extent of the overpainting done during the mid-16th-century restoration.

The combination approach was so successful that the Antwerp researchers decided to collaborate with the National Gallery of Art in Washington, DC, combining MA-XRF with infrared reflectance imaging spectroscopy (RIS) for the second phase of the restoration, which included fully restoring the Lamb of God. "Each method provides some level of chemical contrast in cases where the other does not," the authors wrote. "In particular, each technique can reveal materials to which the counterpart is insensitive, for example, overlaying layers that strongly attenuate x-rays can prove transparent for infrared radiation, and vice versa."

For instance, the MA-XRF imaging mapped the mercury in the vermillion paint, revealing the nostrils of the original Eyckian lamb. Meanwhile, the RIS revealed the original layer of the ungulate's face, which absorbs infrared light. In the end, the analysis uncovered three different versions of the lamb: the original one painted by the Van Eyck brothers; a second version—either by the brothers or one of their contemporaries—which featured larger, squared-off hindquarters; and a third version from the 16th-century restoration that significantly altered the lamb's head.

The new analysis helped guide the conservationists as they removed the 16th-century overpainting, revealing facial features that closely matched the researchers' predictions. Specifically, the lamb's face is quite human in its expressiveness, with distinctive pursed lips, smaller V-shaped nostrils, and a well-defined jawline, as well as eyes that face forward in a rather unsettling, direct gaze at the viewer.

Those eyes remain a matter of considerable debate among art

historians. Some propose that it was done to make the lamb appear more human, as a symbol of the embodiment of Jesus. "A simpler explanation may be that the painting of animals with forward-facing eyes is typical of an older style that was still present in the 15th century but disappeared when artists mastered a more naturalistic depiction of animals," the authors wrote. Within the Ghent altarpiece itself, there are examples of animals depicted with both forward-looking and more naturalistic outward-looking eyes. "Thus, it is not unexpected that the Van Eyck brothers would have painted the Lamb with forward-facing eyes that directly engage the viewer," the authors concluded.

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