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The Mirrors Behind Rembrandt's Self-Portraits

Trilobites

By STEPH YIN JULY 13, 2016



A Rembrandt self-portrait. A new study offered further evidence for the hypothesis that the Dutch painter and other “old masters” used optics to create their portraits. Credit National Gallery of Art, Washington, D.C.

At age 18, Francis O'Neill, an aspiring young painter, went on a train trip around Europe and was struck by the Rembrandt masterpieces he saw in galleries. Like many before him, he was astounded by Rembrandt's technical accuracy.

"I thought, 'What sort of magic has this guy imbued in himself?'" said [Mr. O'Neill](#), who today produces art and teaches from his [studio](#) in Oxford, England.

Now, Mr. O'Neill thinks he's found an answer to that question — and he says it has more to do with optics than magic.

In a [paper](#) published Wednesday in the Journal of Optics, Mr. O'Neill lays out a theory that Rembrandt set up flat and concave mirrors to project his subjects — including himself — onto surfaces before painting or etching them.

By tracing these projections, the 17th-century painter would have been able to achieve a higher degree of precision, Mr. O'Neill said. His research suggests that some of Rembrandt's most prominent work may not have been done purely freehand, as many art historians believe.

He is not the first to suggest that old master painters used optics for their famous portraits.

In 2001, [David Hockney](#), a renowned British painter, and [Charles Falco](#), an optical sciences professor at the University of Arizona, published a [book](#) in which they argued that master painters secretly used mirrors and lenses to create hyperrealistic paintings, starting in the Renaissance.

Their theory, known as the Hockney-Falco thesis, generated controversy among scientists and art historians, some of whom took the findings as an implication that old master painters had "cheated" to produce their works.

One of the theory's most outspoken critics was [David G. Stork](#), an optics expert who claimed to find [discrepancies](#) in the painting analyses done by Mr. Hockney and Dr. Falco. In turn, Dr. Falco [accused](#) Dr. Stork of fabricating data. (A review by Stanford University, where Dr. Stork taught at the time, found Dr. Falco's accusations to be unsubstantiated.)

After learning of the [Hockney-Falco thesis](#), Mr. O'Neill spent a decade studying Rembrandt's work, which he believed displayed many features consistent with the use of optics, such as higher resolution in the center and blurriness along the edges.

Photo



This photo is taken in the reflection of a flat mirror that Francis O'Neill, a painter based in Oxford, is standing in front of. In the photo, you can see Mr. O'Neill projecting his reflection onto a copper plate using the flat mirror and a concave mirror that he holds in his hand. Credit Francis O'Neill

Mr. O'Neill started tinkering with mirrors to find the best ways to achieve projections. He found that arranging mirrors in a zigzag projected an inverted image that he could then trace onto a metal plate or canvas. For the projection to work, one of the mirrors had to be concave, or curved inward, to concentrate light onto one point.

In his paper, which he wrote with Sofia Palazzo Corner, an independent researcher in London, Mr. O'Neill presents recurring themes in Rembrandt's work that point to the Dutch artist's use of mirrors, particularly in self-portraits.

Among these themes is Rembrandt's use of [chiaroscuro](#), a contrast of light and dark, which is a signature of the lighting conditions necessary for projections.

"You're bouncing light in a zigzag, so it goes from your face to the flat mirror, to the curved mirror and then to the surface you're working on," Mr. O'Neill said. "For the face to be brightly illuminated, the rest of the room has to be dark — similar to if you're watching something on an overhead projector."

Another piece of evidence he points to is Rembrandt's off-center gaze in many self-portraits. This suggests that Rembrandt might have been looking at a projection surface slightly off to the side, rather than straight onto a flat mirror, Mr. O'Neill said.

Photo



A self-portrait, called "Rembrandt Laughing." Credit J. Paul Getty Museum, Los Angeles

He believes such a setup also would have made it easier for Rembrandt to create animated self-portraits, including one called "Rembrandt Laughing," painted around 1628.

If Rembrandt were not using a projection, he would have had to hold a laughing expression while looking back and forth between his canvas and a mirror, "the physical discipline of which seems quite extreme," Mr. O'Neill said. With a projection, however, Rembrandt could have just traced himself without having to move his eyes.

Dr. Falco praised Mr. O'Neill's new evidence. But the new study did not convince the critic of his and Mr. Hockney's work, Dr. Stork, who countered that the image produced by two mirrors would appear upside down on the projection surface.

"If the artist is painting over it with downward strokes, then when you take the painting and turn it right side up, all those brushstrokes would go

upward,” he said. “But in every Rembrandt, not a single brushstroke goes in that direction.”

There is no historical documentation that Rembrandt ever used optics, he added. “Rembrandt had lots of people in and out of his studio, and not one of them mentioned a projector in a note to a friend or wife? That seems unlikely,” Dr. Stork said.

Photo



This diagram shows a mirror setup Rembrandt might have used to create life-size self-portraits. Credit Francis O'Neill

Mr. O'Neill, however, believes that the use of optics was common enough during Rembrandt's time that the presence of mirrors in an art studio would not necessarily stand out.

Furthermore, he said, it's possible that Rembrandt used optics to get the proportions and placement of details right, and then finished his paintings freehand — which would explain the lack of upward brushstrokes.

Even with the use of optics, Rembrandt was deserving of the title “old master,” Mr. O’Neill said.

“People have accused me of being jealous, or trying to discredit Rembrandt, but that’s not at all what I’m trying to do,” he said. “If you gave a projection to someone on the street and told them to make a masterpiece, they would never give you a Rembrandt.”

Far from trying to undermine artists like Rembrandt, Mr. O’Neill said, he is interested in how the use of optics “makes us look at artists as scientists.” At the same time scientists had just started using lenses to look at things invisibly small through microscopes and at the stars through telescopes, artists were using lenses to study the world around them, he said.

As for whether he has successfully painted a self-portrait using his optical setup, Mr. O’Neill said he’s sure that day will come.

“Someone will say, ‘prove it,’ and then I’ll show them how it’s done,” he said.

A version of this article appears in print on July 19, 2016, on page D2 of the New York edition with the headline: Master Strokes: Rembrandt May Have Used Mirrors, if Not Smoke. [Order Reprints](#) | [Today's Paper](#) | [Subscribe](#)