

Recent progress in the application of computer graphics to the study of realist old master paintings

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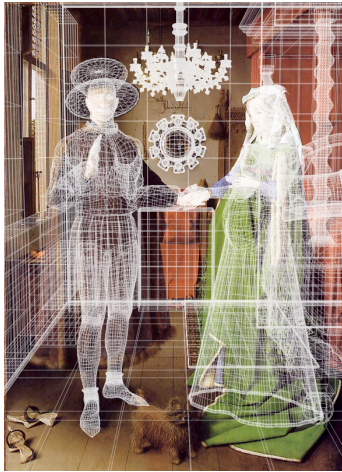
Computer graphics models of artists' studios allow scholars to address a number of vexing problems in the history and interpretation of art, particularly those related to artists' studio praxis (Fig. 1). A model of Jan van Eyck's *Portrait of Arnolfini and his wife* exposed perspective inaccuracies difficult to discern by the unaided eye. The model also confirmed that the focal length of the depicted convex mirror was much shorter than a putative projection mirror for this work, both results leading to a rejection of the claim that this work was executed by tracing optical projections.¹ The lighting direction estimated in a model of Jan Vermeer's *Girl with a pearl earring* agreed closely with directions estimated by five other sources within the painting, revealing objectively this artist's mastery in rendering the effects of light and supporting the claim this work was executed with a live model, not from the artist's imagination.² A model of Georges de la Tour's *Christ in the carpenter's studio* confirmed that the light in the tableau was at the candle, rather than "in place of the other figure" and this, in turn, led to a rejection of the claim this painting was executed using optical projections.³ A model of Diego Velázquez's *Las meninas* revealed that the reflected image of the king and queen in the plane mirror on the rear wall is likely a reflection of the painted image of the royal couple on the hidden side of the large depicted canvas rather than of figures in the position of the viewer, a results that challenges one reading of the work.⁴ A model of Caravaggio's *The calling of St. Matthew* revealed constraints upon the lighting and geometry of the studio and lighting and exposed the constraints needed for a local illumination configuration and a distant solar illumination.⁵ A model of Parmigianino's *Self portrait in a convex mirror* revealed that the warped image is consistent with the artist faithfully recording the the image of a rectilinear room distorted by the mirror, rather than inventing a fictive space. The model also reveals that the work may be hung too high in its gallery home.⁶ A simple, plane model of Hans Memling's *Virgin and Child and Maarten van Nieuwenhove diptych* revealed inconsistencies between the warped image in the convex mirror and the likely tableau itself, thereby supporting the claim that this mirror was added as an afterthought.^{7,8}

Realist paintings are constructed artifacts and most painters (including Renaissance masters) who carefully observe nature nevertheless render their subjects with a personal style that deviates from a "photographic" rendering. Nevertheless, computer models, which implement consistent physics and optics, are useful in analyzing such works. For instance, computer graphics models reveal where and how an artist deviated from a "faithful" reproduction of the tableau before him. Such results may then be the starting point for art historical investigation and interpretation.

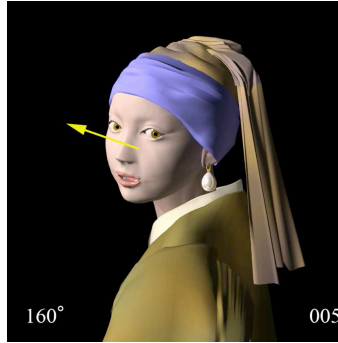
This talk for art scholars—profusely illustrated with art works and movies of computer graphics models of artists' studios—will show the steps by which computer experts together with art scholars build such computer graphics models, the types of assumptions that are brought to bear, and the strengths and limitations of the overall methodology. It is essential that such research be informed by expert art historical knowledge of the artist in question, his oeuvre, context, known working methods, and to the extent possible, that the scholarly question admit an objective, verifiable answer, rather than a personal interpretation.

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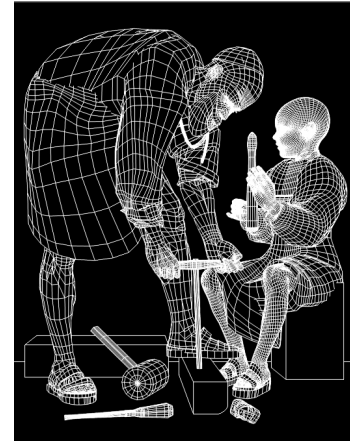
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Jan van Eyck
Portrait of Arnolfini and his wife



Jan Vermeer
Girl with a pearl earring



Georges de la Tour
Christ in the carpenter's studio



Diego Velázquez
Las meninas



Caravaggio
The calling of St. Matthew



Parmigianino
Self portrait in a convex mirror

Figure 1. Computer graphics models of old master works, used to test assumptions and claims about perspective, lighting, artists' praxis (including the use of drawing aids) as well as proper museum display of the paintings.

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