

The Materials and Technique of Two Panel Paintings Attributed to Paolo Uccello: The Oxford *Annunciation* and the Melbourne *Saint George*

This paper presents some results to date of ongoing research into two panel paintings attributed to Paolo Uccello: the *Annunciation* in the Ashmolean Museum, Oxford, and the *Saint George and the dragon* in the National Gallery of Victoria, Melbourne. New scientific analyses of the *Annunciation*, including infrared reflectography, x-radiography and the analysis of a microsample, and visual analysis of both works are presented. Particular attention is paid to the support, underdrawing, incisions, *pentimenti* and execution in the paint layers of the *Annunciation*, and the support, use of silver and gold leaf covered by coloured glazes, punchwork and the appearance of fingerprints on the *Saint George and the dragon*. Comparisons are made with the materials, technique and execution of panel paintings and mural paintings attributed to Uccello to support the attribution of the two works to him and their dating to the early 1430s.

In March of 2002 this author visited the Ashmolean Museum, Oxford to see the *Annunciation* and to consult the documentation for the work. Dr. Catherine Whistler, Senior Assistant Keeper, had recently rehung the Italian renaissance paintings and, following consultation, attributed the *Annunciation* to Paolo Uccello. In September of that year the Ashmolean Museum and the National Gallery, London, kindly agreed to conduct a series of technical analyses of the *Annunciation* including infrared reflectography (IRR), x-radiography and a microsample.¹ The work travelled to London in November; four x-radiography prints, together covering the whole surface of the painting, were made on 14 November, and arrived in Melbourne in February 2003. The IRR prints of details of the painting arrived in March, made from mosaics assembled from data recorded on 21 November 2002.²

The support of the *Annunciation*³ (fig. 1) is a single piece of wood with vertical grain, with no trace of an original frame. Neither is there any clear sign of a *barbe* around the outside of the paint surface, which has been damaged and restored in places. However, there is no reason to think that there has been a significant reduction of the painted surface. The x-radiograph shows numerous worm channels, a common feature of old Italian panel paintings. Fortunately, little damage has resulted to the paint surface from the

¹ For the sake of brevity, provenance and art historical evidence presented in the paper at Bruges has not been included here. The painting was examined in infrared by Rachel Billinge, Rausing Research Associate in the Conservation Department of the National Gallery, London. Infrared reflectography was carried out using a Hamamatsu C2400 camera with an N2606 series infrared vidicon tube. The camera is fitted with a 36 mm lens to which a Kodak 87A Wratten filter has been attached to exclude visible light. The infrared reflectogram mosaics were assembled on a computer using Vips-ip software (www.vips.ecs.soton.ac.uk). Expenses for the project were subsidised by a Research and Graduate Studies Grant from the School of Art History, Cinema, Classics and Archaeology. Thanks to all those at the Ashmolean Museum, The National Gallery, London and The University of Melbourne who contributed to this project, in particular, Dr Catherine Whistler, who approved the scientific analyses of the *Annunciation*.

² Digital versions of the IRR images were received in Melbourne in July 2004.

³ Inv. A.80, tempera, probably oil and gold on panel, 64,4 x 47,5 cm, Ashmolean Museum, Oxford.

infestation of the panel; it is for the most part well preserved. The exposed sides of the *Saint George*⁴ (fig. 2) also have numerous worm exit holes. A series of fine horizontal lines is visible in parts of the x-radiograph of the *Annunciation*, which bear no relationship to the paint surface. Close inspection of the x-radiograph reveals a network of small black dots in a regular grid covering almost the entire x-radiograph (fig. 8). These appear to be the interstices of a single piece of fine weave cloth that extends to, or close to, the four edges of the panel.

Cennino Cennini recommended applying cloth strips over a panel in his treatise on painting from about the late fourteenth century, *Il Libro dell'Arte*.⁵ X-radiographic and stereomicroscopic investigation of losses in the paint layers have shown that Uccello used cloth strips to cover knots and joins between panels of the *Hunt in a forest* and that he covered almost the entire panel of the *Battle* in the Louvre with pieces of cloth.⁶ Cloth interlayers on panel paintings have been reported in other fifteenth century Florentine paintings such as Fra Angelico's *Predella for the High Altarpiece of San Domenico, Fiesole* in the National Gallery, London, to name just one.⁷ Cloth is also visible in places at the edges of the *Saint George*. X-radiography of the *Saint George* is yet to be conducted, so it is not known how much of the panel the cloth covers.

Striking features of the IRR of the *Annunciation* are the very dark areas of the fur lining of God the Father's robes, His hair and beard, the fur lining of the Virgin's robes and the ground in front of the portico (fig. 3 and 5). To the naked eye these areas of paint appear as light to mid grey in colour. A microsample taken from the paint for the ground just to the left of the portico was analysed by Marika Spring of the Scientific Department of the National Gallery, London. The sample was found to contain a single layer of grey paint, composed of lead white and a relatively coarse black pigment that was identified as probably a

⁴ Inv. 2124/4, tempera, probably oil, silver and gold leaf on panel. The work was acquired by the Felton Bequest in 1949 with the name *Saint George slaying the dragon* (A.J.L. McDonnell, Letter to The Secretary, The Felton Bequests Committee, 26 April 1949. p. 2 [copy], including *Report on Work of Art*, Felton Bequest Correspondence, 2/20, National Gallery of Victoria Library, Melbourne). However, as the Saint has discarded his sword, has only a dagger in his hand, and as the Princess bears a chain with what seems to be a collar, it is likely that in this version of the subject the dragon will be tethered rather than slain. Thus, the general title *Saint George and the dragon* is more fitting. The Gallery's caption for the work is "Paolo UCCELLO (attributed to), Italian c. 1397-1475, *St George slaying the dragon* c. 1431, oil, tempera, gold and silver on wood panel, 62,2 x 38,8 cm, Felton Bequest, 1949, National Gallery of Victoria, Melbourne."

⁵ C. CENNINI, *Il Libro Dell'Arte*, Vicenza, 1971, p. 119-120.

⁶ M. KEMP and A. MASSING with N. CHRISTIE and K. GROEN, *Paolo Uccello's 'Hunt in the Forest'*, in *The Burlington Magazine*, vol. 133, n° 1056, March 1991, p. 176, n° 2. Subsequent examination of the unpublished x-radiography of the Karlsruhe *Adoration* found frayed pieces of cloth over many parts of the panel. The x-radiography was kindly provided by Dr. Dietmar Lüdke, Senior Curator for Old Masters, and the Conservation Department, at the Staatliche Kunsthalle, Karlsruhe.

⁷ D. GORDON, M. WYLD and A. ROY, *Fra Angelico's Predella for the High Altarpiece of San Domenico, Fiesole*, in *National Gallery Technical Bulletin*, vol. 23, 2002, p. 13.

carbon black, possibly a mineral black, such as graphite.⁸ A comparable phenomenon occurs in the *Hunt in a forest*, where the fur cuffs and collar of a hunter's costume, which are a mid-brown colour to the naked eye, appear black in the IRR, probably because of an admixture of black pigment.⁹

By comparing the IRR, the x-radiography and the paint surface in the *Annunciation* it is possible to distinguish underdrawing from incisions and painted lines, and to establish the artist's working procedure. The underdrawing is most easily identified when lines in the IRR do not correspond to incisions or painted lines on the surface, such as the Holy Spirit which was drawn next to the top right of the capital of the free standing pillar, but was painted a fraction lower.¹⁰ The lowest depiction of Gabriel was drawn with his left hand holding a lily stem, appearing from behind his right sleeve, but this detail was ultimately not incised or painted (fig. 5). An "S" shaped curve for a contour of the drapery of the Virgin's robe that appears in the IRR a little way below the book was neither incised nor painted (fig. 3-4). The medium or media of the underdrawing is difficult to determine, but may be a combination of metalpoint and brush drawing.

It seems that the artist drew ruled lines for the architecture, and freehand lines for the figures and contours of drapery, with little or no hatching for shadows and no obvious monochrome wash drawing. The artist seems to have drawn the outlines of the portico as a box-like, wire frame structure with a ruler and then drew the Virgin and the lowest Gabriel by hand over the architecture, within, and extending from, the box-like space. A horizontal line for the corner where the floor meets the rear wall extends across the area filled by the lower part of the Virgin's body, meeting a vertical line passing through her proper right sleeve, the book and the lower part of her robe, for the corner where the back wall meets the right wall. This line is joined at the bottom to a diagonal line for the corner of the floor and right wall which meets another vertical line passing through her left sleeve approximately below where the incision for the inside edge of the arched door ends (ultimately painted as a rectangular opening in a slightly different position) for the inside edge of the doorway. Thus, the principal lines of construction for the portico pass through the Virgin (fig. 3). Similarly, the vertical edges of the far pillar extend through the lowest Gabriel's sleeve and an incision passes through his halo (fig. 5). There are other ruled lines in the area occupied by the Virgin's body, the significance of which is unclear. The IRR shows numerous adjustments to the drawing for the architecture, suggesting that there was not a detailed, auxiliary preparatory drawing for the portico, with the details being largely worked out on the panel. Neither does the construction appear to have been measured. For example, the decorative frieze along the top of the building facing the viewer was divided into approximately, not exactly, equal sized rectangles in the underdrawing as a guide for the repeated arabesque motif.

⁸ M. SPRING, *M975 Uccello, The Annunciation (Ashmolean Museum, Oxford). Report on analysis of paint samples*, June 2004, unpublished, Conservation Department, National Gallery, London. The microsample was taken on 27 November 2002.

⁹ See M. KEMP and A. MASSING with N. CHRISTIE and K. GROEN, 1991, fig. 13. A microsample taken from a brown horse revealed finely ground yellow and red ochre, black and lead white (p. 178). Although no microsample was published for the cuffs or collars, it seems reasonable to assume that they too contain an admixture of black pigment.

¹⁰ I am grateful to Rachel Billinge for bringing this to my attention, personal communication, 25 July 2003.

The procedure of drawing figures over construction lines for architecture and furniture is found in Uccello's *sinopia* drawings for the *Stories from the lives of holy fathers* mural paintings in the cloister of San Miniato al Monte in Florence, notably for a figure of a seated monk-saint on the east wall.¹¹ Here too, the principal lines of construction, in this case for a bench, extend right across the figure. In the IRR of the *Hunt in a forest*, the ruled lines for the single-point perspective pass through figures, such as the standing man blowing a horn in the foreground.¹²

Varying amounts of underdrawing and incisions are present in all the figures and the landscape in the *Annunciation*. The incisions in the drapery follow the underdrawing somewhat loosely. The freely executed arabesques in the incisions for the drapery and figures in both works, such as the corkscrew curls of God the Father's hair in the *Saint George*, show an artist completely at ease with his medium. Compasses were used to draw the haloes for the cherubim in the *Annunciation*, as indicated by the points visible in the centres of the unpainted ones. Perhaps the most interesting aspect of the design stage is the geometric construction of perspective in features of the architecture. The opening of the portico facing the viewer was drawn and incised as a round arch and the doorway leading inside was drawn and incised as an arch. Thus, the initial design for the portico was closer to the design of Ghiberti's portico in the Essau and Jacob panel of the *Doors of Paradise*, from which the composition of the *Annunciation* is probably in part derived. The arch closest to the viewer was then made into a pointed arch and the doorway was made rectangular. It seems that the artist drew an approximate square in perspective for the ceiling of the portico, drew diagonals between the corners of the ceiling to find the middle of the square, and then, after many attempts, divided the square into a grid to provide the basis of the *punte* decoration. The final grid is based on eight rows of 'squares' by eight rows, while only those visible through the pointed arch were actually drawn and incised (fig. 6). There were many changes made during the planning stage and the purpose of some of the construction lines is not entirely clear.

In the underdrawing for the Brunelleschian cornice around the freestanding pillar, separated from the capital by a block,¹³ the artist first determined the position of the four corners of the pillar, including the corner which is not visible (approximately), he then drew two diagonals between these corners to establish the correct angle for the corners of the cornice as they extend beyond the pillar. Having worked out the final version of the cornice he then extended the principal lines to the left so that the cornice of the far pillar would be correctly aligned. He also extended construction lines to align their capitals. Of this fairly extensively underdrawn perspective construction, many lines do not appear in the x-radiography or as incisions on the paint surface (fig. 7-8). The artist generally incised, or incised more strongly, those lines that

¹¹ For an illustration of the *sinopia* see L. BERTI, *Gli Affreschi e Sinopie nel Chiostro : Paolo Uccello e Scuola ; Il Castagno in F. Gurrieri, L. Berti and C. Leonardi (eds), La Basilica di San Miniato al Monte a Firenze, Florence, 1988, p. 258, fig. 7.*

¹² See M. KEMP and A. MASSING with N. CHRISTIE and K. GROEN, 1991, fig. 13.

¹³ E. BATTISTI, *Brunelleschi : The Complete Work*, London, 1981, p. 186. The rebuilding of San Lorenzo on the basis of Brunelleschi's designs was underway in 1431 and so it is possible that Uccello drew inspiration from the architect's designs at that time, even if this particular use of a cornice was not Brunelleschi's invention.

he intended to be visible in the final composition. Without seeing the paint surface under a microscope, it is difficult to be sure in every instance whether the incisions are into the ground, an initial paint layer or a final paint layer.

A similar geometric approach to the planning of perspective is visible in the incisions of the *Adoration* mural painting in the church of San Martino Maggiore, Bologna. A *punta* on the inside edge of the right side of the architectonic frame shows that Uccello incised a number of parallel, vertical lines into the *arriccio* (preparatory layer), incised two diagonal lines to form a square in perspective, incised the diagonals between the corners of the square to find its centre, and then extended a horizontal line from this point to a further vertical line to find the correct position for the top of the *punta* in relation to the base (fig. 9). Uccello incised the date of the *Adoration* into an area of drapery in the foreground of the work (fig. 10).¹⁴ The partial legibility of the date, as well as issues concerning Uccello's development, have led to different readings: 1431¹⁵, possibly 1436¹⁶, and 1437¹⁷. In the opinion of this author it reads 1432, with the final numeral in the shape of a 'Z', of the type found in Uccello's autograph *Catasto* documents (tax statements) of 1431 and 1433.¹⁸ [Please delete this text in red].

An aspect of the painting technique of the *Saint George* that is visible to the naked eye is the use of coloured glazes over gold and silver leaf. A similar technique is recorded since at least the 12th century,¹⁹ was used across Europe, and seems to have been particularly popular in Florence in the first half of the fifteenth century. Recent technical examination of Masolino's *Saint Julian* (Museo d'Arte Sacra, Florence) has revealed that the red tunic worn by the saint was executed with a layer of red glaze over silver leaf that had been incised in such a way as to give the impression of the texture of the fabric. Uccello is known to have worked on another part of the same commission, before 1425, in the Carnesecchi chapel in Santa Maria Maggiore, Florence.²⁰ In the *Saint George* a large part of the dragon's wings and body are painted with semi-

¹⁴ That the date is original is suggested by the nature of its incisions, in which a fine instrument must have been used, creating slight ridges along the length of some strokes, perhaps where the still wet material of the *arriccio* or *intonaco* (fresco layer) was pushed to one side. This appears different to the graffiti elsewhere on the fresco, in which the incisions are much coarser. The white material in parts of the incisions must be the remains of the whitewash that covered the fresco until 1977.

¹⁵ F. LOLLINI, *Miniature a Imola: un abbozzo di tracciato e qualche proposta tra Emilia e Romagna*, in F. Faranda (ed.), *Cor unum et anima una: Corali Miniati della Chiesa di Imola*, Faenza, 1994, p. 120, which includes an image of the date in raking light (fig. 20).

¹⁶ C. EISLER, *Surgi d'un mur démoli*, in *Connaissance des Arts*, n° 361, March 1982, p. 71.

¹⁷ C. VOLPE, *Paolo Uccello a Bologna, Paragone*, n° 365, Anno XXXI, July 1980, p. 8-9.

¹⁸ Archivio di Stato di Firenze, *Catasto*, vol. 381, San Giovanni, Drago, p. 779 ; vol. 475, San Giovanni, Drago, p. 483.

¹⁹ Max Doerner (*The Materials of the Artist and Their Use in Painting with Notes on the Techniques of the Old Masters*, trans. Eugen Neuhas, revised edition, second impression, London, 1969, p. 321) noted that the eighth century *Lucca manuscript* described the "*pictura translucida*" technique of applying resin and oil based colours over tin foil.

²⁰ C. FROSININI, "I.5, Masolino, (Tomasso di Cristofano Fini), (Pancale in Valdarno ?, 1383 – prima del 1440), *San Giuliano*, dopo il 1423, tempera su tavola, 114 x 54 cm, Firenze, Museo Arcivescovile di Arte Sacra", in A. PAOLUCCI

transparent green glazes over gold leaf, reinforced with black in the shadows. The same technique of using green glazes over gold leaf was used by Uccello in the surcoat of Tolentino's page in the London *Battle*. The adjacent brocade is executed with red glazes over gold leaf and the sallet he is holding with red glazes over silver leaf. The page's armour, like Saint George's armour, is executed with opaque blackish glazes over silver leaf.²¹ The gold bands of God the Father's papal tiara in the *Annunciation*, and the corresponding feature in the *Saint George* (fig. 11), as well as the princess' gold girdle show traces of red glazing.²² The media for the two works would thus seem to be basically tempera with some oil glazing. These works would have made a sumptuous impression when first painted, with large areas of exposed silver and gold leaf as well as areas covered in jewel-like coloured glazes.

The gold ground around God the Father in the *Saint George* is incised with ruled, radiating lines, and "hexa-prong" punchwork is used to create the alternating areas of stippled texture. Uccello used a similar, perhaps identical, punch in the pomegranate designs on Tolentino's headdress in the London *Battle*.²³ In the *Annunciation* similar punchwork appears in the cherubim, although not with sufficient clarity to determine the type of punch used. Round punches were used to embellish the musical Angels' haloes, while the Virgin's and the lowest Gabriel's haloes were incised by hand with meandering motifs, in a manner distinct from the *Saint George*.

There are other minor differences between the works. In the *Annunciation* the facial features are predominantly modelled softly, in red-brown tones, while in the *Saint George* graphic strokes of black define the upper eyelashes, the irises of the eyes and the lines between the lips, closer to Fra Angelico's style in such works as the *Predella for the High Altarpiece of San Domenico, Fiesole*. Conversely, the pastel colours of some of the Angels' robes in the *Annunciation* are close to Fra Angelico's palette, while the strongly contrasting colours of the *Saint George* are characteristic of Uccello's sometimes wonderfully unorthodox palette.

(ed.), *Rinascimento, Capolavori dei musei italiani. Tokyo – Roma 2001*, ex. cat., Scuderie Papali al Quirinale, Rome, 15 September 2001 – 6 January 2002, 2001, p. 62.

²¹ A. ROY and D. GORDON, *Uccello's Battle of San Romano*, *National Gallery Technical Bulletin*, vol. 22, 2001, p. 10.

²² Investigation of the Karlsruhe *Adoration* subsequent to the delivery of this paper has revealed extensive use of coloured glazes and opaque paint over gold leaf.

²³ For a macro photograph showing the punchwork see P. ROCCASECCA, *Paolo Uccello: Le Battaglie*, Milan, 1997, p. 47.

An intriguing aspect of the *Saint George* is the presence of a few traces of the Master revealed by close examination of the paint surface. Fingerprints appear in the blue paint of the walled city's tower and the horse's saddle. Uccello, like other Renaissance artists, used his fingers to manipulate the glazes of his paintings while they were still fresh. In the London *Battle* he used his thumb and fingers to thin or modulate the blackish glazes over a layer of silver leaf.²⁴ The fingerprints in the *Saint George* do not appear in areas with glazing, however, this does not exclude the possibility that the artist worked the paint intentionally. Unfortunately, the fingerprints in the *Saint George* are too smudged and partial to provide a match with those in the *Battle*.

Even on the basis of these limited comparisons, the materials, technique and influences of the Melbourne *Saint George* can be seen to be similar to those in the Oxford *Annunciation*. These works are characteristic of Florentine paintings from the first half of the fifteenth century, particularly those by Uccello from the early 1430s. It is hoped that the Melbourne *Saint George* can be investigated in the future with a similar range of scientific analyses as has been possible for the Oxford *Annunciation*.²⁵

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²⁴ A. ROY and D. GORDON, 2001, p. 10. Close examination of the Karlsruhe *Adoration* has also revealed extensive use of the artist's fingertips to work blackish glazes over gold leaf.

²⁵ Subsequent to the delivery of this paper, scientific analyses of the *Saint George* have been conducted for this research. At the National Gallery of Victoria I wish to thank Dr Gerard Vaughan, Director, for approving the scientific analyses, and Carl Villis, Conservator – European Paintings before 1900, John Payne, Senior Conservator of Paintings, and Gary Sommerfeld, Senior Photographer, for producing the scientific images.