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# DISCOVERIES DURING THE TECHNICAL INVESTIGATION OF GERARD DE LAIRESSE'S EARLIEST KNOWN CEILING PAINTING (1672)<sup>1</sup>

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## Introduction

Ever since 1913, a three-part painting by Gerard de Lairese (1641–1711) has graced the ceiling of an assembly hall in the Peace Palace in The Hague (figs 1A, 1B and 1C). De Lairese's series is spectacular: each canvas is almost four and a half metres high and the three images together depict a cloudy sky in which allegorical figures and objects appear. The rock in the centre canvas bears the inscription 'G. Lairese Pinxit ano. 1672', making it the earliest signed ceiling by De Lairese that we know. The artist was born in Liège and moved to Amsterdam at the end of 1665. After initially working for the art dealer Gerrit Uylenburgh (c. 1625–1679), he started up in business for himself in around 1667.<sup>2</sup> This series was commissioned by the Amsterdam burgomaster Andries de Graeff (1611–1678) for his newly built house on the Herengracht (now number 446). The decorations were designed for the large reception room overlooking the garden at the rear of the house.

The canvases were put up for auction in 1903. The catalogue describes them as '*Le triomphe de la paix*': the triumph of peace.<sup>3</sup> We know the order in which the canvases hung from an old description of the house at number 446 Herengracht (figs 1A, 1B and 1C).<sup>4</sup> In their current location, however, the canvases on the left and on the right have inadvertently been interchanged. As a result, the river gods depicted at the bottom of the two outer canvases have had their backs turned to one another for well over a century and the clouds in the sky are

presently not properly aligned in the three canvases.

More recent literature no longer subscribes to the notion that the subject of the series is the triumph of peace.<sup>5</sup> Prints by Johannes Glauber (1646–c. 1726), a close associate of De Lairese's, after drawings of the paintings made by De Lairese himself offer a more precise explanation (fig. 2).<sup>6</sup> The French titles of the prints – *La Concorde (Concord)*, *Liberté du Commerce (Freedom of Trade)* and *La Seureté (Security)* – elucidate what we see in the paintings. The central female figure with the sceptre and liberty cap is identified as Liberty. The presence of Mercury further makes it clear that the figure represents freedom of trade. Putti crown her with the crown of ships. A fierce lion defends her with a sword and a shield bearing the arms of the City of Amsterdam. In the left-hand canvas we see the personification of Concord. She tramples two hostile figures, each clad in animal skin. The canvas on the right shows a woman in armour treading Envy underfoot and driving away harpies. This woman symbolises Protection, which is consistent with the theme of Security mentioned on the print. The aforementioned river gods recline at the base of each of the outer canvases.

The restoration carried out between 2009 and 2011 provided an opportunity to conduct extensive technical investigations into the materials and techniques used in the canvases.<sup>7</sup> This generated a great deal of interesting information on De Lairese's early painting technique, about which virtually

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**Fig. 1.** Gerard de Laïresse, *The Triumph of Peace*, signed and dated 1672, oil on canvas, *The Hague, Peace Palace*. The paintings are reproduced in the order in which they were installed in number 446 *Herengracht*. A. Left: *Concord Trampling Two Enemies*, canvas, 446 x 202 cm; B. Centre: *Free Trade Defended by a Lion with Sword and Shield Bearing the Amsterdam City Arms and Crowned by Putti with a Crown of Ships*, canvas, 446 x 232 cm; C. Right: *Protection Chasing Away Envy and Some Harpies*, canvas, 446 x 185 cm (photographs: E. Smits).

nothing is known. The examination also produced a remarkable discovery. All three canvases contain numerous pentimenti – hardly a form or figure seems to have retained its original shape and position. Furthermore, a variety of significant figures and objects were painted out while others were added. This finding prompted an extensive follow-up investigation into the original context, function and iconography of the set,

**Fig. 2.** Johannes Glauber (1646-1726), 'La Concorde', approx. 19.5 x 29.1 cm, from a series of three prints representing *The Triumph of Peace*, etching on paper, *Rijksmuseum, Amsterdam* (photograph: Rijksmuseum).

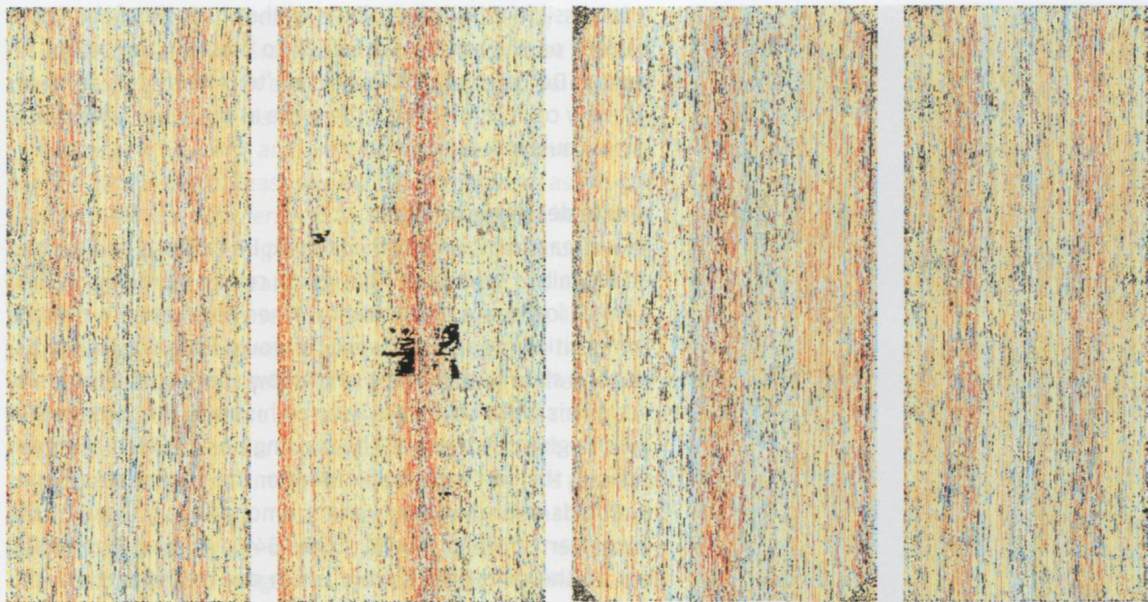


from which it emerged that the substantive pentimenti were done at De Graeff's instigation and were related to the political situation. The results of this investigation will be published in a forthcoming article. The present contribution focuses on De Laïresse's materials and techniques, following his working process from the stretching, mounting and priming of the canvases to the execution of the underdrawing and underpainting, and the finishing of the composition. We will compare these technical findings with De Laïresse's prescriptions in his *Groot Schilderboek* (1707).<sup>8</sup>

#### Canvases

Each ceiling painting is composed of two narrow strips of canvas running the full length. The central canvas also has a strip a few centimetres wide on the right-hand side, consisting of two pieces sewn together. All the canvases have a linen weave. In each case the two broad strips in the painting come from the same roll, as can be seen clearly in the thread density maps.<sup>9</sup> In the maps showing vertical thread density (in De Laïresse's canvases these are always the warp threads), we see an identical pattern for both strips in each painting but in mirror image (fig. 3). This means that two lengths were cut





**Fig. 3.** Vertical, warp, thread count deviation map for Protection Chasing Away Envy and Some Harpies (fig. 1C), 12.4 vertical threads/centimetre (image: Thread Count Automation Project).

from a long roll for each canvas, then one was flipped over and stitched to the other.<sup>10</sup>

The back of De Laireesse's canvas is concealed by the lining canvas that was applied when the works were restored by the firm of Hesterman in 1913.<sup>11</sup> That the strips were sewn together along their selvages with a simple overcast stitch is however still visible at the extreme top and bottom edges of the canvas as well as in the X-radiograph. This type of stitch was regularly used at that time as experience had shown that it produced flat, unobtrusive seams.<sup>12</sup> The three canvases have cusping on all sides, proving that they were sized and primed in their present format. This includes the central canvas with the narrow strip on the right-hand edge: dimensions were fixed from the outset here as well.

#### The original strainers

The original strainers of the left- and right-hand paintings have been preserved and the paintings were still mounted on them until the most recent restoration.<sup>13</sup> The strainers consist of a rectangular frame with a cross-piece joining the centre of the long sides and a diagonal brace in each corner. They seem remarkably slender for such large paintings – the laths are only two centimetres thick and about thirteen centimetres wide – but light structures like this were common at the time, even for large paintings.<sup>14</sup>

The central canvas was given a stretcher in the 1913 restoration.<sup>15</sup> The strainers only have holes from the tacks used to attach the canvases along the sides. The canvases, whose outer edges are for the most part well preserved, show the signs of this stretching.

In De Laireesse's day, canvases were often not primed and painted on the final strainer. Instead they were stretched by lacing them to a temporary working frame, which was larger than the canvas. The edges of De Laireesse's canvases demonstrate that this method was also used for these ceiling paintings since both the ground and the paint of the composition consistently extend a bit beyond the old turnover edges.

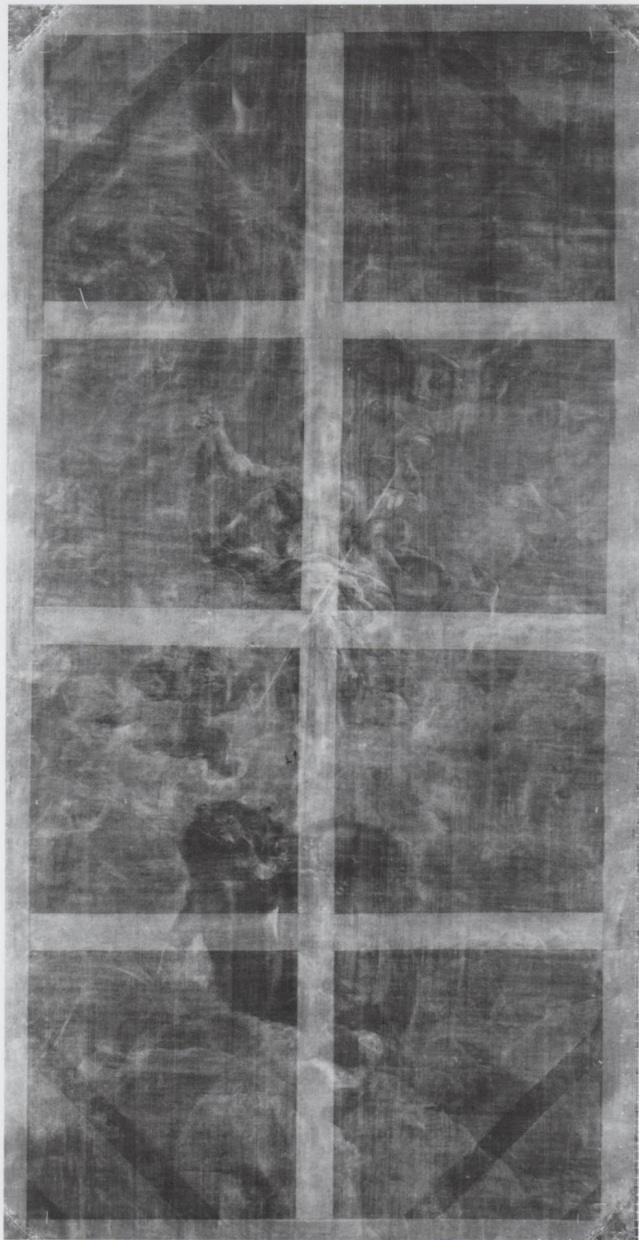
The central canvas originally had chamfered corners, as can still be seen in a photograph in the 1903 sale catalogue.<sup>16</sup> When the work was restored in 1913, a small triangular piece was set into each corner to provide the canvas with a large rectangular shape. The X-radiograph shows that the small inset triangle roughly overlaps four centimetres of De Laireesse's canvas (fig. 4).<sup>17</sup> The chamfered corners corresponded to the original framing of the central painting in the beamed ceiling at number 446 Herengracht, as is demonstrated by the paint surface still containing traces of old frame paint parallel to the chamfered corner.

#### Ground

The three canvases have a ground of the same greyish-brown colour. The central and right-hand canvases have two ground layers: a dark brown layer first, over which a lighter greyish-brown ground has been applied. Although the composition of the ground is not identical in these two canvases, it is very similar. In each case a great many pigments have been used. The first ground layer of the central canvas, for instance, is a mixture of brown, yellow and orange ochre, umber, a considerable quantity of silicates that were introduced with the earth pigments, and also some lead white, chalk and gypsum.<sup>18</sup> The ground also contains various black pigments: charcoal black, lamp black, black earth and organic black. The large number of pigments, particularly the four blacks, is surprising, given that the colour of this ground cannot have been of great importance because it was hidden under the second ground layer. This suggests that left-over pigments were being used up. The second ground layer of the central canvas is also mixed from a considerable number of pigments: lead white, chalk, yellow and brown earth, fine orange earth, a transparent iron pigment, silicates, umber and carbon black. The left-hand canvas was given only a single ground layer, the composition and colour of which are similar to the top layer of the other two canvases.

The greyish-brown ground served as a mid-tone from which the artist worked towards the light and dark (see below), and was left visible here and there in the finished work (fig. 5). The analytical investigation revealed that part of the lead white in the ground layers has saponified and consequently become





**Fig. 4.** X-radiograph of *Free Trade Defended by a Lion* (fig. 1B). The putti at the top left and the putto to the right of the dark cloud have been painted on top of the paint used for the sky, which contains lead and consequently show up light in the X-ray. This means these figures were added at a later stage. The figures of Liberty, the lion, the putti with the crown of ships and those with the triangle and cymbals have been painted directly on the ground, and so show up dark in the X-ray (photograph: Aplus RTD and M. den Leeuw).

transparent.<sup>19</sup> Since fewer lead white particles are present now, less of the incoming light will be reflected, making the ground layer appear somewhat darker today than originally intended.

De Lairese liked to keep the ground colour consistent in all the elements of a multi-part ceiling decoration. In his *Groot Schilderboek*, he described how he once wrestled with a set of ceiling paintings for which the client had supplied him with the primed canvases, one of which had a ground that was not the same colour as the others. As he was painting, he found

it impossible to key the colours of the shadows of the forms painted on the anomalous canvas to those on the others. Although De Lairese did his utmost 'to remedy this as best I possibly could, and make it the same as the others', the differences could still be seen.<sup>20</sup>

#### Aids in designing ceilings

As we read in his *Groot Schilderboek*, De Lairese had devised an ingenious solution for designing ceiling paintings. He had a small, low space in his studio.<sup>21</sup> When he wanted to create a composition for a ceiling work, he would fasten a piece of paper or a slate to the ceiling of this low space so that he could sketch his ideas on it while lying on his back. This loose sketch – a 'rough scratch' – was the starting point for the composition. He then drew his inspiration for the poses, faces, hands and folds of drapery from prints, among others those by the French artist Simon Vouët (1590–1649), working 'everything out on the ceiling itself, from which one may judge how difficult it was'.<sup>22</sup> De Lairese's description tells us – and this is extraordinarily interesting – that not only did he design his ceiling paintings by making a loose sketch above his head, he also actually painted them in this way, 'on the ceiling itself'. However, in his *Schilderboek*, he stated that this laborious approach was confined to his early years. Later, when he had become more skilled in perspective and the 'mathematical rules' of art and had built up some experience, De Lairese no longer found it necessary to do the actual painting of ceilings above his head and was able to remain 'seated comfortably at my easel'.<sup>23</sup>

This, of course, raises the question as to whether De Lairese painted this earliest known ceiling decoration above his head or upright on an easel. As we have seen, all three canvases were painted on a larger temporary frame and not on their final strainers. This means that they were not painted directly on the ceiling in De Graeff's house. The fact that De Lairese's compositions continue, as described, beyond the old turnover edge also clearly supports this view: if the canvases had been painted *in situ*, the compositions would have stopped along the edge of the frame that held the paintings in position on



**Fig. 5.** Detail of *Free Trade Defended by a Lion* (fig. 1B) with rock. The greyish-brown ground layer has been left visible. Some lines executed in brown paint on the ground layer, which indicate the rock, seem to be part of the first sketch (photograph: E. Smits).



the ceiling. We can therefore safely assume that by the time he came to paint De Graeff's canvases, De Lairese had already acquired so much experience that he could paint them more conveniently on his easel.

Indeed, by his own account, he had been active in this branch of painting at least since 1668. In that year, as we can read in his *Groot Schilderboek*, he had developed a 'machine' as a useful aid in painting ceilings: a long wooden trough lined with tin and filled with earth or clay.<sup>24</sup> The trough had a lid with holes in which De Lairese stuck wax manikins on flexible wire in the poses and positions he wanted. He placed the trough at an inclined angle on a table, lit it as required and then made his sketches. De Lairese wrote that he used his machine for five years – in other words until 1673 – from which we may infer that it served its turn for De Graeff's ceiling. This passage also tells us that there must have been a great many more ceiling paintings by De Lairese in Amsterdam. These have been lost or are no longer recognised as his handiwork. We may question whether De Lairese would have regretted this, for he wrote of these earliest paintings: 'I must confess that I daubed some ceilings in my youth'.<sup>25</sup>

### Sketch on the ground

On the basis of the foregoing, we may assume that for De Graeff's ceiling De Lairese sat or stood at his easel while sketching the figures on the primed canvases with the aid of his 'rough scratch' and the drawings of wax manikins he had made.<sup>26</sup> However this sketching phase left no obvious traces. In the rocky outcrop in the central canvas, where the ground has largely been left visible, however, there are a few swift lines here and there put in with diluted brown paint that is slightly darker than the ground (fig. 5). This paint is a mixture of lead white, bone black, yellow and brown earth and a little carbon black with orange earth pigment. The lines are only dimly visible with infrared reflectography (IRR) – less clearly visible, in fact, than with the naked eye.<sup>27</sup> This is because almost none of the pigments used absorb infrared light (only the carbon black absorbs it, but this pigment is present in only very small quantities). If De Lairese did indeed use this brown paint to lay in his composition, it explains why we never see any sketching lines through the paint layer with IRR.

### A systematic approach

According to De Lairese, a systematic approach was essential for a successful result. To this end he identified three distinct phases in the painting process in his *Groot Schilderboek*.<sup>28</sup> The first was 'dead colouring' (*doodverven*) or 'laying in' (*aanleggen*), which for De Lairese meant an underpainting in colour that fixed the position of the forms, with a general indication of light and shade. This was followed by the stage of 'working up' (*opschilderen, opmaken*), where the modelling and colours of the various elements were further elaborated. Finally came 'retouching' (*retocqueeren*) or 'revising' (*nazien*), the phase in which fine nuances and details were added. Splitting the work process into these three stages was standard practice in the seventeenth century, but exactly what was done at each step varied from one artist to another. Some painters, for instance, preferred a sketchy, monochrome underpainting. De Lairese, however, thought – as we can read – that it was of the utmost importance to get everything safely pinned down in the dead

colouring, laying in all the forms in the correct place and with the right tone and colour. This was the only way, he argued, to create a convincing effect of *houding*: the tonal and spatial organisation of a picture that was achieved through the skilled use of strong and weak colour nuances as well as light and dark tones that either brought the forms forward or allowed them to recede into the background. This created the suggestion of a continuously advancing space on the two-dimensional surface in which figures were located and into which one could, as it were, move freely.<sup>29</sup> *Houding* must have been particularly important in a complex allegorical ceiling decoration that has to suggest a view through to the open sky with figures in various parts of the picture plane.

### Dead colouring and working up

This division of the painting process into three phases advocated by De Lairese can be seen in this ceiling. However, one would be mistaken in thinking on the basis of his exposition that De Lairese has worked very strictly and precisely here. On the contrary, this early decoration was executed in a swift, fluent technique with most of the forms suggested by loose brushstrokes.<sup>30</sup>

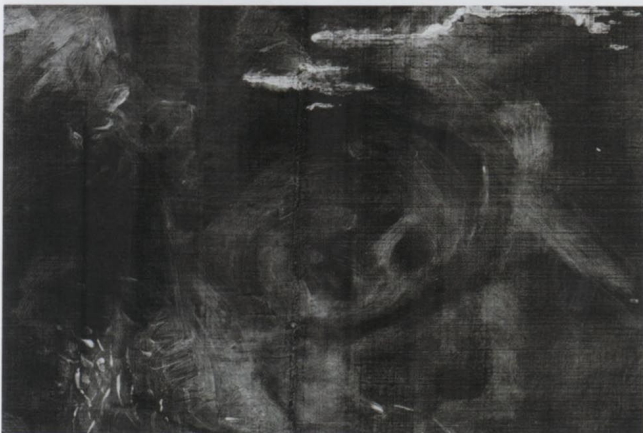
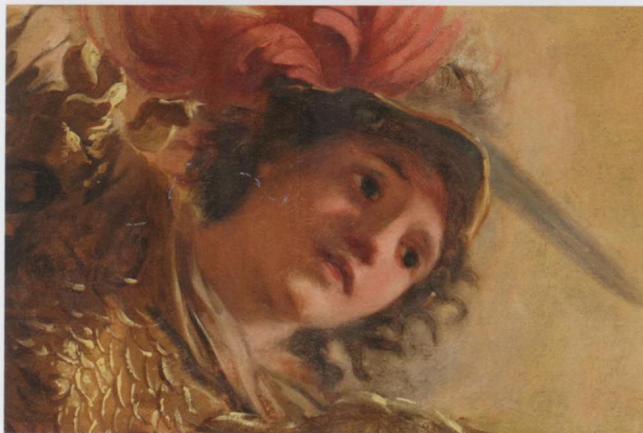
This broad manner is already evident in the dead colouring, particularly in the flesh tones, as illustrated by Protection's face (fig. 6). The underpainting is applied schematically in a light pastose skin colour, tending towards greyish-yellow, which is rich in lead white. The rapid touches with a clearly identifiable brushstroke shimmer through the paint surface because the paint layers applied on top of it have been somewhat abraded. These impasto underlying strokes can be seen particularly clearly in the chin and the neck, and immediately below, where a set of zigzag streaks was subsequently covered by the garments. The streaks show up clearly in the X-radiograph, where it can also be seen that they are absent from the eyes, mouth and side of the nose. It would seem that for the shapes of these features, the greyish-brown ground remained temporarily visible as a shadow tone during the dead colouring. During this stage, De Lairese also worked with black paint, which shows up clearly in IRR. He used it to indicate the eyebrows, pupils and hair.

After this dead colour layer was dry, the illuminated and shaded flesh tones were finished with glazes of organic red and warm brown respectively (fig. 6). Once these were dry, the mouth, nose and eyes were indicated with a single line and spot of organic red: this is probably the phase De Lairese called retouching or revising. The painter worked with suggestion, creating the forms with partly overlapping dashes and strokes. There are no eyelids, for instance, and it is not entirely clear where the shapes of the eyes, nose and mouth begin and end. Nowadays De Lairese's canvases hang six metres off the ground, but even in De Graeff's house they were installed between the ceiling beams at more than four and a half metres high. Viewed from this sort of distance, the dashes and strokes blend to form convincingly modelled figures. The same structure is also evident in the other figures. The left-hand enemy in the left-hand picture, the putti with the triangle and tambourine in the central section and Envy on the right are clear examples of this bold technique.

When it came to the bodies, De Lairese took their final modelling into consideration right from the dead colouring



stage. Some of the figures, such as Envy whose body has been powerfully articulated in chiaroscuro, were also underpainted with a strong tonal contrast between light and shade. The large areas of shadow on Envy's body were indicated with a fairly dark greyish-brown. In other figures, such as the brightly lit figure of Liberty, the underpainting is an almost uniform pinkish yellow. In the two putti holding a crown of ships above Liberty, the greyish dead colouring has been left largely visible with just a few warm pink strokes and glazes on top. De Laireesse must have chosen this surprisingly sparse finish deliberately: these little figures are just as ill-defined in the drawing and print after this painting (fig. 2). We may conclude from the prints that other passages, such as the arm with which



**Fig. 6.** Detail of Protection Chasing Away Envy and Some Harpies (fig. 1C) with the face of Protection, after conservation (photograph: E. Smits).

Concord holds the horn of plenty, must likewise have been purposely left sketchy.

Paint cross sections and observations of the paint surface tell us that various types of dead colouring were used for the animals and draperies – we see thin, flatly applied preparatory layers as well as opaque, already modelled preparations. Most of the draperies show modelling in the dead colouring stages, as in Concord's yellow gown and her skirt, which has been painted with the blue pigment smalt. On top of this base, these draperies were finished either by working wet-in-wet or by applying layers and paint touches over the dried underlayer. A thin, even dark grey base layer that shows up prominently in IRR was found in Protection's armour and hip area. After this was dry, the armour was modelled with brown paint and the highlights were suggested with touches of yellow. The position of the lion in the central canvas was only indicated in the dead colouring by an amorphous brown oval that was smaller than the finished animal. The creature was then worked out with swift brushstrokes, for the most part directly onto the ground, after which the whiskers and other details were added.

### Pentimenti

As we have said, the investigation brought to light a remarkably large number of pentimenti. Observations of the paint surface, in conjunction with X-ray and infrared examination, reveal that changes have been made to virtually every figure. In the first place there are countless corrections to the outlines of limbs and draperies. Such small changes can also be found in other early ceilings by De Laireesse.<sup>31</sup> In his younger years, it was evidently his custom to shift his forms around somewhat. Aside from these minor adjustments, there are also a significant number of drastic changes in the canvases under discussion, where large forms have been moved. For instance, IRR has revealed that Concord's foot was originally placed on the enemy's head, not beside it as it is in the final version (fig. 7). The folds of her skirt and gown were initially different too. These garments must have been adjusted to accommodate the different positioning of the foot.

The most striking aspect, however, is that all sorts of figures and objects have been painted out or added later. Both the river gods and most of the putti are later additions. These figures are recognisable as additions because, unlike their counterparts that were planned from the outset, they are painted on top of the finished sky, so not directly onto the ground. They can also be distinguished in the X-radiograph; whereas the forms painted onto the ground show up as relatively dark, the figures and objects painted on top of the sky appear light as a result of the underlying paint layer containing lead white that has been used for the sky (fig. 4). Of course not all the forms painted on top of the sky were additions that were only conceived later. Long, narrow forms like Liberty's lance and the blade of the lion's sword were painted over the sky for practical reasons.

Other figures and objects were, as we have said, painted out. For instance, where three small putti now fly above Concord's head there was originally a billowing cloak, the shape of which shows up dark in IRR (fig. 7). The drapery was red, as we can see from a paint cross section with a layer of red ochre painted directly on the ground and covered with the paint





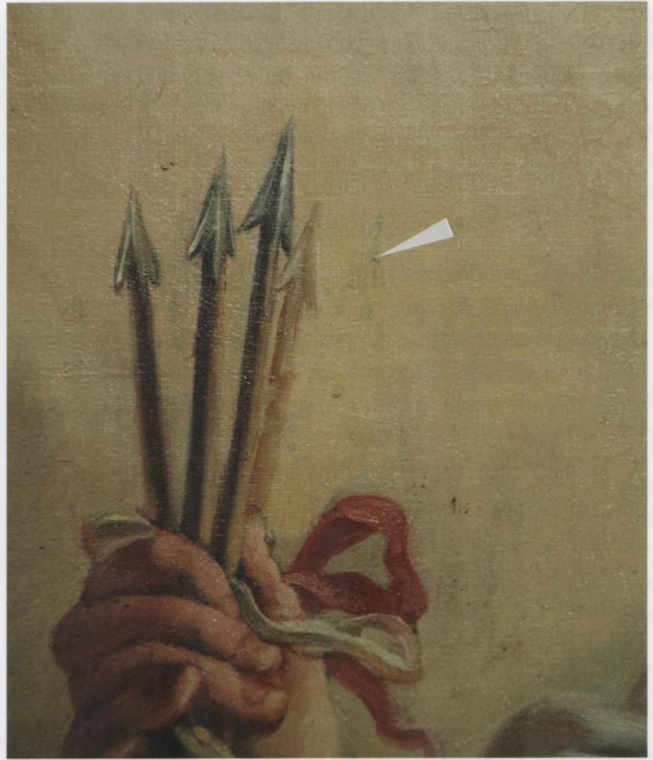
**Fig. 7.** The IRR image of *Concord* (*Concord Trampling Two Enemies*, fig. 1A) shows:

- the former billowing cloak that was painted out above her head;
  - the original bundle of seven arrows;
  - the face and hand of a putto just to the left of the bundle of arrows;
  - the foot of Concord on top of the enemy's head;
  - the original forms of Concord's yellow skirt and blue gown.
- (Photograph: A. Wallert)

used for the sky. There is an extraordinary pentimento in Concord's hand. She now clasps four arrows, but originally there were seven. Three were painted out with the paint used for the sky. We can see the old arrows in the infrared image (fig. 7). The bottom ends of the full sheaf of seven arrows can still be seen emerging from below her hand. In IRR we also see the small face and hand of a putto, now painted out, reaching for the olive branch held out by one of the putti on the left of the painting. All these changes seem to have been made at a late stage in the painting process: the earlier forms were already largely or even wholly finished when they were painted over.

It is important to know whether these changes were made by De Lairese himself (or at least under his supervision) and not by someone else at a later date. The style and paint handling strongly suggest that they are by De Lairese's hand.<sup>32</sup> It is striking, though, that most of the added figures were executed more hastily: the river gods, for example, are quite crudely painted. Cross sections show that the paint layers of new forms lie directly on the rejected ones without the slightest trace of any 'intervening' layer – of dirt or varnish, for instance (fig. 8). This suggests that the changes must have been made not long after the first versions were painted. Moreover the pigment mixtures used for the added forms always correspond with those in the first stage. Among those pigments is a rarely used bright yellow earth which is quite distinctive in its typical morphology of fine, sharp splinters (fig. 8). All this indicates that the pentimenti are either by De Lairese himself or by one of his assistants.<sup>33</sup>

The reproductive prints prove essential in interpreting the pentimenti. Numerous figures and objects in these prints differ from the final paintings. The technical investigation has



**Fig. 8.** Cross section taken from one of the arrows (in *Concord Trampling Two Enemies*, fig. 1A) that was covered with the paint used for the sky.

5	40 µm	Paint used for sky: lead white, smalt, a little splintery yellow earth pigment, a little fine bright orange, a little fine black.
4	10-12	Brownish-grey paint used for arrow: lead white, yellow and brown earth pigments, chalk, bone black, a little carbon black, a little fine bright orange.
3	15-25	Paint used for sky: lead white, splintery yellow earth pigment, smalt, a little fine bright orange, a little fine black, deep red pigment.
2	15	Paint used for sky: lead white, silicates, smalt, splintery yellow earth pigment, a little fine bright orange, very few black particles.
1		Brown ground layer: lead white, chalk, yellow and brown earth pigments, bright red earth, iron oxide, silicates, umber, carbon black.

(Photograph: M. van Eikema Hommes)

now demonstrated that in almost all cases these are elements that De Lairese revised later. In the prints we find, for instance, the billowing cloak behind Concord and the head and hand of a putto under her sheaf of arrows (fig. 2). This means that the drawings for the prints must have been made before the paintings were finished. It is also striking that a number of the pentimenti that came to light in the technical investi-



gation do appear in the prints. The two river gods are already there, for example, and Concord's sheaf of arrows has already been reduced from seven to four (fig. 2). The only explanation for this is that De Lairese made his drawings, which were the basis for the prints, at a point when he had already changed various things in his paintings, while other alterations were yet to be made.

### Conclusion and discussion

Technical research was conducted into the materials and techniques used in the ceiling that Gerard de Lairese painted for the Amsterdam burgomaster Andries de Graeff in 1672, in order to gain insight into the early painting technique of this influential artist. It appeared that while De Lairese's method differed in some respects, in others it was surprisingly consistent with his expositions in his *Groot Schilderboek*. For instance, all three canvases have the same colour ground – something to which De Lairese attached a great deal of importance. We also see in this set of ceiling paintings the division of the painting process into three stages that he described as 'dead colouring', 'finishing' and 'revising'. De Lairese described how in his youth he made both the sketches for ceiling decorations and the paintings themselves above his head. It was only later, when he had built up more knowledge and experience, that he was able to paint his ceiling paintings at his easel. The findings of our technical research show that by the time he made the ceiling decorations under discussion, the artist had moved on from his earliest, laborious method.

The countless pentimenti in the ceiling set are surprising. We are familiar with minor shifts of position in other early paintings and ceiling decorations by De Lairese, but the sheer scale on which figures have been altered, added or removed in this set of canvases is unprecedented. In a subsequent publication we will argue that most changes (including the painting out of three of the arrows and the adding of the river gods) were made at De Graeff's instigation in order to bring the connotations of the decorations in line with the prevailing political situation in the Republic. De Lairese's thoughts on these major alterations are not known to us, but he may have felt conflicted about them. Indeed, the many changes here are in contrast to the systematic working method he advocated in his *Schilderboek*, where he advised artists to establish all the forms in their final position with their correct colour and tonal contrast at the dead colouring stage.

### Biographies

Margriet van Eikema Hommes obtained her doctoral degree for her dissertation on the discolouration of fifteenth- to seventeenth-century oil paintings in 2002. Since 2005 she has worked as a senior researcher at the Cultural Heritage Agency of the Netherlands. In 2010, the Netherlands Organisation for Scientific Research awarded her a grant for the five-year research project 'From Isolation to Coherence: an Integrated Technical, Visual and Historical Study of Seventeenth- and Eighteenth-Century Dutch Painting Ensembles', to run from 2012 to 2017. This interdisciplinary project is based at the Delft University of Technology, where she is an associate professor in the Materials in Art and Archaeology department. Van Eikema Hommes has published books and articles on historical

painting techniques in the fields of art history and conservation science.

Tatjana van Run graduated in Art History (2009) and Art Studies (research Master) (2012), both at the University of Amsterdam. She is now working at Delft University of Technology on a PhD project on the development and production of figurative ceiling paintings produced for the canal houses and country estates of Amsterdam's elite in the late Golden Age with the working title 'Earthly Paradises: The Amsterdam Production of Ceiling Decorations in Private Homes in the Late Golden Age' and an expected completion date of 2017. This research is part of the project 'From Isolation to Coherence: an Integrated Technical, Visual and Historical Study of Seventeenth- and Eighteenth-Century Dutch Painting Ensembles'.

Katrien Keune received her degree in Chemistry at the University of Amsterdam in 2000 and gained her PhD degree in Analytical Chemistry in 2005. Her thesis is entitled 'binding medium, pigments and metal soaps characterized and localized in paint cross-sections'. She is currently responsible for the scientific research in the project 'From Isolation to Coherence: an Integrated Technical, Visual and Historical Study of Seventeenth- and Eighteenth-Century Dutch Painting Ensembles' (2011–2016, Delft University of Technology). She is also the project leader and researcher in the multi-disciplinary Science4Arts/NWO research project 'Paint Alteration in Time (PAInT)' (2012–2016, University of Amsterdam).

Ige Verslype studied Art History at the University of Utrecht and trained as a paintings conservator at the Limburg Conservation Institute in Maastricht. Following a postgraduate internship at the Straus Center for Conservation at Harvard University Art Museums in Cambridge, Massachusetts, she has been working as a paintings conservator at the Rijksmuseum Amsterdam since 2004. Verslype's scientific interest lies in the technical study of paintings and how the investigation of materials and techniques can contribute to the interpretation and understanding of works of art. In 2013, she joined the interdisciplinary research project on the integrated technical, visual and historical study of seventeenth- and eighteenth-century Dutch painting ensembles, supervised by Margriet van Eikema Hommes. She is conducting her PhD research on the technical development of painted wall hangings in the context of this project.

Arie Wallert worked from 1991 to 1996 as an art historian and museum scientist at the Getty Conservation Institute. Since 1996, he has worked as a scientific researcher at the Rijksmuseum Amsterdam. As such he has organised various exhibitions. He works on the technical examination of paintings in relation to conservation. Furthermore he was coordinator of a working group on organic colorants in the project 'Molecular Aspects of Ageing of Painted Art (MOLART)'. He also participated in the NWO project 'The impact of oil'. In January 2012 he became professor for Technical Art History at the University of Amsterdam.

Milko den Leeuw completed his training in conservation and pictology (an analytical method for the attribution and eval-



uation of paintings) at the Dora van Dantzig studio in Amsterdam in 1989. In 1991 he founded the Atelier for Restoration & Research of Paintings (ARRS) together with Ingeborg de Jongh. Den Leeuw has worked as an external conservator for many museums, art dealers and private collectors. He has (co-)authored publications in museum catalogues, journals and conference proceedings, and the book *De Gouden Bocht van Amsterdam* (2006).

Ingeborg de Jongh studied Art History at the Vrije Universiteit Amsterdam, followed by conservation training at the Dora van Dantzig atelier, Amsterdam. She completed her studies with an internship at the Museum of Fine Arts, Budapest, with a specialisation in sixteenth- and seventeenth-century Dutch Master paintings. She established the Atelier for Restoration & Research of Paintings (ARRS) in 1991 together with Milko den Leeuw. She has worked as an external conservator for Christie's Amsterdam and for Dutch museums, art dealers and private collectors.

## Notes

- This research is part of the five-year research project 'From Isolation to Coherence: an Integrated Technical, Visual and Historical Study of Seventeenth- and Eighteenth-Century Dutch Painting Ensembles', led by Dr Margriet van Eikema Hommes and funded by the Netherlands Organisation for Scientific Research (Innovational Research Incentive Schemes, Vidi grant), which runs from 2012 to 2017. This project is based at Delft University of Technology. The Cultural Heritage Agency of the Netherlands and the Rijksmuseum Amsterdam are partners in the project, see from-isolation-to-coherence.nl. The article was translated into English by Lynne Richards. We are grateful to Suzanne Decemvirale-Van de Meerendonk for editing our later additions to the article.
- A. Roy, *Gérard de Lairese (1640–1711)*, Paris, 1992, 48.
- Frederik Muller & Cie. *Tapisseries – tableaux anciens – porcelaines – faïences – meubles – argenterie – bijoux ... La vente publique aura lieu le 17-20 novembre 1903 dans l'hôtel "De Brakke Grond" Nes 53 à Amsterdam*, Amsterdam, 1903, 24.
- J.A. Alberdingk Thijm, *Verspreide verhalen in proza ... 1879–1884*, 4 vols, vol. 3, Amsterdam, 1883, 205, note 26.
- D.P. Snoep, 'Gerard Lairese als plafond- en kamerschilder', *Bulletin van het Rijksmuseum*, 18, 1970, 4, 159–217.
- On the subject of these prints, see J. van Tatenhove, 'Lairessiana (II), Werkgroep begeleid door J. Tatenhove', *Delineavit et Sculptit*, 17, 1997, 28–47.
- Restoration carried out by *Atelier voor Restauratie en Research van schilderijen*, The Hague.
- G. de Lairese, *Groot Schilderboek ...*, 2 vols, Amsterdam, 1707.
- These maps are created by a computer program that calculates the average thread density of the whole canvas from digitally-input X-radiographs. Deviations from this average appear in colour on the maps: D.H. Johnson, 'Thread Count Report: Triumph Of Peace, Presented by the Thread Count Automation Project', unpublished report, July 2013.
- In the painting on the left (with Concord), the right-hand strip of canvas has been trimmed slightly over the full length.
- M. van Eikema Hommes, *Art and Allegiance: The Ambitions of a Wealthy Widow in a Painted Chamber by Ferdinand Bol*, Amsterdam, 2012, 179.
- Eikema Hommes, 190.
- Currently the strainers are stored in the Peace Palace, The Hague.
- E. Hendriks, 'Haarlem studio practice', in *Painting in Haarlem 1500–1850: the Collection of the Frans Hals Museum*, ed. N. Köhler, Ghent, 2006, 65–93.
- On the X-radiograph, however, the diagonal corner braces of the original strainer show up as dark bars (fig. 4). This indicates that at some time a protective layer was applied to the back of this canvas while it was still attached to its original strainer.
- See note 3.
- A cross section of this small 'double' strip reveals that De Lairese's canvas had been primed here, but not painted; in other words the composition does not continue over it.
- Pigment analysis by light microscopy and SEM-EDX.
- SEM-EDX analysis has shown that free fatty acids released from the oil matrix have reacted with the lead white pigment. A percentage of the lead white particles have thus been converted into lead soaps that have a similar refractive index to the oil and are thus transparent in the paint layer. Lead soap formation is a well-known degradation phenomenon in oil paintings. K. Keune and J.J. Boon, 'Analytical imaging studies of paint cross-sections illustrate the oil paint defect of lead soap aggregate formation', *Studies in Conservation*, 52, 2007, 161–176.
- 'zulks ... , zo veel my magelyk was, ... te verhelpen, en met d'anderen gelyk te maaken'; De Lairese, *Groot Schilderboek*, vol. 1, 330.
- De Lairese, *Groot Schilderboek*, vol. 2, 154–155.
- 'alles tegen de zolder: waar uit men kan oordeelen, wat moeite het was.' De Lairese, *Groot Schilderboek*, vol. 2, 154–155.
- 'gemakkelyk aan mynen Ezel zitten'; De Lairese, *Groot Schilderboek*, vol. 2, 154.
- De Lairese, *Groot Schilderboek*, vol. 2, 146. De Lairese wrote that he developed this machine himself, although similar devices with wax manikins had been used before this. For these devices see D. de Grazia and M. Steele, 'The "Grande Machine"', *Cleveland Studies in the History of Art*, 4, 1999, 64–75.
- 'Ik wil wel bekennen, dat ik in myne jonkheid eenige Zolders heb beklad.' De Lairese, *Groot Schilderboek*, vol. 2, 154.
- The following remark by De Lairese indicates that he assumed that for ceiling paintings one started with sketching the composition on the primed canvas: 'Wat aangaat het bereiden der Doeken eer men daar op begint te tekenen, als ook daar na wanneer het in de verw gestreeken is om het op te maaken, ten einde door de zelve zyne geheugenis te vervarssen en voor ooggen te hebben, zullen wy nu breeder verhandelen'; De Lairese, *Groot Schilderboek*, vol. 2, 145.
- Infrared reflectography was carried out with an Osiris scanning InGaAs camera scanning 16 x 16 tiles of a 512 x 512 focal plane array sensitive to just beyond 1700 nm. Visible light was filtered out through an 875 nm infrared filter.
- De Lairese, *Groot Schilderboek*, vol. 1, 12–15.
- P. Taylor, 'The concept of *houding* in Dutch art theory', *Journal of the Warburg and Courtauld Institutes*, 55, 1992, 210–32.
- De Lairese worked more precisely in his later ceiling decorations; see the essay by E. van Rietschoten et al. in this publication.
- For example, in De Lairese's *The Virtue of Charity* (c. 1675, Amsterdam Museum) the position of Charity's arm and the arm of one of the children has changed.
- Only four putti, which were added at a later stage, are distinctly different because of their relatively precise paint handling and subdued colouring. These figures are not consistent with other works by De Lairese and may have been painted by someone else.
- This is also true for the four putti that were added later and that show discrepancies in colouring and paint handling, see note 32.