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The Transfer and Restoration of an Eighteenth Century Gilt Leather Screen

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Abstract

This paper presents the first published account of the complete transfer of the silver, paint and varnish layers from a gilt leather screen onto a new support. The screen, an example of late eighteenth century Chinoiserie, was almost certainly produced in England, and consists of six rectangular folds, each supporting a single panel of gilt leather.

The screen was received for conservation in an extremely poor condition. The leather support had become highly acidic and friable and, more significantly, had also begun to de-laminate; precipitating the distortion, detachment and loss of the decorative surface.

The development of a transfer technique is discussed in terms of the other, less extreme, options available. The treatment is described, including cleaning, consolidation, facing and removal of the leather, the provision of a new support and extensive re-touching.

Introduction

The techniques by which a painted image can be transferred from a deteriorated substrate onto a new support have changed little over the past two hundred years [1-6]. From its origins in Antiquity for the transfer of wall paintings, to widespread use by mid-eighteenth century for the treatment of canvas and panel paintings, the procedure was regarded as the restorer’s tour de force; its secrets shrouded in mystery [1].

However, by the end of the century, Montamy had published one of the first descriptions of the transfer of a canvas painting thereby revealing the operation to be relatively straightforward [2].

The perception and application of such an extreme technique has since altered in line with changes in the appreciation of the historic and artistic integrity of a work of art. For example, whilst Dalbon (1898) advised art lovers not to hesitate in having it performed on paintings whose paint was lifting; noting also the exaggerations made by other authors of the difficulties involved [3], Stout (1948) commented on the dramatic and sensational aspects of the technique. With greater objectivity than his predecessors, he cautioned against the detriment to pictures from its unwise use [4]. A current approach stressing both the inadvisability and danger of transfer, and the circumstances under which it may be the only option available to the restorer has been given by Wyld and Dunkerton (1985) [6]:

‘To transfer a picture from its original support is an extreme and irreversible form of treatment, and should be avoided whenever possible. The process itself is not without risk, a transferred picture is inevitably changed; the texture and appearance of the paint may be altered, ... and ... an unnatural flatness in the new support may be disturbing. Before a decision to transfer is made there must be some certainty that every conceivable treatment has been tried, and that developments in the techniques and materials of conservation will not, within the foreseeable future, lead to some new method of coping with the problems whilst avoiding transfer. This last point is not an easy one.’

The screen: construction and technique

The screen is divided into six folds, each comprising a single panel of gilt leather supported by a wooden stretcher. Each fold measures 2130 mm by 530 mm and, in common with many other screens of this size, each panel is made from three sheets of vegetable-tanned calf skin. These have been skive-jointed across their widths and adhered together with animal glue. The leather in each case was approximately 2.0 mm to 2.3 mm thick.
Although it is beyond the scope of this paper to investigate the origin and history of the screen, it is believed to have been produced in England during the last quarter of the eighteenth century; a gilt leather industry having been established in London from at least the early seventeenth century [7, 8, 9, 10]. The design reflects the popularity for Chinoiserie; the inclusion of Chinese or pseudo-Chinese decorative motifs into European works of art [11]. The main section shows various exotic species of birds amidst flowers, foliage and vines, whilst borders are formed at the top by a hanging garland of flowers, and at the sides by vases of flowers and blossom.

A cross-section of paint taken from the lower edge of the peacock's tail (fold five) shows a typical method of execution in which the leather has been prepared with a layer of size prior to being gilded with white metal leaf (Fig. 1). The dimensions of the leaves visible under the varnish are consistent with those of silver leaf [12]; confirmation being made with a micro-chemical spot test [13]. Despite the assertions of both contemporary and modern authors that parchment size was used to adhere the silver to the leather, the thickness and glossy appearance of this layer suggests that an oil size has been used [14, 15, 16].

The yellow varnish characteristic of gilt leather is clearly visible above the silver. Moreover, the presence of silver beneath several opaque layers of paint confirms observations that the whole support was gilded and varnished before the design was painted, rather than the gilding being restricted to the unpainted areas in which it would have been visible [17]. Pigments identified using polarized light microscopy include: a mixture of red lead and vermilion, lead tin yellow (also in mixtures with red lead to give orange), yellow ochre, brown and red earths, azurite (also mixed with orpiment to give green), Prussian blue, lead white and carbon black. The medium in each case is oil. Several areas of shallow embossing are present around the edges of the decorative elements, and along the vertical and horizontal lines separating the main design from the borders.

Still, the flesh side of the leather was painted black originally, and decorated with a narrow border of green paper framed by the stretcher bars. This was now obscured by a restoration lining of coarse, plain-woven hemp. Leather cover-strips (later confirmed to be replacements made when the screen was lined) are present between the vertical edges of each fold, and are held in position with brass-plated, domed steel tacks.

**Condition**

The leather support had deteriorated to the extent that it no longer provided a stable substrate for the overlying layers of silver and paint. The processes of oxidative and hydrolytic degradation of collagen to which vegetable-tanned leathers are susceptible have been described in detail elsewhere [18]; in this case the pH of the fibres was recorded at between 2.3 and 2.6 indicating a severe degree of chemical deterioration.

Evidence of a dramatic loss of strength within the support was marked. In the first instance large areas of paint had been disrupted by cracks which followed the oblique angle of follicle growth through the grain surface and into the underlying matrix of fibres. More critically, several planes of de-lamination had formed through the leather running parallel to the paint surface. This damage was apparent either as large blisters above which continuous areas of paint hung loose, or as areas in which the paint had been completely lost. De-lamination was concentrated at the centre of each panel (especially panel five), and around the mid-point of each exterior, vertical edge; the latter perhaps as an unavoidable consequence of handling whenever the screen was folded or moved. Blooming of the varnish was also noted, together with some localized mould growth [19]. The silver leaf which would have been visible originally as gold under the yellow varnish had tarnished throughout each fold to a green-brown colour.

Although discrete de-lamination within gilt leather supports as a consequence of natural ageing is not unknown, a more likely explanation for its regular occurrence across each of the panels might be attributed to the restoration lining which was probably undertaken at some time during the late nineteenth or early twentieth century in an attempt to stabilize tears in the leather.
Tests on the adhesive used for lining yielded surprising results. Although clearly a mixture of wax and resin (historically beeswax and dammar), it was found to have a melting point in excess of 85°C, Feller (1958) describes mixtures of dammar and beeswax in varying proportions as resembling the behaviour of a material having a eutectic; the melting point remaining at around 47°C for increasing additions of dammar from 12% to 87%, after which it rises sharply to 86-89°C [20]. Although oxidation of the resin component over time would tend to contribute to this effect, the unusually high melting point of the lining adhesive may be more probably explained in terms of it having an unusually high resin-to-wax ratio. This could have been intentional had the restorer wanted to use the heat needed to melt the adhesive as a means of softening and laying down loose paint. It is certain however that the application of such a mixture would have exceeded the shrinkage temperature of the leather support, thereby inducing severe compression forces beneath the largely incompressible layer of paint. These may not have caused immediate de-lamination, however they may have been sufficient to precipitate its onset throughout the panels at a later, more advanced state of decay.

**The decision to transfer and the evolution of a treatment**

Lucas (1963) listed the four reasons necessitating the transfer of a painting from its original support as (summarized here): deterioration of the support, disintegration of one or all of the layers, lack of adhesion between the layers, and movement within the support [21]. The screen clearly exhibited each of these conditions, however it was necessary to explore other, less invasive treatments, if only to demonstrate their anticipated ineffectiveness. Foremost amongst these was the option of introducing an adhesive /consolidant through cracks in the paint to fill the underlying blisters. Trials with a range of materials including BEVA 371, Paraloid B67, B72, and acrylic emulsions proved however that a mixture fluid enough to flow through a crack and saturate a large underlying area of friable and absorbent fibres could not be introduced in sufficient final quantities to effect a firm bond.

Such a treatment would also not safeguard better-preserved areas of leather against incipient decay, would not correct any of the distortions in the paint, and ran the disastrous risk of reducing the support to an uncontrollable, sticky mess.

The option of removing the hemp lining and at least part of the original leather remained the only treatment likely to stabilize the paint and prevent further de-lamination. Experiments on detached fragments of paint showed that leather remaining on the underside could be thinned down with a scalpel through and past the damaged layers, and into the last 0.2 mm to 0.5 mm of grain. The decision was therefore taken to dismantle the screen, remove all of the lining and unstable leather save a thin layer of grain as a margin of safety protecting the silver, and transfer the paint, silver and varnish layers onto a new, stable support.

**Treatment**

A scheme for choosing the adhesives and solvents for each successive stage was drawn up. This was based around the two most important and, ideally, exclusive adhesive systems to be used: those of facing and re-lining. The essential requirement was for a facing that could be applied and removed without disturbing either the new lining, the various consolidants and fillers used in the treatment, or the paint and varnish layers of the object itself. It was clear from this stage that the favoured lining adhesive would be the thermoplastic resin BEVA 371; a choice made in preference to cold lining with a solvent activated acrylic dispersion. Acrylics would have their place in this treatment, but as fillers to retain the corrected surface texture of the paint during lining; a time at which their relative insensitivity to the elevated temperatures needed to activate BEVA 371 would be an advantage. Therefore, if BEVA 371 was to be used to attach the new support to the underside of the paint, the adhesive used to attach the facing would have to be removed with a solvent to which BEVA was not sensitive. The chosen facing adhesive was therefore a Lascaux wax-resin mixture which, being highly thermoplastic, was unlikely to transfer its own surface characteristics onto the paint during re-lining.
Although various other combinations of adhesives could have been considered, a non-aqueous system of incompatible solubility was therefore built around white spirit and its capacity to act as a good solvent for wax resin, but as a poor solvent for both BEVA 371 and Paraloid B72 [22].

**Dismantling, cleaning and consolidation**

The folds of the screen were separated at their hinges, and the dome-headed tacks and coverstrips removed. The last operation was complicated by the presence of a thick layer of animal glue securing the strips to the surface of the paint and varnish. Beneath these were found fragments of the original coverstrips which had also been glued in position, however their removal during the previous restoration had destroyed much of the underlying paint. Separation of the gild leather panels from their frames was finally achieved by removing a further eighty to one-hundred steel tacks which lay beneath the coverstrips. At this stage tracings were made of each panel noting the presence of cracks, holes, or particularly fragile paint. These were to serve as references during removal of the supports.

The paint surface was cleaned with odourless mineral spirits applied sparingly and removed with swabs. This was undertaken more as a means of removing particulate matter prior to consolidation and the application of a facing, than to bring about a visual improvement to the image. A consolidating solution of Paraloid B72 was then applied to strengthen the paint during the application and removal of the facing. As noted earlier, B72 would be insoluble in the white spirit used to remove the facing and would therefore act as a protective, isolating layer against which the last traces of wax could be removed.

**Facing**

The facing comprised a long-fibre, glazed, Japanese tissue which had been prepared with several coats of Lascaux wax resin. In order to improve the adhesion between the facing and the paint, some of the remaining wax solution was thinned to a liquid at room temperature and applied to the paint surface, after which the layers of tissue were smoothed into position.

Sufficient solvent had evaporated after one day to allow the facings to be pressed, however a space of one week was allowed before a final bond was made using a warm iron. Several layers of cotton calico were then adhered above the tissue in order to provide additional strength and rigidity; the first layer possessing a particularly fine weave in order to avoid transferring a woven pattern through the tissue facings and onto the paint surface. The adhesive in this case was a mixture of sodium carboxymethyl cellulose in water and Lascaux acrylic dispersion which would enable the calico to be removed with water after transfer and re-lining without disturbing the underlying tissue.

**Removal of the linings and the leather**

As the hemp linings were both inflexible and heavy, and difficulties were anticipated in being able to remove them without causing unnecessary stress or further damage to the paint film. It was also likely that the alternative approach - cutting the linings into squares and removing them piece by piece - would be equally disruptive. As it was thought preferable to keep the paint and facing as flat possible, a wooden roller was fabricated onto which the lining could be attached progressively as it was cut away from the leather. The roller resembled a section of a wheel some five or six meters in radius; the curved side being approximately the same size as a single panel. Its position and movement was directed by a set of rails which also served to keep its curved side several millimetres above the panel to avoid crushing the paint. Removal of the lining and a significant proportion of the original leather proceeded quickly using a long-bladed palette knife to follow the existing planes of de-lamination.

Once the linings together with some attached leather had been lifted away, the remaining supports were thinned to within 0.2 mm to 0.5 mm of the silver through the cutting away of increasingly smaller quantities of leather (Fig. 2). The painted areas were now clearly visible through the back of each panel on account of the silver remaining well-preserved under areas of paint whilst having corroded to a darker colour where protected only by the yellow varnish. At this point it became clear that the grain surface of the leather had also been prepared originally with dilute parchment
glue; a common technique in gilding whereby an unevenly porous substrate such as leather is sealed to promote even drying of the oil size [10]. Taking the removal of the support down to this saturated layer of grain satisfied us that all of the unstable leather had been removed, however, as a cautionary measure against further de-lamination, the remaining fibres were consolidated with a dilute solution of Paraloid B72. It was hoped that this would also seal the silver against further tarnishing.

**Filling and re-lining**

Concern over the buckled paint surface and the likelihood of retaining these deformations after treatment prompted the next step of laying the panels and their facings paint-side down on the warm surface of a vacuum hot-table. Once the paint had softened, the vacuum and cooling systems were activated and the panels, whose paint surfaces had effectively been ironed flat, were left to set. This procedure was carried out after tests had established the safe limits of temperature and pressure at which the embossed elements of the design would be preserved.

In contrast, as the preferred and safest method of re-lining the panels was to place them on the hot table paint-side uppermost, the possibility of transferring these deformations back into the paint surfaces together with any ridges or marks left on the reverse-side by the scalpel had to be addressed. With reference to a published treatment carried out under similar circumstances, it was decided to apply a filler to the now uneven, reverse-side of the panels in order to accommodate any irregularities [6]. For this task Lascaux Structura, a quartz-filled acrylic gesso was chosen as it had the advantages of extreme flexibility, low mass, and the ability to be sanded flat in much the same manner as a traditional chalk/glue gesso. A priming layer of Lascaux acrylic emulsion varnish was first brushed over the consolidated remains of the leather, after which the Structura was applied with a trowel. Several layers were needed to build up a thickness sufficient to cover all the surface irregularities, after which the Structura was allowed to dry and then sanded completely flat.

Each panel was re-lined onto a double thickness of polyester sailcloth which had previously been prepared with several coats of dilute BEVA 371 [23]. Each panel was placed face-up on the sailcloth and brought up to temperature under moderate pressure after which the cooling system was turned on and the panels allowed to set whilst still under vacuum.

Once the panels were re-mounted onto their temporary baseboards using the tack edge of the sailcloth, the facings could be removed. Water was used to soften the mixture of sodium carboxymethyl cellulose and acrylic adhesive holding the calico in position; the wax-resin acting as a moisture barrier to protect the surface of the paint. Each layer of Japanese tissue paper was then removed by brushing with white spirit, waiting for several minutes for the wax to absorb the solvent and soften, and then gently peeling the paper away from the paint. Any wax remaining on the surface was removed by gentle swabbing with cotton wool moistened with white spirit.

**Re-touching and final assembly**

The physical stability and surface characteristics of the paint were revealed to be excellent, with good preservation of the embossing, however the very poor original condition of the panels and the full extent of the damage was now apparent. Whereas losses were visible previously against the sympathetic red/brown of the exposed leather, the Structura fills revealed all damaged areas in uniform, brilliant white.

Before each panel was re-mounted, backboards were attached to the stretchers to give protection against damage by impact to either the front or the back. The original decorative pattern revealed on the back of the screen during removal of the old re-lining was recreated by adhering black cotton canvas onto the hardboard, which was then decorated with a copy of the original green border and protected with a coat of varnish. The gilt leather panels were finally attached to the stretchers by stapling through an excess margin of sailcloth.

Re-touching was carried out over two coats of Paraloid B72. As the application of Structura from the backs of the faced panels prior to lining had effectively filled the losses flush with the surface of the paint, the need for further
filling from the front was very much reduced. The chosen re-touching medium of alkyd resin approximated closely the handling of the original oil medium, thereby facilitating the reproduction surface blends of colour and light impasto. The technique was based upon laying down a foundation colour which was then modified by the addition of a second or third colour in a pattern of small, irregular dots. The resulting optical mix of colours on the surface integrated well with the already visually complex surface of the original gilt leather and remains undetectable at distances of more than a few centimetres. Fine surface effects were achieved using glazes, again with alkyd medium before the application of a final varnish of Paraloid B67. As the chosen medium for re-touching was soluble in white spirit, the first coat of B72 acted as a surface upon which any mistakes could easily be removed, whilst a final varnish of Paraloid B67 carried the additional advantage of approximating the low-to-medium gloss typical of well-preserved gilt leather. Once the folds had been screwed together, new leather coverstrips were cut and secured in position with a combination of BEVA 371 and replacement dome-headed tacks. The final structure of each fold is shown in the diagram, Fig. 3.

Conclusions

It should be understood that the decision to transfer the paint layers onto a new support was not taken lightly. The time involved, the need for advanced craft skills and the complexities of re-touching should be considered by anyone attempting a similar treatment. An evaluation in terms of degrees of success is perhaps unsuited to such invasive work in which the regrettable need to remove of an original support must be weighed up against the undoubted visual and structural improvements to the paint surface. The treatment thus raises questions concerning the physical integrity of an object over its intended function. Although gilt leather is essentially a composite material, its meaning as decorative art resides principally within the clarity, texture and preservation of the painted image rather than the leather support. For a screen in this condition with an otherwise uncertain future, minimum intervention would have amounted to an abdication of intellectual responsibility in facing this fact.

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3. Dalbon, C., Traité technique et raisonné de la restauration des tableaux, Paris (1898)


11. The elements and history of *chinaeiseries* are described in: Osborne, H. (ed.), *The Oxford companion to the decorative arts*, Oxford University Press (1975), P. 221


13. A spot test was carried out using a small excised sample of metal leaf. Filter paper was prepared by soaking in a 0.03% solution of 5-(4-dimethylaminobenzylidene) rhodamine in acetone and allowed to dry. The sample of metal was placed on the paper and moistened with a drop of water. A red-violet stain indicated silver.


17. Waterer, J., op. cit., p 38


19. Identified as *Aspergillus spp.*


22. For an account of a facing and transfer using similar techniques, see: Bilson, T.W., The conservation of a Roman Egyptian painted shroud fragment, *The Conservator*, 16 (1992)


**Suppliers of Materials**

A. P. Fitzpatrick
1 Barnabas Studios
10-22 Barnabas Road
London E9 5SB
Tel: 0181 985 7865
Fax: 0181 985 7659

Lascaux BEVA 371: mixture of ethylene vinyl acetate co-polymers, ketone resin N and paraffin.

Lascaux Structure: acrylic resin dispersion with modified quartz filler.

Lascaux Acrylic Varnish: acrylic resin dispersion.

Lascaux Adhesive Wax 443-95: microcrystalline wax and polyterpene resin mixture.

Lascaux 498HV Acrylic Adhesive: thermoplastic butyl methacrylate dispersion thickened with butyl-ester.

Paraloid B72: ethyl methacrylate/methyl acrylate co-polymer.

Paraloid B67: poly(iso-butyl methacrylate).

Richard Hayward & Co. Ltd.
c/o John Heathcoat & Co. Ltd
Tiverton, Devon EX16 5LL
Tel: 01884 257867, Fax: 01884 252866

Polyester sailcloth for restoration # 00169 (205 cm width, 4.6 oz/m²).
The authors


Résumé

Cet article relate la restauration exceptionnelle d’un paravent en cuir doré, intervention qui a nécessité le transfert complet de la couche picturale sur un nouveau support. Le paravent, un exemple probablement anglais de la fin du XVIIIème siècle avec motif dit le Chinoiserie, se compose de six battants, chacun supportant un panneau rectangulaire de cuir doré, estampé et peint.

Lors de sa prise en charge par les restaurateurs, l’état de conservation de cet objet était dramatique.

Le degré de détérioration acide du cuir était tellement sévère qu’il n’était plus en mesure de servir de support à la surface dorée et décorée. Il était pulvérisé et avait même commencé à se démonter, précipitant la distorsion, la désolidarisation et la pertes de la couche picturale.

La nécessité de procéder à un transfert de la couche picturale et de développer une méthode de travail est discutée et le choix de cette méthode radicale par rapport à d’autres solutions moins extrêmes est argumenté. L’intervention est ensuite détaillée et chaque phase de l’opération est décrite: le démoutage, le nettoyage, la consolidation, le facing et le retrait du cuir, le nouveau support de doublage, la retouche et le ré-assemblage des panneaux.

Fig. 1. The layer structure of the cross-section of paint taken from the peacock’s tail in fold five. There is an oil size (5) on the leather (6), then silver foil (4) with three layers of yellow varnish (3). There are five layers of paint (2) and two layers of varnish (1) on top.
Fig. 2. Removal of the leather support. Note both the design and embossing visible from the back through the final layers of grain.

Fig. 3. The structure of each panel after restoration. The original layers are: 8. leather; 7. oil size; 6. silver; 5. yellow varnish; 4. paint and 3. original varnish. Layer 2 is a Paraloid B72 intermediate varnish and layer 1 is Paraloid B67 varnish over re-touchings. The new support consists of: 9. Acrylic primer; 10. acrylic gesso; 11. BEVA 371; 12. polyester sailcloth; 13. BEVA 371 and 14. Polyester sailcloth. The backboard (15) is un-attached.