to rigid boards, a treatment which induces physically damaging and aesthetically disturbing distortions. The visually unobtrusive Japanese paper tabs ensure pleasing display and allow scholars access to both sides of the fragment with minimal handling. This approach comes from treating fragments as complex objects rather than just as decorative surfaces. The process comes full circle when excised leaves are reunited with their original books, as in the case of the Psalter-Hours of Isabelle of France (Cat. 61) or the Pabenham-Clifford Hours (Cat. 64).

Where restoration seeks to complete, conservation seeks to open up: the restorer imposes on the work the current view, necessarily based on a single interpretation, where the conservator allows a multiplicity of views to be extracted from the physical evidence of the object itself, in the knowledge that fashions in approach and techniques of analysis evolve with the passing of time. The terms ‘preservation’ and ‘conservation’ suggest stasis, but the discipline is characterised by a concern with managing change. This process requires openness to the questions this section started with, questions which are essential to the continuing development of the conservation profession. The answers are strongest with multidisciplinary dialogue.

Digital and Mathematical Reconstructions

Marie D’Autume, Stella Panayotova, Paola Ricciardi and Carola-Bibiane Schönlieb

If paint losses are not to be filled in and overpainting not to be removed, would we ever be able to study and enjoy damaged illuminations in a state sufficiently close to their original condition? Art-historical and scientific analyses combined with modern technology offer alternatives to restoration. They help us detect and explain the damage, and reconstruct the illuminations without touching the originals. Virtual image restoration, also called image inpainting, denotes the process whereby missing or occluded parts in images are filled in on the basis of information provided by their intact parts. Computer graphic designers, artists and photographers have long used manual inpainting to digitally restore damaged paintings or manipulate photographs.

Although most modern publishers of manuscript facsimiles pride themselves on reproducing faithfully every feature of the original, from original parchment flaws to later damage, the Folio Society took a different approach to the thirteenth-century illuminations of William de Brailes, partially reconstructing them from evidence preserved in the decoration (Cat. 31).

Full, virtual image restoration can now be automated by mathematicians applying powerful methods based on so-called Partial Differential Equations (PDEs). They operate in much the same way as trained restorers do: they propagate information from the structure around a hole into the hole to fill it in. The same method can be applied to more complex problems, such as the removal of overpainting and the reconstruction of the original image.
ill. 8.10a-f  Mathematical reconstruction of the scenes in ill. 8.9. © Marie d’Autume and Carola-Bibiane Schönlieb, 2015
SECTION EIGHT: FROM VANDALISM TO RECONSTRUCTION

8.10d

8.10e

8.10f
A suitable test case was offered by the Claude of France’s Primer (Cat. 39) where Adam had been supplied with a green skirt and Eve with a veil by a post-medieval viewer offended by their nudity (ill. 8.9).

The process began with a digital color photograph of an overpainted scene (ill. 8.10a) and an infrared image of it (ill.8.10b). The infrared image revealed the original structure of the painting beneath the later additions. The digital restoration based on a and b involved various steps (ills. 8.10c-f). They are shown separately for Adam (top row) and Eve (middle row) in the right-hand scene, and for both figures in the left-hand scene (bottom row). First we marked the part that we would restore and created a mask (c).

Then, we solved a local PDE that is constrained to the color given on the boundary of the mask in a and the structure encoded in b and extracted in d. This process, known as image osmosis, resulted in the restored images in e. Taking e as an initialization, we applied a second restoration process to the painting by solving another PDE that can also represent non-local image features, such as textures and patterns. We obtained the images in f.

Collaborations between art historians, scientists, conservators, mathematicians and imaging experts can produce the surrogate for multiple reconstructions, bringing us closer to the original beauty and meaning of the illuminations, while their current condition remains unaffected.

Notes
1 For thought-provocative discussions see de Hamel 1996 and Wieck 1996.
2 Duffy 2006, 146–70.
3 For examples of both, see the Macclesfield Psalter (Cat. 65), Fitzwilliam Museum, MS 1–2005, fols. 77r, 140r, 167v, 242r reproduced in Panayotova 2008b.
4 The strong traces of blue along the contours of figures and letters in the Bible’s initials indicate that the ultramarine was gently dabbed away from the backgrounds with a soft, damp tip. This approach, both meticulous and selective (the blue areas in figures and ornament were preserved), reveals appreciation for medieval aesthetics.
5 For instance, in Fitzwilliam Museum, MS 1–2005, fols. 58r, 246r reproduced in Panayotova 2008b.
6 The numerous initials cut out of manuscripts in Cambridge and Oxford libraries have not surfaced to date, suggesting that they were not excised out of appreciation or in view of reuse (de Hamel 1996). Boredom coupled with desire to inscribe oneself within the book shows in a copy of the Bible printed in Mainz in 1462 and illuminated in Cologne (Peterhouse, S.10b). Some of its painted initials were probably excised before 1600, like those of many Peterhouse manuscripts (Thomson forthcoming). The few spared by the sixteenth-century vandals received graffiti from students in Peterhouse or Trinity College in the 1720s and 1730s: ‘Porteous’ (Jer); ‘Cook Fool’ (Lam); ‘Spearman 1732’ (Bar) and ‘Spearman’ (Joel, Amos); ’P[ercival] C[lennell] Trin[ity] Col[lege] 1735’ (Dan) and ’P[ercival] C[lennell] (Hab); ‘Bonnel, Trinity, 1735’. Robert Porteous who came to Peterhouse aged twenty in 1725 and became deacon at Lincoln in 1729 was probably the brother of Beilby Porteous, Chaplain to George III in 1769 and Bishop of London (Venn 1922–1927, III, 383). Jacques and George Spearman matriculated at Peterhouse in 1731; Jacques became deacon at Lincoln in 1735 and then priest in Norwich, George went on to become Justice of the Peace (Venn 1922–1927, IV, 129). Percival Clennell matriculated at Trinity College in 1733 (Venn 1922–1927, I, 354).
7 For the Carmelite Missal, cut up in the early nineteenth century by the children of the collector Philip Hanrott, see Rickert 1952.
8 For the early nineteenth-century Lincoln Cathedral choir boys who excised illuminations from volumes in the library while preparing for services, see Wieck 1996, 236.
9 Doyle 2012.
Framed like a small painting, with its journey through sales and private collections recorded on the reverse like visa stamps in a passport, this is one of the miniatures excised in modern times from a copy of Guillaume de Deguileville’s Le Pèlerinage de l’âme illuminated in Metz c.1435-1450. Since 2003, the Fitzwilliam Museum has acquired forty-three miniatures from the same manuscript (including this one, MS 1-2014, bought from Les Enluminures after its sale at Christie's, London, 18 Nov. 2014, lot 2), in the hope to reconstruct the original digitally, even if partially; see Panayotova 2008d.

Fitzwilliam Museum, MS 3-1954; Morgan and Panayotova 2009, no. 175.

Fitzwilliam Museum, MS 187; Morgan and Panayotova 2009, no. 251.

Fitzwilliam Museum, MS 46; Morgan and Panayotova 2009, no. 252.

For other examples, see Jackson 1981, 576-82; Wieck 1996; de Hamel 1996; Evanston 2001, 91-93.

For another Crucifixion treated in a similar way and pasted on wood, see Fitzwilliam Museum, MS 381; Morgan, Panayotova and Reynolds 2011, no. 250.

For images painted on parchment and glued to wood, see Scallaïèrez 1992; Wieck 1996, 233-34. See also Rudy 2013.


The term was first used to describe an art-destroying ruffian in the 1860s; Evanston 2001, 49.

Burn 2016, 19-21.

All of Marlay’s cuttings are listed in Wormald and Giles 1982, 85-154. For the Flemish and German cuttings, see Morgan and Panayotova 2009; for the Italian and Spanish cuttings, see Morgan, Panayotova and Reynolds 2011; for the French cuttings, see Jackson, Morgan and Panayotova 2014 and forthcoming volumes of the same catalogue series.


Panayotova 2008a, 66-70.

James 1912a; Panayotova 2008a, 45.

Frederick 1953-1954; Evanston 2001, 36-7; Angers 2010, 81-3.


Outley 1826, 3.

Munby 1954, 33-35.

Fitzwilliam Museum, MS 2572-b; Morgan and Panayotova 2009, no. 246.

Fitzwilliam Museum, Marlay cuttings It. 23a-b; Morgan, Panayotova and Reynolds 2011, no. 303.

For the collage as a nineteenth-century phenomenon, see Evanston 2001, 93-101. For other fragments or collages from Sistine Chapel manuscripts in the Fitzwilliam’s collection, see Maral cuttings It. 29-38 (Morgan, Panayotova and Reynolds 2011, nos. 298, 300, 305, 307) and Marlay cutting Z.1 (Cat. 88).

Fitzwilliam Museum, MS 1-1957; Morgan and Panayotova 2009, no. 127; Morgan, Panayotova and Reynolds 2011, no. 221.

Sapiro 2009.