

The colour of music – a case study detailing the examination and treatment of a unique work by Roy de Maistre

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ABSTRACT

Roy de Maistre [b. 1894, d. 1968] is considered one of the most important figures in the development of abstract painting in Australia. With a passion for both music and art these combined concerns became pivotal to his conception of modern art. Working with Roland Wakelin he devised a colour music code based on the analogies between the colours of the spectrum and notes of the musical scale. *Colour Music* (circa 1934), a 5 meter long gouache painting executed on two overlapping piano rolls, is one of the most intriguing and resolved statements of de Maistre's colour music ideas. Of interest to both art and music historians, previous examinations of the work had intimated the presence of musical note annotations hidden beneath the paint layers. This finding highlighted the need for further research and examination of the work, in addition to the need for conservation treatment in order to stabilise its fragile and deteriorated condition. This paper details the art historical research, technical examination and non-destructive instrumental analysis carried out on this unique work to gain a better understanding of the artist's materials and techniques, and outlines the treatment undertaken to stabilise the work in order to make it suitable for display in the Sydney Moderns exhibition at the Art Gallery of New South Wales (AGNSW).

Keywords Colour Music, Roy de Maistre, Piano Roll, Colour Music Code

BACKGROUND

Roy de Maistre's interest in colour and music began when he moved to Sydney in 1913. While studying violin and viola at the Sydney Conservatorium of Music (known then as the State Music Institution) he also studied art at the Sydney Art School under the tutelage of Anthony Dattilo-Rubbo. With Dattilo-Rubbo's encouragement, de Maistre became interested in post-impressionism and other contemporary art movements overseas, and soon began to develop his own theories on colour. After a short period of service in WWI, de Maistre worked with Dr Charles Gordon Moffitt who was based at Goulburn Hospital, to develop a 'colour treatment' for soldiers traumatised by the horrors of war (Johnson 1988). It was at this time de Maistre realised the full emotional, therapeutic and spiritual potential of colour. Through a friendship with Adrian Verbrugghen son of the Sydney Conservatorium's director, de Maistre was exposed to a circle of innovate thinkers and had access to a comprehensive library of art literature (Gertsakis 2013). He read widely on art trends overseas including Orphism; an off shoot of cubism which used bright colours to represent abstract forms, and on the work of the Synchronists whose work analogized music and colour. In 1918 de Maistre became friendly with Roland Wakelin and from there a collaboration began. For the next year, he began to develop a 'colour music code' and in 1919 he and Wakelin held a joint exhibition at the Gayfield Shaw Art Salon titled *Colour in Art*. The show, the first of its kind in Sydney, included a number of paintings and colour charts all dedicated to the relationship between colour and music harmony. The show was highly controversial, and the conservative audience struggled to come to terms with the abstract ideas being presented to them. The criticism de Maistre received following the show convinced him that his ideas could not flourish in Australia, and so he set aside his colour music theories for some years.

De Maistre's colour music code was based primarily on Newton's artificial colour spectrum, presented in *Opticks* 1704 (Hutchison 1997-2013). His modified version assigned music notes A to G to the colours of the spectrum ROYGBIV (red, orange, yellow, green, blue, indigo and violet), thus representing the white notes of the keyboard (Figure 1). Using this code, de Maistre built up a colour wheel which was marketed commercially by Grace Bros in 1926. The wheel, consisting of 132 shades of colour divided into 12 segments, with masks to reveal different colour harmonisations, proved successful with interior designers, artists, students and teachers.

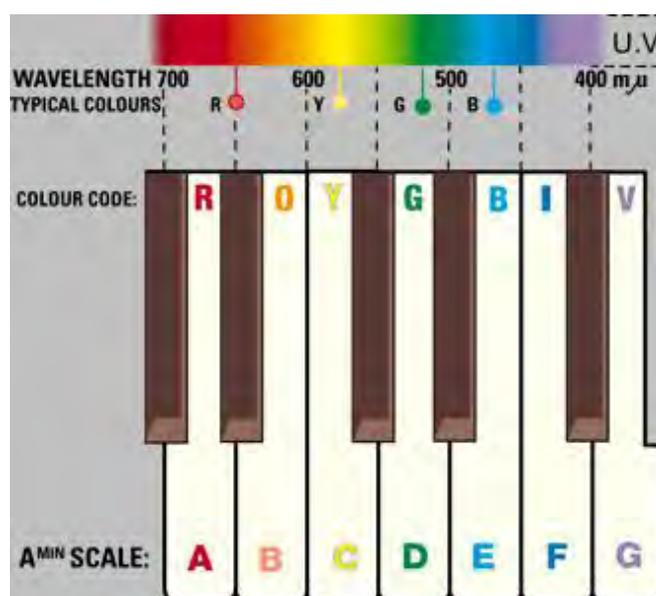


Figure 1. Roy de Maistre's Colour Music Code.

THE ARTWORK

De Maistre revisited his colour music ideas when he moved to London in the early 1930s. His unique and ambitious *Colour Music* is executed in gouache, chalk pastel and pencil on two un-punched piano rolls, one overlapping the other to create the effect of a scroll. This 5 meter long interplay of music and colour is believed to be one of the most pure and accomplished statements of the artist's career as it beautifully synthesises his colour music ideas.

As an item intended to be rolled and unrolled, the work had suffered significant wear and tear since its acquisition by the Art Gallery of NSW in 1969 [Gift of Sir John Rothenstein]. The fragility of the work, a direct result of the physical stress placed on it, had resulted in the structural stability of the roll being compromised and the roll being unsuitable for examination, research or display in its full painted length.

CONSERVATION PROJECT

As a work of great significance within the AGNSW collection, the main aims of the conservation project [generously funded by the Friends of Conservation] were as follows:

1. Gain more information on de Maistre's materials and methods, through research, technical examination and instrumental analysis using non-destructive techniques.
2. Repair and stabilise the work in order to make it suitable for both research and display.

MATERIALS AND TECHNIQUES

THE SUPPORTS

The two overlapping piano rolls (one painted and one blank) which are branded on the leaders as *Universal* rolls, were most likely sourced in London when de Maistre moved there in the 1930s. The Aeolian controlled Universal Music Company Ltd, had a factory at Hayes, Middlesex, England (The Pianola Institute 2013), where it is possible de Maistre purchased the 16 metre long un-punched rolls either directly from the factory or through a local supplier. The piano roll paper in each instance measuring 11¼ inches in width and 0.09mm in thickness is wrapped around a cardboard core with black plastic spool ends (Figure 2).

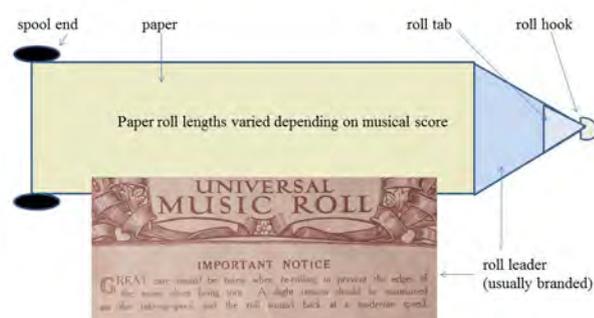


Figure 2. Anatomy of a Piano Roll

The paper, which appears yellow-brown in colour, has a smooth and almost glossy surface suggesting it may have been waxed for strengthening. Research suggests that piano roll papers from this period were generally of a high quality¹, and this was supported by a visit to the Powerhouse Museum Collection, where it was noted that similar Universal rolls from the period from the private collection of Barclay Wright owner of the Mastertouch Piano Roll Company, were in very good condition overall. De Maistre's rolls by comparison however were far more discoloured suggesting they may either have been exposed to poor environmental conditions at some time or the paper may have been of a lesser quality, a possibility due to paper shortages experienced during the interwar years. Another possibility is that de Maistre sourced the blank paper rolls without leaders and attached the *Universal* leaders himself at a later date.

THE MEDIA

Visual Examination

Carefully mapping out the score in pencil, de Maistre divided the picture plane into flat vertical bands of colour painted in gouache, moving from left to right across the roll as if translating a music manuscript. The bands are then divided and crossed by horizontal and oblique lines to form rectangles and lozenges and are painted with adjusted heights to represent pitch. Applying his code, the colours represent the notes of the octave, with lighter and darker tones signifying movement up and down the scale. The bass rhythm represented in the lower half of the work is echoed in the treble by dividing the colour sequence in half. Pencil inscriptions at the beginning of the painted section identify piano, violin and cello as the main instruments, with more faint inscriptions evident under the paint through the roll. Visual examination suggested de Maistre was more experimental in his application of media within the first 2 meters of the roll, attempting to create lighter and darker hues by mixing his colours and by applying chalk pastel over the paint in areas.

Infrared Examination

In order to determine the musical note annotations hidden under the paint layers, the object was examined using an Osiris A1 infrared system [Opus Instruments LTD]. Infrared reflectography (IRR) is a method commonly used to detect under-drawings due to its ability to reveal graphite and other carbon-based materials. One of the benefits of the process is that it is non-destructive and no sampling is required.

The infrared investigations, supported theories by Heather Johnson (de Maistre's biographer) and Niels Hutchison² that *Colour Music* was in fact a representation of Haydn's Trio in B flat (1794) for keyboard, violin and cello (Hoboken XV: 20) (Figure 3). Interestingly de Maistre claimed he had a condition known as colour synaesthesia, whereby he perceived letters and numbers as inherently coloured. After his death, no sheet music was found at his studio (Johnson 1994), which might suggest de Maistre translated the musical score into colour merely by listening to it. It is possible however that de Maistre became so preoccupied with his code that he trained his mind to interpret music as colour. Works from other collections, including *Arrested Phrase from Haydn Trio in orange-red minor 1919-1935* (NGA) and *Arrested movement*

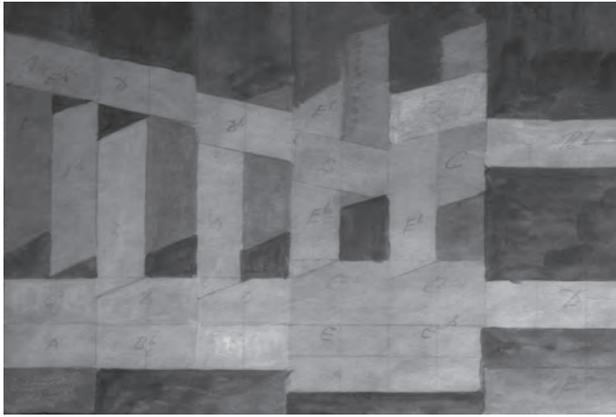


Figure 3. IR examination revealing graphite inscriptions relating to musical score. Roy de Maistre (Australia; England, b.1894, d.1968). (*Colour music*), (circa 1934). Gouache on piano roll, dimensions variable. Art Gallery of New South Wales. Gift of Sir John Rothenstein in memory of the artist 1969. © Caroline de Mestre Walker.

from a trio 1935 (NGV), appear to be based on the piano roll, with sections appearing almost identical (Hutchison 2013). Whether de Maistre created *Colour Music* as an artwork in itself or as a working model for his paintings is not known, but it is visually striking in its full expanse.

Ultraviolet Examination

Further examination of the media was carried out using ultra-violet (UV) light, a method used to identify certain pigments through characteristic absorption or fluorescence. During this process, some notable observations were made:

1. A fiery orange-red fluorescence of one of the deeper red pigments suggested the presence of madder lake (Figure 4). A pigment derived from the roots of the madder plant, it is the natural dye from the root called 'purpurin' which causes the pigment to fluoresce in this way (Gettens & Stout 1966).



Figure 4. Detail from *Colour Music* showing fiery orange-red fluorescence of dark red pigment under UV light.

2. A bright yellow fluorescence was noted in the white paint areas and under many of the other paints, suggesting the presence of zinc white (Pigments through the Ages 2013).

X-Ray Fluorescence [XRF]

XRF analysis (a non-destructive elemental analysis technique) was also carried out to identify the pigments using a portable XRF Tracer III-V Device [Bruker AXS KeyMaster Technologies]. The instrument was used at 3 settings: 40kV, 1.5uA; 33kV, 1.2uA; 15kV, 15uA, the latter two of which were used under vacuum and were more appropriate for elements of decreasing atomic weight (Figure 5). The instrument was manually held at a 5mm distance from the surface and the acquisition time was on average 60 seconds. For the purpose of this study approximately 6-8 readings were taken from areas throughout the roll for each of the 7 pigments (ROYGBIV) corresponding to the notes of the octave (Table 1).

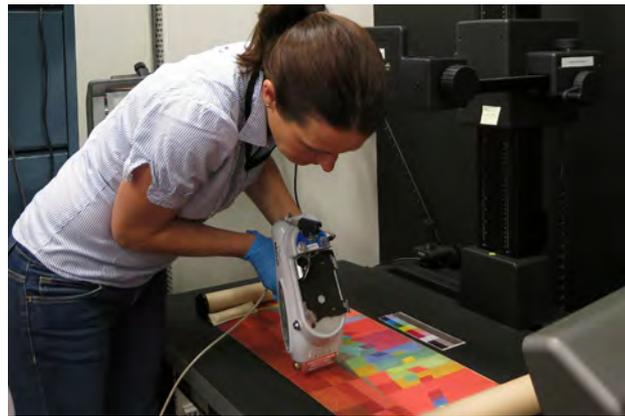


Figure 5. examination of colour music using a portable XRF Tracer III-V Device

RESULTS FROM TECHNICAL EXAMINATION

While it was acknowledged that non-destructive techniques could only provide limited information regarding the pigments present, much useful information was obtained. Zinc white (Chinese white) was confirmed as the main white pigment in the roll a wash of which was found present under most of the other pigments. Examination of the light red and orange pigments revealed peaks for mercury and sulphur, suggesting the presence of vermilion, while examination of one of the deep red pigments revealed little information via XRF supporting the presence of madder lake as implied by UV. The orange pigment, with what appeared to be chalk pastel applied over the surface, also revealed peaks for iron, suggesting the possible presence of an ochre, umber or iron oxide red. The presence of cobalt yellow was surprising as cadmium had superseded it by this time, however de Maistre does appear to have mixed the pigment with chrome yellow within the early sections of the roll. Two very different greens appear in the roll, a rich lush green which appeared to be chrome based, and a blue-green colour which appeared to be a combination of chrome and emerald green, another curious find which was supported by strong absorption observed via IRR. The blues appeared to be a mix of chrome green and cobalt blue with indigo appearing as pure cobalt blue. The presence of cobalt and arsenic in the violet pigment suggested the presence of cobalt violet. Generally speaking de Maistre appears to have used a traditional palette, consistent with those produced by manufacturers such

MEDIA ANALYSED	MAIN ELEMENTS DETECTED	INFERENCE
Red (light)	Hg, S	Vermilion (HgS)
Red (dark)	-	Madder Lake (C ₁₄ H ₈ O ₄ , C ₁₄ H ₈ O ₅) (inferred by UV)
Orange (light)	Hg, S	Vermilion (HgS)
Orange (medium/dark) With red/brown chalk pastel	Hg, S, Fe	Vermilion (HgS) + Ochre, umber or iron oxide red
Yellow (light)	Co, K	Cobalt Yellow (K ₃ [Co(NO ₂) ₆]H ₂ O)
Yellow (dark)	Co, K, Cr, Pb	Cobalt Yellow K ₃ [Co(NO ₂) ₆]H ₂ O + Chrome Yellow (PbCrO ₄)
Green (rich)	Cr	Chrome Green (Cr ₂ O ₃) or Viridian (Cr ₂ O ₃ .2H ₂ O)
Green (minty)	Cr, Cu, As,	Chrome Green (Cr ₂ O ₃) + Emerald Green (Cu(AsO ₂) ₂)
Blue (appears green/blue)	Co, Al, Cr	Cobalt Blue (CoO Al ₂ O ₃) + Chrome Green (Cr ₂ O ₃)
Indigo	Co, Al	Cobalt Blue (CoO · Al ₂ O ₃)
Violet	Co, As	Cobalt Violet (Co ₃ (AsO ₄) ₂)
White	Zn	Zinc White (ZnO)
Black	-	Carbon Black (C)(as detected by IR)

Table 1. Results from XRF analysis of media

as Winsor & Newton at that time.

CONDITION OF THE WORK BEFORE TREATMENT

The paper on both rolls had become significantly creased and torn from repeated rolling, with several areas of paper loss evident along the edges of the painted areas. The paper had also become extremely discoloured appearing yellow-brown in colour and the leaders were suffering significant losses around

the edges, consistent with being the most exposed parts of the roll. The roll hooks which would have attached the rolls within a Pianola had become detached on both rolls with the roll tabs beginning to detach also. Within the first 2 meters of the painted roll, significant mould staining was evident on the verso edges, in addition to water staining and the evidence of previous repairs including self-adhesive tape. Severe creasing was also evident within this early section, particularly when viewed under raking light. The physical stress of rolling had also resulted in significant media loss in areas, particularly within the first 2 meters of the roll where extensive tearing and creasing

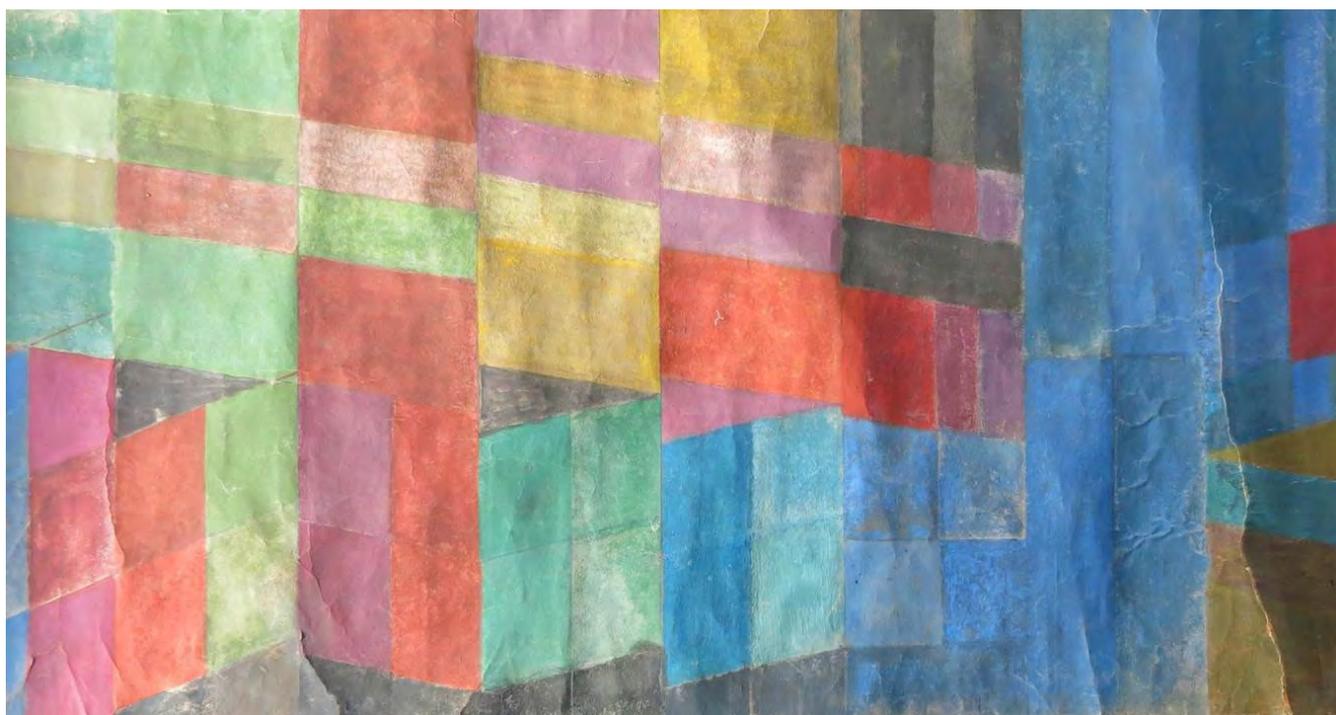


Figure 6. Detail from *Colour Music* showing cockling, creasing and tearing of roll.

		Tengujo Buff Tissue			K-38 (Kozo)		
		5 rolls	10 rolls	Cockling	5 rolls	10 rolls	Cockling
IN-SITU REPAIR MATERIALS							
Wheat starch paste + methylcellulose	50:50	Pass	Pass	No	Pass	Fail	No
Methylcellulose	5%	Fail	Fail	No	Fail	Fail	No
Wheat starch paste	5%	Pass	Fail	No	Pass	Fail	No
Klucel G	5%	Pass	Fail	No	Pass	Fail	No
Isinglass	10%	Pass	Fail	Minor	Pass	Fail	Minor
PRE-COATED REPAIR MATERIALS							
Wheat starch paste + methylcellulose	50:50	Pass	Fail	No	Pass	Fail	No
Methylcellulose	5%	Fail	Fail	No	Fail	Fail	No
Wheat starch paste	5%	Pass	Fail	No	Pass	Fail	No
Klucel G	5%	Fail	Fail	No	Pass	Fail	No
Isinglass	10%	Pass	Fail	Minor	Pass	Fail	Minor
Aquazol® 500	10%	Pass	Pass	No	Pass	Pass	No
Aquazol® 200	10%	Pass	Pass	No	Pass	Pass	No
Aquazol® 50	10%	Pass	Fail	No	Pass	Fail	No

Table 2. Results from testing of adhesive and repair papers using in-situ and pre-coated repair materials.

was evident (Figure 6). Mould and water damage also appeared to have impacted the media, with more pronounced media loss evident on the corresponding painted areas.

PRE-TREATMENT TESTING OF PAPER REPAIR MATERIALS

In order to determine the most suitable method for structural repair of the work, a number of tests were carried out using a range of repair papers and adhesives. The main objective was to determine which combinations would best withstand the future actions of rolling and unrolling.

Materials were prepared for repairs using a test *Universal Piano Roll* purchased online and dating roughly to the same period. The tissues and papers were chosen to compliment the roll paper in terms of colour, thickness and strength, and the adhesives were selected for their strength and flexibility. For comparative purposes, the author tested repairs carried out 'in-situ' - using freshly made adhesives, and using adhesive 'pre-coated' repair materials. The use of pre-coated materials was deemed advantageous because of the low moisture levels required for activation (reducing the risk of tideline staining and damage to the media), and because of their quick application and drying time (Anderson & Reidell 2009) a major factor considering the long format of the roll. In addition to the more common adhesives used in conservation, Aquazol® [poly (2-ethyl-2-oxazoline)] – a synthetic water-soluble adhesive known for its excellent adhesion strength, flexibility and reversibility was also tested as a pre-coated repair adhesive (Lechuga 2011). Pre-coating was carried out as follows:

- Each adhesive was brushed onto a sheet of Mylar.
- The repair papers were spray misted with water.
- The repair papers were then dropped onto the various adhesives.
- A layer of Bondina® was placed over the repair paper and

the rolled with a roller (to evenly adhere the repair paper to the adhesive).

- The repair paper was then allowed to air dry, before peeling it off the Mylar support.

The repair materials were then used to mend a number of intentionally created tears on the test piano roll (Figure 7). The in-situ repair papers were profiled, pasted and applied to the tears on the light box, while the adhesive pre-coated papers were activated with water using damp cotton swabs.



Figure 7. Preparation of adhesives and repair papers for testing prior to treatment.

The repairs were then physically tested by repetitive rolling to determine which combination of materials could best withstand the physical stress and strain. The repairs were also assessed in terms of whether they resulted in cockling (Table 2).

While pre-coated repair materials have many advantages, in most instances they did not appear to have adequate

strength to withstand the physical action of rolling. The fact that feathered edges could not be achieved may also have contributed to their failure. While Aquazol®500 and 200 did perform well in the tests and the author acknowledged its potential use for short term repairs where adhesive strength is required, there is currently limited research available on its long term stability and ageing characteristics, thus it was decided not to proceed with the adhesive in this instance. The 50:50 methylcellulose (MC) and wheat starch paste with Tengujo buff tissue appeared to perform best in the tests overall and was thus selected for repair of the piano roll paper.

TREATMENT

The two rolls were surface cleaned individually using a soft brush and vulcanised rubber sponge. The painted roll was inverted and old repairs were removed on the light box with the aid of damp cotton swabs. The tears were then replaced with the selected buff Tengujo tissue using a waterline pen for profiling. The repairs were then adhered to the roll with the selected 50:50 MC/wheat starch paste adhesive, applied using cotton swabs in order to minimise the risk of cockling and wetting of the media. The unpainted roll was repaired on the verso in the same manner.

Paper in-fills were carried out with a toned Kozo paper and large creases were humidified locally with damp blotter and Gore-Tex® (in non-media areas only) and pressed under small weights. The leaders, which were suffering from large paper losses, were repaired with a Japanese paper of similar weight, thickness and colour using the same adhesive.

Media consolidation was carried out using 2 methods:

- Direct application of the consolidant using a small brush under magnification.
- Vapour method, using a nebuliser.

A 0.5% w/v aqueous solution of JunFunori (glue extracted from the red algae genus *Gloiopeltis*) was chosen over other common consolidants for this purpose, as it is known to be especially suitable for the consolidation of matt paint (Geiger & Michel 2005, Swider & Smith 2005, Michel 2011).

Further to discussions with the relevant Curators, retouching of areas of media loss, particularly within the most damaged areas of the roll (first 2 meters), was carried out using a methylcellulose isolating layer in order to ensure the reversibility of the process. Winsor & Newton artist's quality watercolour paints were used for this purpose with a 000 brush under magnification using a loop (Figure 8). The primary aim of toning was to minimise the impact of media loss and



Figure 8. *Colour Music* during toning of media loss.

balance the overall aesthetic of the work. The work was checked by the relevant Curators during this process to ensure the visual integrity of de Maistre's experimental approach was maintained. Further to toning, the rolls were then re-rolled back together and the repaired work was placed in a custom made storage box.

TREATMENT RESULTS

As a result of the treatment of the work a number of positive outcomes were achieved:

- The structural stability of the work was restored.
- The media was stabilised in turn reducing the risk of further media loss.
- The visual integration of the image was improved, facilitating greater appreciation of the artwork.
- The work was made available for more comprehensive research and display.

CONCLUSIONS

Through the process of research, examination and treatment of *Colour Music*, much useful information was revealed about Roy de Maistre's materials and techniques. His choice of music rolls as a support for the work demonstrated his interest in keeping his materials as true in nature to the musical subject matter as possible. Information revealed through Infrared reflectography not only assisted in confirming the musical score, but also provided insight into de Maistre's structured and methodical approach to mapping out his code. The media deterioration observed within the first 2 meters of the roll demonstrated de Maistre's experimental use of pigments, mixing and matching to create lighter and darker tones, yet he appears to resolve his ideas as the work progresses applying his media in a more direct and ordered fashion. The conservation treatment carried out to stabilise this work, has resulted in the opportunity for more thorough research of the roll, which it is hoped will continue to inform and engage art and music enthusiasts into the future.

ENDNOTES

1. As per email correspondence with Rex Lawson – The Pianola Institute. Nov 2013.
2. Niels Hutchison is author of the website: www.colourmusic.info.

REFERENCES

- Anderson, P & Reidell, S 2009, 'Adhesive Pre-Coated Repair Materials', in *Book and Paper Group, LCCDG and ACDG*, May 21. [ONLINE] available at: http://sarahreidell.files.wordpress.com/2012/05/anderson_reidell_lccdg_acdg_handout_2009-06-011.pdf
- Colour Music. 1997-2013. *Colour Music*. [ONLINE] Available at: <http://www.colourmusic.info/>. [Accessed 15 January 2013].
- Geiger, T & Michel, F 2005, 'Studies on the poly-saccharide JunFunori used to consolidate matt paint', *Studies in Conservation*, vol. 50, no. 3, pp. 193-204.
- Gertsakis, E 2013, 'Roy de Maistre: colour-music and the Verbrugghe's', in Edwards, D & Mimmocchi, D (eds), *Sydney moderns: art for a new world*. AGNSW Publication, p. 46.

- Gettens, RJ & Stout, GL 1966, *Painting Materials: A Short Encyclopaedia*. Dover Publications, pp.126-127.
- Hutchison, N 1997-2013, '1. Painting by Numbers', *Colour Music in Australia. De-mystifying de Maistre*. [ONLINE] Available at: <http://www.colourmusic.info/maistre.htm>, [Accessed 15 January 2013].
- Hutchison, N 2013 'De Maistre decoded' in Edwards, D & Mimmocchi, D (eds), *Sydney moderns: art for a new world*. AGNSW Publication, p. 56.
- Johnson, H 1988, *Roy de Maistre: the Australian Years, 1894-1930*. Craftsman House, Roseville NSW.
- Johnson, H 1994, *Roy de Maistre: the English Years, 1930-1968*. Craftsman House, Roseville NSW.
- Lechuga, K. 2011, 'Aquazol-Coated Remoistenable Mending Tissues'. *Adhesives and Consolidants for Conservation: Research and Applications*, CCI Symposium ICC - Ottawa, Canada. Oct 17-21 2011.
- Michel, F 2011, 'Funori and JunFunori: Two related consolidants with surprising properties', *Adhesives and Consolidants for Conservation: Research and Applications*. CCI Symposium ICC -Ottawa, Canada. Oct 17-21 2011.
- Pigments through the Ages 2013. Available at: <http://www.webexhibits.org/pigments/>. [Accessed 22 April 2013].
- The Pianola Institute 2013. *History of the Pianola – Music Roll Manufacture*. Available at: http://www.pianola.org/history/history_rolls.cfm. [Accessed 6 May 2013].
- Swider, JR & Smith, M 2005, 'Funori: overview of a 300-year-old consolidant', *Journal of the American Institute for Conservation*, vol. 44, no. 2, pp. 117-26.

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