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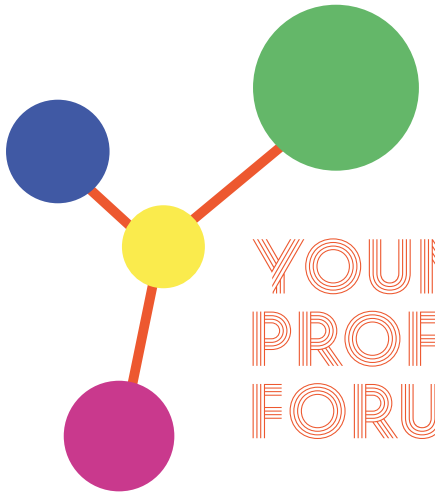
LA VENARIA REALE



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SUMMARY

Goiânia, also aiming to determinate clear and compatible guides with the growth and development of the city.
The first results described here will support the continuity of the research development that will result in the normative project for the Pioneer Nucleus of Goiânia, in which readings are incorporated that provide a basis for understanding the object in question as a historical organism, through the understanding of the several temporal stratifications perceived from the ruptures, remains and urban accumulations that resulted in its current configuration.

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PRESERVING THE MATTE:
EVALUATION OF SELECTED ADHESIVES AND FILLERS FOR A CONSERVATION TREATMENT ON A GOUACHE PAINTING BY GINO DE DOMINICIS

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INTRODUCTION

When it comes to contemporary paintings, degradation processes often occur in a very short time. The execution technique can lead to an extremely rapid deterioration, which begins in the early years of their life, usually requiring a prompt intervention. A conservation treatment becomes highly challenging in the case of matte paint, due to its sensitivity to morphological and optical changes. This effect is even more noticeable on gouache paints, as their high pigment volume produces a light-scattering, resulting in a strong matte finish. Additionally, gouache paint layers often start to flake producing the so-called "mud cracking". When thick layers overlap, the solvent can evaporate through the exposed surface only. As a result, a rigid and fragile film is formed on the surface, while the underlying layers maintain a certain degree of humidity. These differences cause significant tensions, resulting in flakes with the typical "cup-shape".
The extreme sensitivity of the gouache painting *Con Titolo* can be addressed to two main causes: the widespread "mud cracking" and the micro-fragmentation of the figurative area, in some regions resulting in color gaps (fig. 1). The brittleness condition did not allow the artwork to be placed upright.

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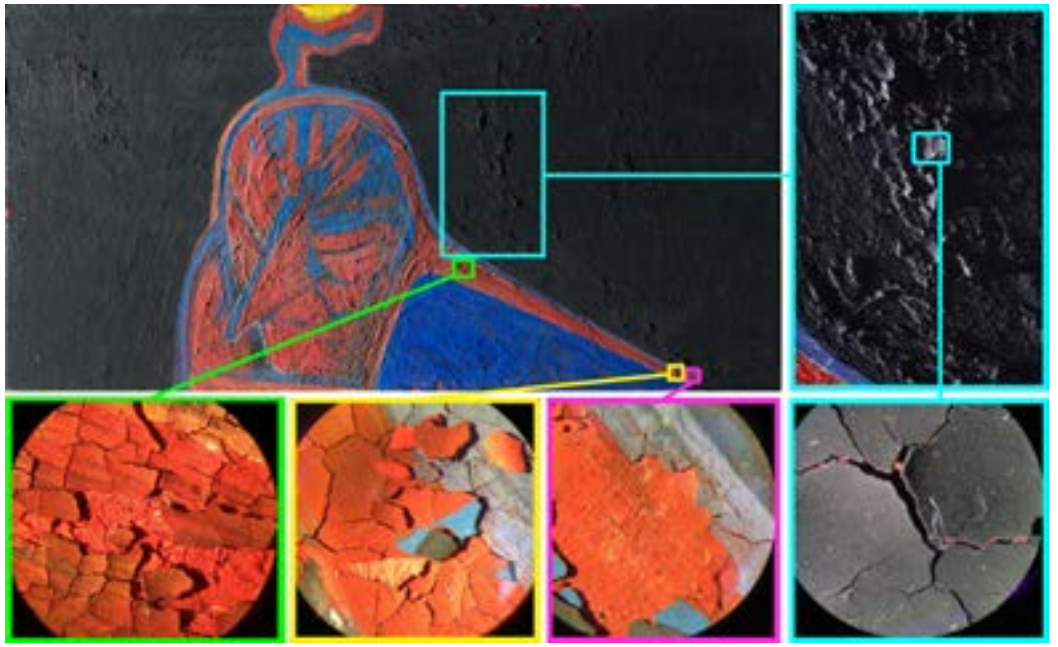

fig. 1

1. Paint surface of "Con Titolo" in ranking light (top left). Details of the "mud cracking", the micro-fragmentation, and color gaps (bottom and right) (courtesy of Opificio delle Pietre Dure).

Eventually, the absence of a protective coating makes the artwork even more sensitive to non-desired modifications of the matte surface. Hence, a conservation treatment and a protection system were needed to fix the detached paint layers while maintaining their peculiar matte finish. At the end of the intervention, the painting could finally be exposed and correctly conserved.

CON TITOLO (1986)

Con Titolo (37,8 x 76 x 2 cm) is a gouache painting on plywood realized by the Italian artist Gino De Dominicis (Ancona, April 1, 1947 – Rome, November 29, 1998) in 1986[1]. The artwork does not have a preparation layer nor a protective coating. It depicts a non-identifiable entity against a black background, suspended in time and space. It is representative of De Dominicis' personal artistic path on the atemporal nature of painting, as a practice able to survive all ages. The painting is currently stored at the Centro Pecci per l'Arte Contemporanea in Prato (IT), and belongs to the Alessandro Grassi Collection, largely dominated by the Transavangarde and the Postmodern Art from the early 1970s to the early 2000s[2].

[1] Pezzato 2020, p. 144.
[2] Pezzato 2020.

EXPERIMENTAL TESTS FOR THE FIXING INTERVENTION

Firstly, experimental tests were performed on mockups to select the most suitable adhesive for the fixing intervention. Only aqueous solutions have been considered, as the compatibility between thesolvent and the detached layers is an essential condition to carry out a stable and effective treatment.
Based on the available literature, multiple products have been tested in the first place, i.e.:

– Klucel® E (**KE**)[3]
– Klucel® G (**KG**)[4]
– Bermocoll® E230 FQ (**B230**)[5]
– Bermocoll® E320 FQ (**B320**)[6]
– 200 (**G200**), 250 (**G250**), and 300 (**G300**) bloom grade gelatine (type B)[7]
– Cold extraction (**c.e.**) and hot extraction (**h.e.**) FU-NORI seaweed (**FS**)[8]
– Cold extraction (**c.e.**) and hot extraction (**h.e.**) FU-NORI powder (**FP**)[9]
– JunFunori® (**JF**)[10]
– Aquazol® 50 (**A50**)[11]

A step-by-step selection process was followed, with the aim of examining the most important properties for the fixing intervention, i.e. optical qualities, adhesive strength, surface-tension[12].

Optical qualities. Mockups were made using plywood panels, whereon black gouache layers were applied to reproduce as much as possible the constituent materials of "Con Titolo". Each adhesive has been tested in three different concentrations, i.e. 1%, 2%, and 3% in demineralized water (dem. H2O). Only A50 was tested in different concentrations on the basis of the available literature, i.e.5%, 10%, and 20%[13].
The optical properties have been examined using gloss[14] and colorimetric[15] analyses, respectively measuring Δ and ΔE. Measurements were taken before and after the application of the adhesive solutions, and after a 45-days ageing process under UV-B light as well[16].
All the cellulose ethers (KE, KG, B230, B320), the FS (c.e.), the FP (c.e.), the G300, and the JF showedminimal variations in brightness and color both before and after the ageing process (fig. 2). Hence, they have been selected for the second testing.

[3] Klucel® E, Kremer Pigmente GmbH & Co. KG, lot n. 63700.
[4] Klucel® G, C.T.S. s.r.l., lot n. 1659.
[5] Bermocoll® E230 FQ, Nouryon.
[6] Bermocoll® E320 FQ, Nouryon.
[7] Gelatine 200/250/300 bloom grade (16 Mesh; Calfskin), Italgelatine S.p.A.
[8] FU-NORI, Kremer Pigmente GmbH & Co. KG, lot n. 63477.
[9] FU-NORI powder, C.T.S. s.r.l., lot n. 112.
[10] JunFunori®, Lascaux™, lot n. 9567609.
[11] Aquazol® 50, Kremer Pigmente GmbH & Co. KG, lot n. 63901.
[12] Technical specifications of the instrumentation are clarified as footnotes only if cited for the first time.
[13] Arslanoglu 2004, pp. 10-11.
[14] Arroweld Glossmeter Arwe-20/60/85. Only the 85° measurement angle has been examined (ISO 2813).
[15] Konica Minolta Spectophotometer CM-2600d. Only SCI values have been examined.
[16] UV-B light: UV Lamp, Vilbert Loumart (15 W – 312 nm).

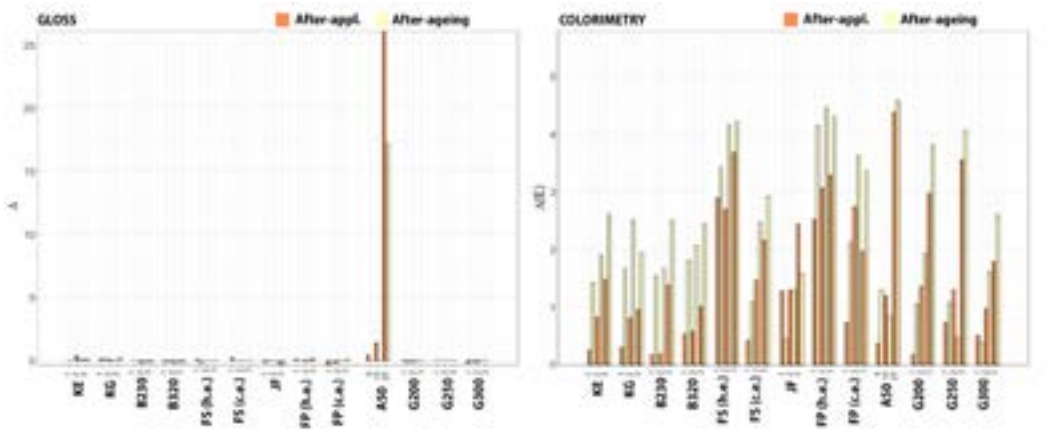

fig. 2

2. Bar charts of the Δ values (left) and the ΔE values (right) resulting from the difference between the measurements taken before the application and after the application (orange bars), and between those taken before the applications and after the ageing process (yellow bars).

Adhesive strength. A peel test was used to evaluate the adhesive strength of the selected adhesives. Linen stripes coated with two gouache layers have been used to simulate the adhesion between the flaking paint and the underground layer. Each pair of stripes has been coupled using a 3% solution of the selected adhesives, then the load and the time to the complete separation have been measured. The FS (c.e.), the FP (c.e.), and the G300 in descending order have proved the higher adhesive strength, while all the cellulose ethers and the JF have resulted in an almost nil adhesion.
Empirical tests have been also carried out. Gouache fragments have been artificially produced and then fixed on gouache on plywood mockups using the aforementioned adhesives. Different concentrations have been tested[17] according to the available literature[18]. All the aqueous adhesive solutions have been examined comparing two application methods: ultrasonic atomization[19] and dripping[20]. The first one could have prevented stains[21], while the second one could have been more effective in the formation of a stable adhesive joint. Then, the adhesive power has been assessed using a metallic spatula.
The 1,5% FS solution, the 1% G300 solution, and the 2% B230 solution, all by dripping, proved to be the most suitable ones for the fixing intervention. Fairly good results have been given by ultrasonic atomization as well, namely in the case of the 0,5% FS solution, and the 1% G300 solution.

Surface tension. As for the dripped solutions, a lower surface tension was required and led to further testing. The adhesion strength of the three FS, G300, and B230 formulations have been examined in hydro-alcoholic solution, using dem. H_2O and anhydrous absolute ethanol **(E)** to lower the surface tension, i.e.:

[17] As for cellulose ethers, FU-NORI seaweed, gelatines, and FU-NORI powder: from 0,25% to 2% in dem. H_2O. As for JunFunori®: from 0,5% to 6% in dem. H_2O.
[18] Carnazza et al. 2018, pp. 120-125; Cumming e Colbourne 1998, pp. 41-42; Feller e Wilt 1990, pp. 102; Geiger e Michel 2005, pp. 194-202; Masson e Ritter 2004, p. 94; Michel et al. 2002, p. 263; Prestipino et al. 2015, pp. 262-269; Reddington e Wheeler 2012, pp. 64-65; Roche e Dessennes 2002, pp. 241-242.
[19] Beuer IH 40 Ultrasonic Nebulizer, (Ulm, Germany).
[20] Insulin syringe BD Micro-Fine™+ Demi (0,3 ml).

– FS (c.e.): 1,5% in dem. H_2O and E (7:3 v/v)
– G300: 1% in dem. H_2O and E (9:1 v/v)
– B230: 2% in dem. H_2O and E (1:1 v/v)

Tests showed that the adhesive strength decreases together with the surface tension. Nevertheless, the former decreases just to a small extent in the case of the FS (c.e.).
The rate of diffusion of the aqueous and the hydro-alcoholic solutions has been further examined using the digital microscope Dino-Lite[22]. The variations in the contact angle in a fixed time showed the lowest surface tension of the FS (c.e.), which was selected for the fixing intervention.

EXPERIMENTAL TESTS FOR GAPS FILLING

At a later stage, tests were performed once more on mockups to select a suitable filler for the color gaps. Two acrylic mediums, i.e. Lascaux™ Medium 2 Matt **(LM2)**, and Lascaux™ Sirius® Acrylic Medium Matt **(LSA)**, and the Golden® Regular Gel **(GRG)** acrylic gel were selected for the investigation. They would be removed using anhydrous absolute ethanol[23], which does not affect the original layers.
Colorimetric and gloss analyses have been performed on mockups to assess eventual variations after a 45-days ageing process under UV-B light. Their mechanical resistance has been investigated by subjecting the three products to a stress cycle, namely: three days in a humid chamber (74-77 RH%), three days in a hot chamber (40-42 °C) and three days under UV-B light. After repeating the cycle four times, the LM2 has been selected, as it proved to be the most resistant and stable filler.

THE INTERVENTION

At the end of the whole testing, the conservation intervention was performed on *Con Titolo* under the microscope. Firstly, the deposit was removed from the surface by micro-aspiration[24]. Afterward, the fixing intervention was performed using the 1,5% FS (c.e.) hydro-alcoholic and aqueous formulations in combination to achieve both a good diffusion and a suitable adhesive strength. The intervention has been performed treating each single flake at a time. The adhesive was injected under the flaking layers with a syringe with a flexible tap[25] and then slight pressure was applied with a silicone brush. For

[21] Maheux, McWilliams 1995, pp. 19-25.
[22] Dino-Lite Edge Digital Microscope, AM7115MT-FUW, OK® Italy s.r.l.
[23] Anhydrous absolute ethanol, Carlo Erba Reagents s.r.l.; lot. n° V9E092049F.
[24] Portable Standard Surgical Aspirator, FASET S.p.A. Model 206, SN. 120908.
[25] Miraject® Endo Luer syringe, 0.3 x 40 mm.

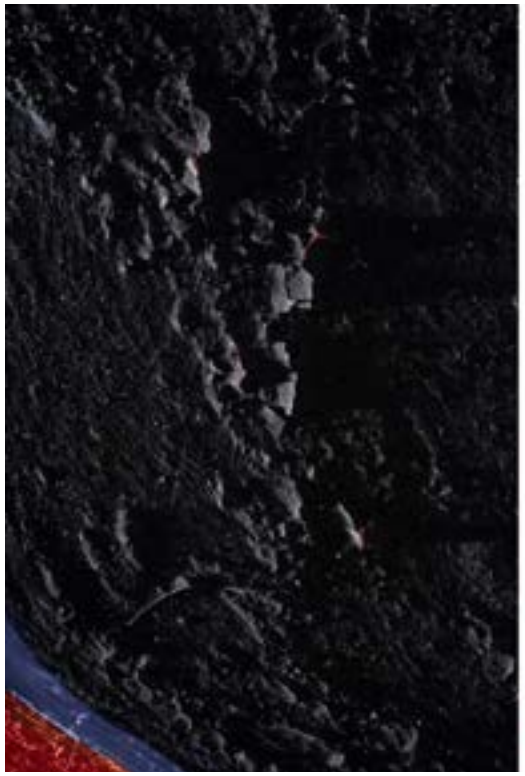

fig. 3

fig. 4

3. Detail in ranking light of the paint surface before (left) and after (right) the fixing intervention (courtesy of Opificio delle Pietre Dure).

4. "Con Titolo" presented in its original frame after the whole treatment: front (left) and back (right) (courtesy of Opificio delle Pietre Dure).

thicker fragments, the 2% FS (c.e.) aqueous solution was used. The ultrasonic atomization of the 0,5% FS (c.e.) aqueous solution was used to consolidate the powdery white trace and the micro-fragmentation on the figurative area.
Thereafter colorimetric analysis was carried out on the artwork, confirming the preservation of its optical properties. Eventually, gaps were filled with LM2 mixed with pigments, and the "chromatic selection" technique was performed using watercolor *Conté a Paris* pencils.

CONCLUSIONS

The restoration of a matte painting can bring several challenging issues, particularly when it comes to contemporary materials and dark paints. The extreme sensitivity of the surface demand a highly careful approach, in our case implemented performing an extensive preliminary investigation. The cold-extracted FS has proved to be the ideal adhesive to fix the detached layers. Its capability to preserve the painting's optical properties, its adhesive strength and its low surface tension allowed to perform the fixing intervention while maintaining the artwork's matte finish (fig. 3). Besides, the LM2 showed excellent results in restoring color gaps as well, while reproducing the artwork's texture and finish.
Additionally, the storage area of the Centro Pecci was monitored to define an effective strategy for the conservation of the artwork. The original frame was strengthened, and a multi-laminated glass was applied on the front (fig. 4).

CONTRIBUTIONS

Conceptualization, C.B.; Methodology, C.B., O.S., C.M.; Investigation, CB; Resources, C.B., S.P., O.S., C.M., R.P.; Writing, C.B.; Review, O.S., C.M., G.L., R.P., S.P. All authors have read and agreed to the published version of the article.

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