

# The impact of wax-resin linings on the appearance of paintings

## Investigating colour change in ground layers in Netherlandish seventeenth-century canvas paintings

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### Introduction

The research examined the impact of wax-resin linings on the colour of ground layers in 17<sup>th</sup>-century Netherlandish paintings on canvas. In these works the colour of the ground is often left visible to be used as a middle tone. A colour change imparted by lining would, therefore, alter the overall tonal balance of the paintings.

The goal of the study was to support the work of conservation professionals in identifying colour change due to lining in order to prevent misinterpretation of the works and adapt conservation strategies.

The hypothesis puts forward that visual impact of wax-resin linings on the appearance of 17<sup>th</sup>-century Netherlandish canvas paintings is related to the original preparation technique.

Central to the research methodology was the study of visual phenomena observed on historically informed grounds reconstructions.

### 1. Experimentals

#### 1.1 Material and technical historical sources

Evidence gained from technical study of paintings informed the decision making process for the material and technical characteristics of the reconstructions as well as for the lining procedure used throughout the research (figs. 1 and 2).

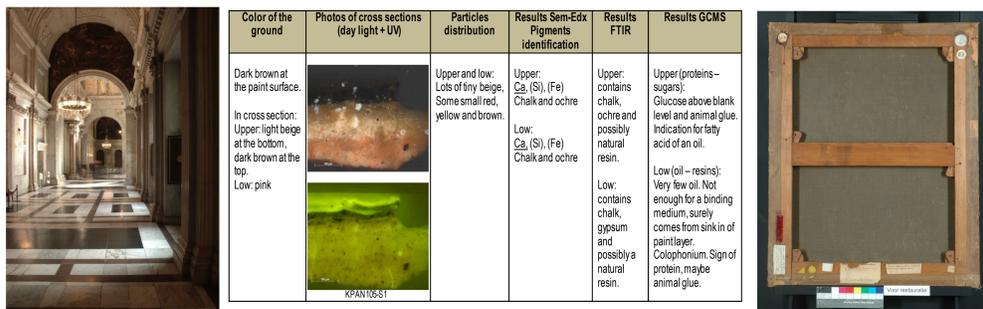


Fig. 1 The paintings so-called *The Batavians Series* in the Royal Palace Amsterdam were crucial case studies of the research. Left: two paintings of the series, view in situ; right: summary of results from technical examination and instrumental analysis of the ground layers in *Simson* by Jacob Jordaens, ca. 1660. Photo: J. Schlomoff.

Fig. 2 Technical study of a painting lined in 1907 with wax-resin. Photo: S. van Oudheusden.

Information from historical documentary sources was also crucial (figs. 3-6).



Fig. 3 De Mayerne Manuscript (cover page), 1620-1646.

Fig. 4 The documentation of the 1975 lining of *The Night Watch*, 1642, by Rembrandt, includes many photographs.

Fig. 5 Léo Marchand, paintings conservator in Dordrecht, is lining a painting in the early 1980s.

Fig. 6 Drawings by G. Messens, Belgium conservator, in postprints "Lining paintings," 1974.

#### 1.2 Making and lining the reconstructions

The reconstructions differentiate from real paintings due to their compositions that exclude minor components and varnish layers (figs. 7 and 8). Further, ageing phenomena were not reproduced.



Fig. 7 Some of the materials used for making the reconstructions.

Fig. 8 Overview of the reconstructions before wax-resin treatment.

The lining procedure used is a simplification of historical practices (figs. below).



#### 1.3 Colour measurements

The research used a Minolta spectrophotometer in the CIELAB colour space. Colour differences were calculated using the 1976 colour difference equation.

#### 1.4 Light microscopy

Cross-sections were used in order to study layer thickness for the ground reconstructions.

#### 1.5 Ground application on opacity charts

The influence of the degree to which the ground obliterates the darkened underlying canvas support on the colour change was examined by a pilot-study on ground's hiding power. This comprised the application of ground compositions in various thicknesses on opacity charts. (fig. 12).

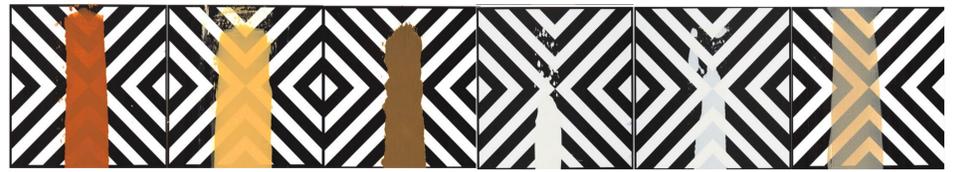
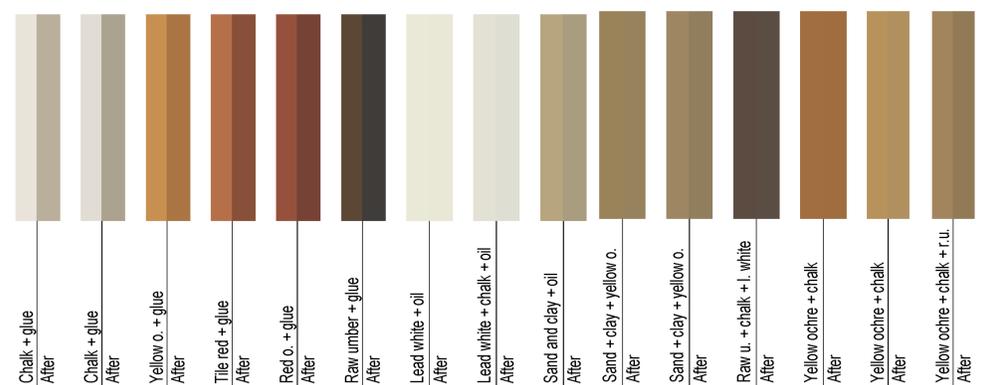


Fig. 12: A few of the oil-bound grounds tested in this study applied on opacity chart (red ochre, yellow ochre, raw umber, lead white and clay). The ground composed of lead white is applied in two different thicknesses.

### 2. Results

- Colour change in ground reconstructions after wax-resin impregnation is **not systematic**.
- The degree of colour change in ground reconstructions **varies depending on:**
  - The nature of the binding medium in the ground:** oil-bound grounds are less prone to change than glue-bound grounds.
  - The type and proportion of pigments in the ground:** Chalk containing grounds are the most vulnerable regardless the binding medium. In pigment mixtures including lead white, raw umber and yellow ochre in oil, the more chalk the more colour change. If raw umber is added to lead white and chalk containing oil-bound, the colour change is diminished. Grounds composed of sand and clay with or without yellow ochre in oil are very vulnerable to colour change.
- The **hiding power** of ground layers is a key factor regarding the extent of the change as well as its visual manifestation.
- The grounds that underwent colour change became **darker and cooler in tone**.



### Conclusion

The study of visual phenomena observed on historically informed reconstructions was central in this research. The reconstructions are a simplification of the material and physical complexities usually found in historical paintings. This approach proved to be beneficial for the research since it allowed to clarify the conditions under which and the extent to which wax-resin linings may have changed colour in paintings. It also permitted the identification of physical phenomena resulting from the lining treatment.

#### References

Emilie Froment, *The Consequences of Wax-Resin Linings on the Present Appearance and Conservation of Seventeenth century Netherlandish Paintings*, PhD dissertation, University of Amsterdam, 2019.

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