



MATERIAL EXPERIMENTATION AND VIRTUOSO PERFORMANCE: OBSERVATIONS ON THE PAINTING TECHNIQUE OF REMBRANDT'S WORKS IN THE GEMÄLDEGALERIE, BERLIN

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ABSTRACT Rembrandt was exceptional for the versatility and idiosyncrasy of his painting technique. His drive for innovation and incessant search for new forms of imagery and expression led to an oeuvre of unusually wide range. He constantly developed and refined not only the content and composition of his pictures, but also their painting technique. The Gemäldegalerie, Berlin has one of the world's most important and extensive collections of works by Rembrandt, which were examined extensively in a research project from 2011 to 2016. The diversity of the knowledge resulting from these examinations, analysed collectively here for the first time, offers new insights into the development, application and virtuosity of Rembrandt's painting techniques.

Introduction

Shortly after his encounter with the young Rembrandt and Jan Lievens in Leiden, Constantijn Huygens wrote,

I feel it incumbent upon myself to state that I have never observed such dedication and persistence in other men, whatever their pursuits or ages ... Such indefatigable application to diligent labour may well yield great results quickly, but I have often wished that these excellent young men would practise moderation and consider their constitutions, which a sedentary occupation has already rendered less vigorous and robust.¹

Here, Huygens identifies in the young Rembrandt an artistic ambition that would continue to characterise his life and

work into old age. Rembrandt's capacity for innovation and his relentless, passionate quest for new pictorial forms and means of expression gave rise to an oeuvre of extraordinary artistic and stylistic breadth.² He developed and continually refined not only his approach to subject matter and composition but also the techniques he employed in his paintings.

Owing to the conspicuousness of Rembrandt's brushwork, the way he dealt with the materiality of the medium would seem to be evident at first glance. Yet in actual fact his process of creation remains largely hidden from view and is occasionally still a mystery. The nuance and flexibility of his approach and the effort he expended in the working process are revealed only through detailed, systematic examinations of his paintings. In contrast to most of the previous publications that deal with materials used by Rembrandt,³ the present study turns its attention to methods of applying and working paint and structuring surfaces.

By way of example, we elaborate on four characteristics of Rembrandt's painting technique observed in the holdings in Berlin: his manner of building up flesh tones, his technique of scraping and scratching into still-wet paint, his creation of marbled effects and his particular treatment of signatures. The findings discussed in this article are based on detailed analyses of 27 works in the Gemäldegalerie, Berlin by Rembrandt, his workshop and his circle from the period 1627 to 1660.⁴ The investigations involved comprehensive study of the accumulated technical imaging, including X-radiographs, ultraviolet (UV) photographs, infrared reflectograms (IRR), raking-light photographs and neutron activation autoradiographs (NAAR). This was done in conjunction with new technical examinations, primarily comprising microscopy at up to 64× magnification. Subsequently, the results of the investigations were evaluated collaboratively from the perspectives of art history and the technology of art. Working through and comparing this broad range of materials has afforded insights into Rembrandt's use and ongoing development of particular painting techniques. With the examples discussed, which represent only a small portion of the whole, we hope to contribute to a better understanding of Rembrandt's painting techniques and their optical effects.

Relief-like underlayering of the flesh tones

Writing in the early 18th century, Arnold Houbraken alluded to the almost sculptural build-up of paint in Rembrandt's flesh tones when he remarked ironically that one could have lifted a portrait off the floor by its nose.⁵ Houbraken also noted, however, that this manner was mainly characteristic of Rembrandt's late works, whose paint 'looked like it had been smeared on with a mason's trowel'.⁶ Yet, as the investigation of the holdings in Berlin has shown, the introduction of three-dimensional form to the underpainting is present even in the artist's early works. Furthermore, this technique was by no means restricted to large-scale paintings intended to be viewed from a distance.

Rembrandt's early works testify to his great interest in using paint as a three-dimensional substance. From 1626 at the latest, he experimented with various effects and manifestations of the impastoed application of paint.⁷ The 1627 picture *The Money-Changer* (Figure 1a), the earliest work by Rembrandt at the Gemäldegalerie, proves to be highly revealing in that regard. The small-scale painting shows a half-length figure of an old man seated at a table and wearing a pince-nez. He inspects a gold coin by candlelight. The candle, which he holds in his hand, is the sole source of light in the composition. It illuminates the tall piles of books and loose papers arranged in a semi-circle in front of the man. Inspired by the candle and torchlit night scenes of the Utrecht Caravaggisti, this is Rembrandt's first distinctly chiaroscuro staging of a composition.⁸ Presumably the challenge of representing the effects of light in a realistic way prompted him to explore new painterly approaches. Rembrandt placed the source of light at the centre and, by elaborately working up the paint relief on the candlelit surfaces of both flesh and objects, he achieved a quasi-sculptural representation in light and shadow (Figure 1b). The process of forming the relief began in the underlayers, using a viscous, light greyish-yellow paint. Strongly illuminated details were given additional emphasis with a thickly applied white paint layer. After that, the light-toned relief structure was further adjusted by the sparing application of thin, coloured glazes. As the raking-light image makes clear, this procedure allowed Rembrandt to lend body to the illuminated objects and build up the individual motifs with suitably crumpled or creased textures. The old man's facial features were also structured by means of a pronounced relief: the prominent cheekbones, the nasal ridge, the forehead, the chin, the deepset eyes and the downturned mouth with thin lips (Figures 2a and b). In contrast to the lit areas, which were worked up in relief, the rest of the painting's surface is smooth and uniform. The dimly lit room owes its impression of depth to a nuanced gradation of light and colour values, which imparts materiality to the setting and objects.



Figure 1 (a) Rembrandt, *The Money-Changer*, 1627, oil on oak, 31.9 × 42.5 cm, Staatliche Museen zu Berlin, Gemäldegalerie, Kat. Nr. 828D; (b) raking light, from left. © Staatliche Museen zu Berlin, Gemäldegalerie (images: Christoph Schmidt).

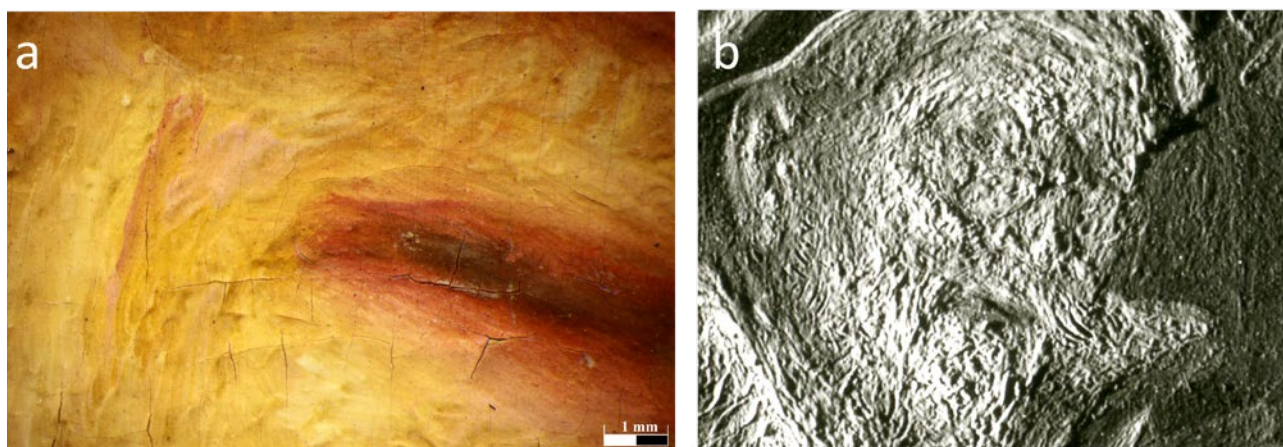


Figure 2 Rembrandt, *The Money-Changer* (Figure 1). **(a)** Raking light, detail of the old man's face; **(b)** microscopic image of the mouth (image a: Christoph Schmidt; image b: Claudia Laurenze-Landsberg).

The relief structure that is so pronounced and thoroughly worked out in *The Money-Changer* is also found in the flesh of later, large-scale faces, but in significantly subdued form. In later works with small figures, the underlayering of the faces was carried out in the main flesh colour. In those cases, Rembrandt did not employ a relief-like underpainting. The only exception found in Berlin is among the small figures of *The Abduction of Proserpina*, painted about 1631 (Figure 6): in this early work, each face measures only about 3 cm from chin to hairline. Nevertheless, the faces of Proserpina, Diana and one of their female companions were worked up in exceedingly precise fashion, finely modelled with light and shadow, reddish tints in the cheeks and highlights on the noses. Their features were executed upon a base layer in a lighter shade of the flesh tone. This bright layer lies on top of a nearly black layer of underpainting. This type of build-up of the flesh tones, which is unusually elaborate for such small figures and hardly perceptible to the naked eye, seems appropriate for a painting on whose every detail Rembrandt lavished special attention and care, a topic to which we shall return below.⁹

Rembrandt's *Self-Portrait* of 1634 is another of the Berlin paintings in which the flesh of the face was formed in a relief-like manner.¹⁰ The lit, left half of the face was established initially by application of thickly impastoed light grey paint which was overlaid with lighter accents of white made from very finely ground pigments.¹¹ The facial features were then worked out in colour in exceptionally thin applications. The cheeks were tinted with a very finely ground pink. In contrast, Rembrandt underpainted the other half of the face, which lies in shadow, in a thicker grey, with loose, only slightly impastoed brushstrokes. The elaboration in colour was achieved with very thin applications of different shades of brown.

A further example of this type of modelling is present in the painting *Samson Threatening his Father-in-Law*, created in 1635,¹² in which the relief-like underlayering of the lit half of Samson's face was carried out in yellowish-white paint. His proper right cheek received an additional underlayer of white. Rembrandt overlaid that with a very thin, partly discontinuous layer of grey and pink hues. Samson's

hand was also formed in a light grey paint and its light-toned areas were then underlaid with white. Rembrandt executed the surface modelling of the hand in thin, mostly opaque layers of brown.¹³

The painting *Old Man with a Beard and Beret*,¹⁴ dated 1645, is one of the formerly deattributed works that in more recent times have been newly ascribed to Rembrandt by Ernst van de Wetering.¹⁵ In this painting we also encounter a highly comparable build-up of the flesh with a relief-like underlayering. Once again, the lit half of the face was uniformly underpainted with a yellowish-grey impasto. This was followed by applications of yellowish white in the lighter-toned areas. Rembrandt further emphasised some of the highlights by underpainting them in white, and he carried out the final modelling with thin layers of paint. The ruddy patches, characteristic of ageing skin, consist of vermillion on top of a layer of pink paint. Additional accents were made with individual thin strokes of vermillion. In contrast, the face's areas of shadow were underlaid with a darker grey and then worked up in various shades of reddish brown. The hands, another lit element of the picture, were, like the face, underpainted with a relief-like texture, but in a dark grey. Following that, the hands were elaborated with several layers of lighter grey, yellowish white and white. Finally, Rembrandt overlaid those applications with thin layers of pink, red and brownish paint.¹⁶ In addition to other stylistic and technical arguments, this very specific observation clearly speaks in favour of an attribution to Rembrandt himself.

Relief-like underlayering is also present in the flesh areas of the Gemäldegalerie's two latest works by Rembrandt: *Moses Breaking the Tablets of the Law*, dated 1659 (Figure 4) and *Jacob Wrestling with the Angel* of about the same year.¹⁷ In the latter picture, the face of the angel was underpainted using both a pale yellowish grey and a cool grey. Particularly bright areas such as the ridge of the nose, the highlight at the tip of the nose and the forehead were additionally accented in white. Rembrandt then worked out the details of the facial features in layers of varying thickness, some impastoed. Only after completion of the nose were the cheeks further lightened in tone.¹⁸

Scraping and scratching into still-wet paint

Another painting technique observable among the pictures in Berlin, that had already been written about in the early 18th century, was the practice of scraping or scratching into wet paint. Of all the techniques discussed in this article, this is the only one that is normally visible to the naked eye and thus immediately discernible to any viewer.¹⁹ Houbraken was presumably the first to write about the use of a brush handle to scratch into still-soft paint in his biography of Arent de Gelder, a late pupil of Rembrandt.²⁰ Although Houbraken's remarks were not about Rembrandt, in the centuries that followed, the scratching technique became inextricably connected with the great artist, given its clear visibility on the surface of his works. About a hundred years after Houbraken, Christiaan Immerzeel commented on the technique, explaining that Rembrandt employed it to 'express various things better according to his taste'.²¹ It is therefore hardly surprising that scratching came to be understood as an authentic and especially characteristic feature of Rembrandt's paintings. This is also evident in the revisions that Sir Joshua Reynolds made to *Susanna and the Elders*: in the areas he altered, Reynolds clearly attempted to imitate Rembrandt's working methods. As a reminiscence, so to speak, of Rembrandt's technique, he even scratched into the wet paint in the depiction of the garden setting – although with less purpose and precision than Rembrandt.²²

Small surface excavations noted in the pictures in Berlin were indeed produced by scratching into wet paint – and

it is possible to identify further variants of this manner of working surfaces. The systematic investigation of the works in Berlin yielded a much more nuanced understanding of this phenomenon than was previously available. As photomicrographs show, in addition to simple scratches and scorings carried out with a pointed tool, in many cases the excavations are better described as scrapings, produced by removing the upper paint layer at a width of about 0.5 cm, thereby revealing the underlying layer. Rembrandt appears to have very purposefully varied his technique of paint removal to achieve different effects,²³ making it possible for him to articulate, for example, the structure of hair, the pages of books and the patterns in textiles.

Furrows in the wet paint are discernible even in early works such as *The Stoning of Saint Stephen* of 1625 and the Leiden *History Painting* of 1626.²⁴ The picture in Leiden gives the impression that the young Rembrandt may have employed this technique with a bit too much enthusiasm and exuberance.²⁵ Yet such a dense accumulation of scratches would not be repeated: just one year after the completion of the Leiden *History Painting*, in the 1627 *The Money-Changer* in Berlin, Rembrandt was already using the technique much more sparingly and purposefully to lend definition to book pages and the old man's beard (Figures 3a–c). In a way somewhat akin to a sgraffito, he scraped through the surface to reveal an underlying layer of contrasting colour. Then, using a thin paint, he reworked some areas of the book pages. To remove the paint that had flowed into the existing grooves, he made

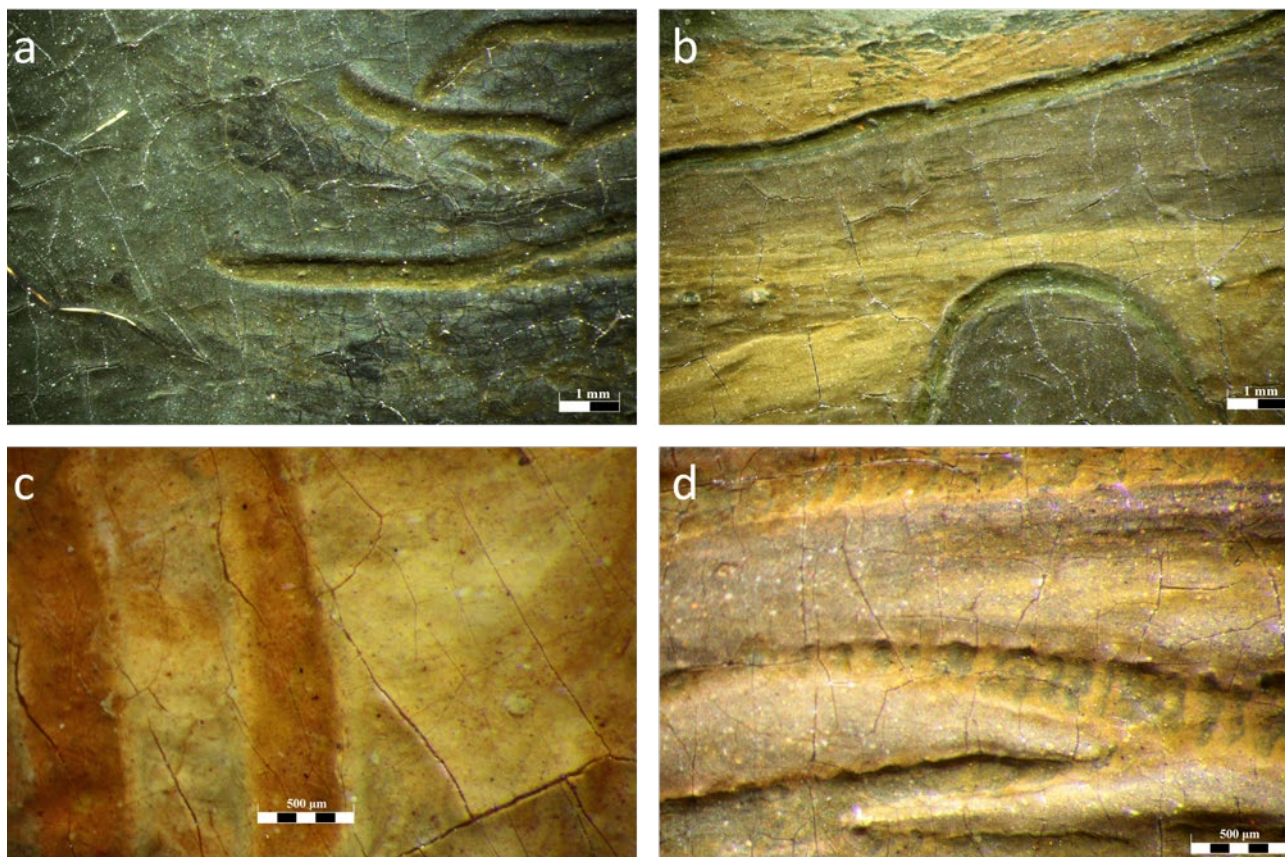


Figure 3 Rembrandt, *The Money-Changer* (Figure 1). Microscopic images of scrapings: (a) below a book; (b) below a scroll; (c) in the beard; (d) on the pages of the large folio to the left of the coins lying on the table (images: Claudia Laurenze-Landsberg).

short, vertical scrapes or scraped the lengths of the grooves anew. The scraping in this painting was performed with a thin tool (with a squared tip about 0.3–0.4 mm wide) which produced small, rounded indentations along the edges of the grooves (Figure 3d). It can be assumed that Rembrandt, a master draughtsman and etcher, used a quill or reed pen for this type of scraping.²⁶ These flexible drawing implements were bevelled at the tip and could also be squared-off, resulting in wider scratches (or scrapes). It was also possible, by rotating the pen, to create very fine lines with the tip's edge.²⁷ A pen with a blunted tip would explain the rounded indentations at the edges of grooves in *The Money-Changer*.

In the 1628 *Samson and Delilah* in Berlin, Rembrandt possibly used a reed pen for the description of Samson's hair and sash and for emphasis of a rounded fold in Delilah's skirt. In addition, he used a pointed object to create scratched-in curls in Delilah's hair.²⁸ Rembrandt also employed this technique with clear intention in later pictures. For example, in *Minerva in her Study* (New York, Leiden Collection), he scraped a pattern into the brown textile hanging in the lower right half of the picture. The upper, dark brown paint layer was scraped away with a thin tool, revealing brownish yellow beneath.²⁹ In *Self-Portrait with a Velvet Beret* and *Samson Threatening his Father-in-Law*, Rembrandt employed scratching only to help define the hair. In all but one of the later works in the Gemäldegalerie, the use of scraping and scratching as a means of artistic description or accentuation is no longer found. However, in two works Rembrandt used paint-removal techniques for other purposes: in *John the Baptist Preaching*³⁰ Rembrandt scraped off paint layers to introduce a correction. In *Old Man with a Beard and Beret*, a wide, scraped depression establishes the upper contour of the curtain.

Only in the late *Moses* of 1659 (Figure 4) do scratched-in details show up again, this time in the beard. In addition, this work contains some very wide scrapings in Moses' chest strap. The outer contour of the strap was underpainted with black brushstrokes, and the strap's transverse stripes were also laid in using black, with the long and short sides of each stripe applied in a thick impasto. The chest strap was then executed in colour, and the paint that lay in the transverse stripes was scraped off using a flat tool with a tip about 4 mm wide. Given that the scrapings contain internal grooves, it seems possible that they were carried out with a small wooden stick or palette knife (Figure 5).

Although the use of a brush handle, as mentioned by Houbraken, cannot be fundamentally ruled out for any of the Berlin paintings, it also cannot be proved in any concrete way. The brush is simply the tool most directly associated with the painting process and the equipment found in workshops, and for that reason the literature has almost inevitably assumed that brush handles were used for scratching.³¹ What can be said for certain is that Rembrandt typically employed scratching or scraping into still-soft paint as a concluding accentuation. In contrast, his pupil Arent de Gelder, who also mastered this type of treatment of the surface, surely having learned it

from Rembrandt, integrated scratching and scraping more directly into his painting process.³² De Gelder painted over and reworked areas that he had excavated in this manner, sometimes even repeatedly.³³ Instead of using the technique to emphasise particular features, he often applied it to the entire surface of textiles he depicted. The element of chance evidently played a much greater role in De Gelder's practice than it did in his teacher's.³⁴ In all the examples given above, Rembrandt proceeded very deliberately and purposefully, in terms of both the fashioning and the amassment of such scratches. With regard to the late work of Rembrandt, Jonathan Bikker and Anna Krekeler arrived at the same conclusion: 'It is not only the assortment of surfaces to which this technique was applied, but



Figure 4 Rembrandt, *Moses Breaking the Tablets of the Law*, 1659, oil on canvas, 168.1 × 136.5 cm, Staatliche Museen zu Berlin, Gemäldegalerie, Kat. Nr. 811. © Staatliche Museen zu Berlin, Gemäldegalerie (image: Christoph Schmidt).



Figure 5 Rembrandt, *Moses Breaking the Tablets of the Law* (Figure 4): microscopic image of a sash strap of the garment (image: Claudia Laurenze-Landsberg).

the variety in quantity and type that makes Rembrandt's use of scratchmarks in his late work so captivating'.³⁵ The examples presented above make clear that this observation applies not merely to Rembrandt's late work but rather to his whole painted oeuvre.

Marbled effects

The examination of the Rembrandt holdings in Berlin brought to light marbled effects in several works, created by combining different hues of paint wet-in-wet and swirling them together by rotating the brush. Even in a work as early as *The Money-Changer*, there are places where Rembrandt must have twisted his brush while applying paint. Such is the case with the alphabetical characters that he pressed with the brush into the still-soft underlayer, producing lightly marbled structures.³⁶

About three years later, Rembrandt very deliberately employed marbling in *The Abduction of Proserpina* (Figure 6) in which he depicted flowers, leaves and ornaments by combining differently coloured, fluid paints and by exploiting the tendency of those paints to flow into one another (Figures 7a–c). The flowers in this small-figured picture measure only about 2–3 mm in size, making the marbled effects only barely visible to the naked eye. Despite that, Rembrandt executed them in great detail and with utmost care. The microscopic images that show the brilliant effects of this marbling are a feast for the eyes.³⁷ Rembrandt expended great effort on even the smallest of details in *The Abduction of Proserpina* as evidenced from the painting's overall process of creation, during which he made numerous corrections and changes. He also spared no effort or expense with regard to the painting technique and materials used. The picture thus contains a profusion of finely painted details that are of utmost perfection. Furthermore, he used the costly pigment lapis lazuli for the large area



Figure 6 Rembrandt, *The Abduction of Proserpina*, c.1631, oil on oak, 84.4 × 79.5 cm, Staatliche Museen zu Berlin, Gemäldegalerie, Kat. Nr. 823. © Staatliche Museen zu Berlin, Gemäldegalerie (image: Christoph Schmidt).

of sky. With this representation of the Proserpina myth, Rembrandt created a thoroughly ambitious and high-quality work that clearly exceeded his usual standards at the time. Because the picture was in the collection of the stadtholder Frederik Hendrik shortly after its completion, one can reasonably assume that Rembrandt made it expressly for him, although it remains an open question as to whether Rembrandt would have done this on commission or at his own risk.³⁸ The lavish use of elaborate, parti-coloured marbled effects in the smallest details underpins the assumption that the picture was conceived for Frederik Hendrik. The *Minerva*, probably also created about 1630/31 and likewise

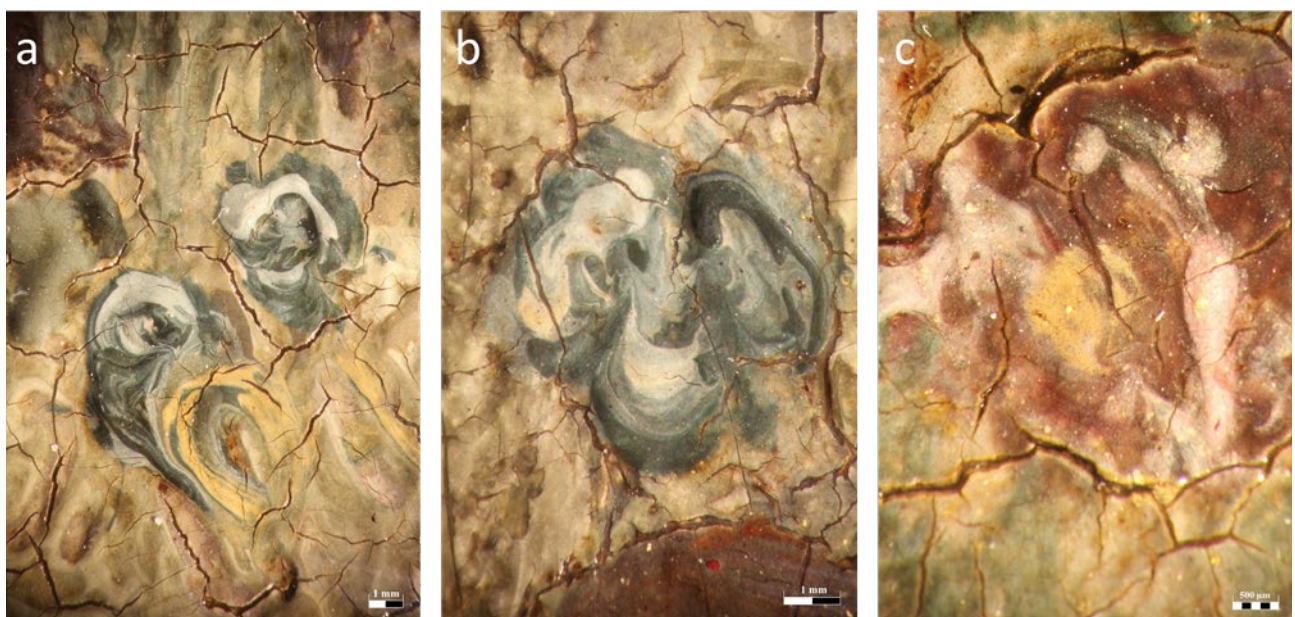


Figure 7 Rembrandt, *The Abduction of Proserpina* (Figure 6): (a–c) microscopic images of painted flowers (images: Claudia Laurenze-Landsberg).



Figure 8 Rembrandt, *Susanna and the Elders*, 1647, oil on mahogany, 76.6 × 92.8 cm, Staatliche Museen zu Berlin, Gemäldegalerie, Kat. Nr. 828E. Microscopic image of a yellow flower above the head of the old man in the foreground (image: Claudia Laurenze-Landsberg).

once owned by Frederik Hendrik, also features lapis lazuli in some of the brushstrokes;³⁹ apparently these are the only two paintings by Rembrandt containing that pigment. Most notably, however, the *Minerva* also features flowers and ornaments formed, as in the *Proserpina*, by the marbling of fluid paints.⁴⁰ In later works, Rembrandt used such marbled effects much more sparingly.

In *Old Man with a Beard and Beret*, the sitter's beard was modelled with curved grey, yellow and white brushstrokes applied wet-in-wet.⁴¹ In *Susanna and the Elders*, extensively reworked by Joshua Reynolds between 1769 and 1792, the style of the plants to the right of the rock formation clearly betrays the hand of Rembrandt (Figure 8).⁴² The vegetation is executed in great detail, its colours fluidly commingled in a variation of the marbling technique. This handling of detail and colour differs clearly from that found in the areas reworked by Reynolds. The contrast underscores the two painters' markedly different approaches.⁴³

Marbled effects are found even in Rembrandt's late works at the Gemäldegalerie. He built up the Hebrew letters in *Moses Breaking the Tablets of the Law* with utmost care, applying them in several steps using not only various colours but also brushes of different widths. In certain places, the colours were combined for a marbled effect; in others, pressure applied to the brush created fan-like structures.⁴⁴ Similar observations can be made about *Jacob Wrestling*

with the *Angel* in which the angel's eyes are worked out with great subtlety. Of particular note in the left eye are the red border of the pupil and the eye's inner corner, which displays a marbling of fluid yellow and red paints.⁴⁵

Embellished signatures

A surprising finding of our investigations was that Rembrandt clearly added embellishments to some of his signatures.⁴⁶ When the signatures are viewed only with the naked eye, it appears that Rembrandt simply applied dark paint over a lighter background, but a closer look under the microscope reveals added accentuations in some of the signatures. In terms of the technical elaboration involved, the attention he lavished on those examples exceeded the effort that was normally expended on signatures.⁴⁷

Once again, *The Money-Changer* offers both the earliest and the most unusual example. The painting is signed 'RH' and dated '1627' on the folio volume lying open to the left of the old man. The linked letters 'RH' were pressed into the still-soft, dark surface using a thin, somewhat stiff brush (without paint): only the upper arch of the letter 'R' was then gone over with greyish-brown paint.⁴⁸ The numerals of the date were applied only after the surface had dried, using a small amount of greyish-brown paint on a thin brush; that paint lies flat on the dark surface.⁴⁹ The signature was therefore carried out in two steps with drying time in between: first the monogram was pressed into the soft paint, and later the date was applied on the dried paint. The impression of the signature into the surface is in keeping with the relief-like modelling present in many parts of the work. The embellishment of the letter 'R' is notable; that type of supplementary ornamentation of individual letters shows up regularly in later works.⁵⁰

The painting *Samson Threatening his Father-in-Law*, created about eight years later in 1635, also bears an embellished signature. The painting is signed and dated on the pilaster at the right edge: 'Rembrandt·f·v·163[. . .]'. Originally the date must have read '1635', since that year appears in two early reproductive engravings.⁵¹ The '5' was very probably lost in 1807, when the canvas was confiscated under Napoleon and brought to Paris, where it was then lined. In the process of reattaching the newly lined canvas

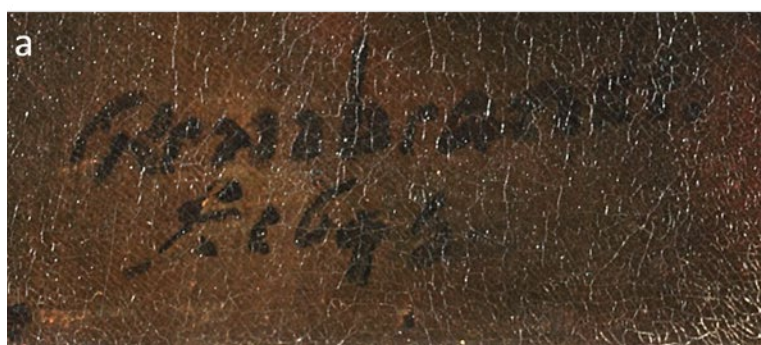


Figure 9 Rembrandt, *Old Man with Beard and Beret*, 1645, oil on canvas, 110 × 82 cm, Staatliche Museen zu Berlin, Gemäldegalerie, Kat. Nr. 828A. (a) Detail of the signature and (b) detail of the same signature. The 'f' was decorated with light and dark yellow and greenish-greyish-brown. © Staatliche Museen zu Berlin, Gemäldegalerie (image a: Christoph Schmidt; image b: Claudia Laurenze-Landsberg).

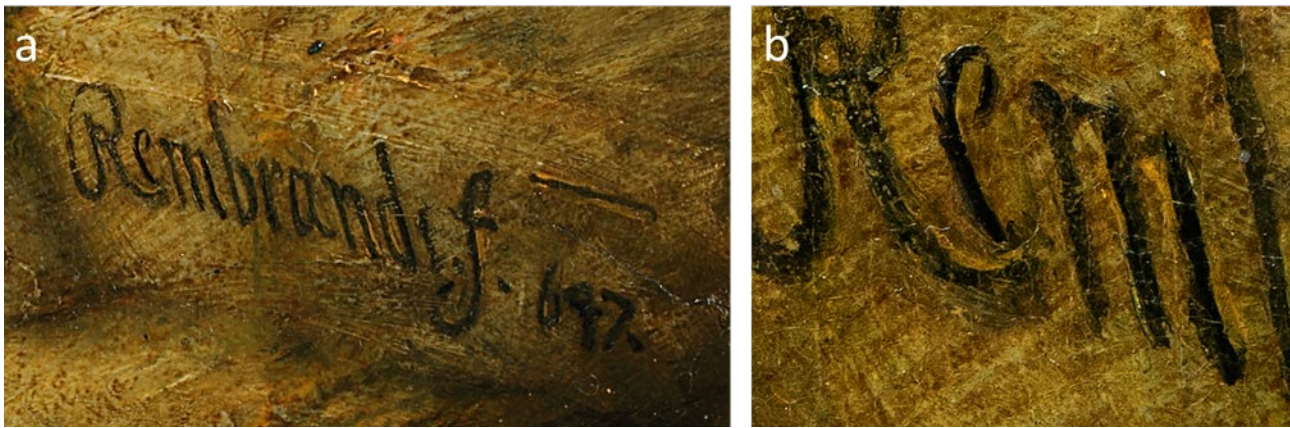


Figure 10 Rembrandt, *Susanna and the Elders* (Figure 8). **(a)** Detail of the signature: the letters of the signature were painted in black against the cool, light grey of the stone steps. Additional light effects in yellow were added to the black in the curves of the letters 'b' and 'd', along the lines for 'r', 'm', 'n' and 'f'. **(b)** Detail of the same signature. © Staatliche Museen zu Berlin, Gemäldegalerie (image a: Christoph Schmidt; image b: Claudia Laurenze-Landsberg).

to the stretcher, the final numeral of the date must have been folded over the edge and thus removed from view. Rembrandt applied this signature in a first step using a thin black paint before going back over it in greyish brown, in part more broadly. He further differentiated the first letter, 'R', by tracing over its lower arch in white and then overlaying that with a thin application of light greyish-brown paint. The upper half of the 'R' is a modern reconstruction; it lies on top of a filled loss. Directly beneath the 'R' lies a horizontal arc that was applied wet-in-wet using white paint as well as grey and yellow toning.⁵²

Proceeding chronologically, the next example is the painting *Old Man with a Beard and Beret*, signed and dated 'Rembrandt. f. 1645' at the lower left. This was painted in bone black, applied on top of the background colour. The letters 'ndt' and all the numerals of the date were additionally gone over with a finely ground, greenish-grey-brown paint. Furthermore, having carried out the 'f' in black, Rembrandt then embellished the letter with light and dark yellows and with greyish green (Figure 9a–b). The signature thus exhibits features typical of Rembrandt's handling, thereby supporting the autograph nature of the work. Ironically, it was doubt over this signature's authenticity that had once served as the starting point for a deattribution: in 1968, Horst Gerson identified it as a 'false monogram'.⁵³ Noting what he viewed as an inauthentic signature, Christian Tümpel assigned the work merely to the circle of Rembrandt.⁵⁴ Subsequent scholarship attributed the painting variously to the school or studio of Rembrandt.⁵⁵ However, having newly evaluated the picture, Ernst van de Wetering returned it to the master in the sixth volume of the *Rembrandt Corpus*.⁵⁶ The most recent examinations on the part of the Gemäldegalerie confirm the attribution to Rembrandt – it turns out that the date was obviously corrected and painted over by Rembrandt himself.⁵⁷ This observation accords well with the finding that the picture underwent various modifications during the painting process, so that within a single work one can speak of two variants, each of which was evidently signed and dated in a manner characteristic of Rembrandt.

Susanna and the Elders is not only one of the most outstanding works by Rembrandt in Berlin but also one of the most fascinating in terms of its genesis.⁵⁸ It is signed on the step at the bottom right as follows: 'Rembrandt.f. [1]647'. A thin black line appears above the date. The black of the signature lies on top of the cool, light grey paint of the stone step. Rembrandt added yellow embellishments representing the effects of light to the curves of the letters 'b' and 'd' and along straight portions of the letters 'R', 'm', 'n' and 'f' (Figures 10a and b).

The signature on the 1659 *Moses Breaking the Tablets of the Law*, the Gemäldegalerie's only late work by Rembrandt that bears a date, was also subsequently worked over by the artist. Located at the right bottom edge, where it lies on top of various green and yellow areas of the stone backdrop, the signature was carried out using a wide bristle brush loaded with black paint. It reads 'Rembrandt- f. 1659'. The brush maintained continuous contact with the surface during the signature's application. While the black paint was still soft, the area of the signature was gone over with green giving rise to marbled effects. Additionally, before the paint had dried, the space between the letters 'm' and 'b' was accented in yellow.⁵⁹

Conclusion

The observations presented here on the paintings in Berlin make clear that from very early on Rembrandt engaged in an intense exploration of the possibilities of various techniques and working methods. Paintings such as *The Money-Changer* appear to have served as a kind of testing ground for that undertaking. The techniques discussed above – the relief-like handling of flesh tones, the use of scrapings and scratchings, the employment of marbled effects and the embellishment of signatures – are found throughout the whole course of Rembrandt's career, from the early to the late oeuvre, but certainly not in all paintings or according to a fixed pattern. While producing his early works, Rembrandt appears to have successfully assembled an array of tried-and-tested

techniques to be used as the building blocks of later works, in which he would further develop those techniques but never employ them in a standardised way. His working methods were highly varied, detailed and considered, without ever becoming rigid or conforming to set conventions. It is astonishing that Rembrandt used many of the techniques under discussion even in small-scale paintings, even though the technical details of such works are often hardly discernible to the naked eye: he still invested much time and effort in such passages.⁶⁰ Although the precise execution of those details is barely visible without magnification and other aids, they nevertheless influence a painting's general effect. In the case of the *Proserpina*, for example, they all contribute to the work's overall resplendence. And so in the absence of technical examination, the production process of Rembrandt's paintings often remains hidden and mysterious. Yet the effect of his art is matchless – each painting a marvellous jewel in its own right.

Notes

1. 'Ik voel mij gedrongen te verklaren dat ik een dergelijke toegewijdeheid en volharding nog bij geen groepering van mensen bij geen bezigheid en bij geen leeftijd ooit heb waargenomen ... Het deert hen zo weinig, dat je zou denken met bejaarden te doen te hebben, die zat van jaren zijn en al die onbeduidendheden allang achter zich hebben. Deze onvermoeibare volharding in noeste arbeid mag snel tot grote resultaten leiden, toch heb ik vaak gewenst dat de uitmuntende jonge mannen zich hierin wat zouden matigen en ook rekening zouden houden met hun gestel, dat door hun zittend leven nu al niet zo sterk en robuust is.' Huygens and Heesakkers 1987: 89–90, after the Latin original. English translation cited after Vogelaar 1991: 134.
2. Van de Wetering 2006.
3. Among the various publications on this topic, see esp. Groen 1997; Van de Wetering 1997; Groen 2005; Groen 2014; Janssens et al. 2016; Van Loon et al. 2017.
4. From 2011 to 2016, these Rembrandt holdings were examined in detail in a research project funded by the Mellon Foundation. Since late 2016, all the findings have been publicly available in the Rembrandt Database (<https://rembrandtdatabase.org>). This article presents the first analytical synthesis of the results.
5. 'Ook word 'er getuigt dat hy eens een pourtret geschildert heeft daar de verw zoodanig dik op lag, datmen de schildery by de neus van de grond konde opligten.' Furthermore, concerning the portrait of Jan van Beuningen, he noted, 'het hoofd scheen uit het stuk te steken, en de aanschouwers aan te spreken.' Houbraken 1753: pt. 1, 269.
6. 'Vele jaren agter den anderen heeft hy het met schilderen zoo druk gehad dat de menschen lang naar hunne stukken moesten wagten, niettegenstaande dat hy met zyn werk vaardig voortging, inzonderheid in zyn laatsten tyd, toen het 'er, van na by bezien, uitzag of het met een Metzelaars truffel was aangesmeert.' Houbraken 1753: pt. 1, 269. On the interpretation of Rembrandt's impasto brushwork in the centuries after his death, see, among others, Suthor 2014: 17–40.
7. Van de Wetering 1991: 27, 29; Franken 2019.
8. Van de Wetering 1991: 27, 29. On this, see also the booklet that accompanied the exhibition *Lichtgefuge: Parcours der Lichtmalerei*, 8 March–8 May 2011 (Berlin, 2011): 13, no. 8.
9. Brown et al. 2019: 204–9, no. 91–2 [Katja Kleinert].
10. Rembrandt, *Self-Portrait with a Velvet Beret*, 1634, oil on panel, 58.3 × 47.6 cm, Gemäldegalerie SMB, Kat. Nr. 810.
11. See the Rembrandt Database, <https://rkd.nl/explore/technical/5007200>, file nos. 0001506056, 0001506057 and 0001506065.
12. Rembrandt, *Samson Threatening his Father-in-Law*, 1635, oil on canvas, 159.5 × 131 cm, Gemäldegalerie SMB, Kat. Nr. 802.
13. See the Rembrandt Database, <https://rkd.nl/explore/technical/5011205>, file nos. 0001514273 and 0001514279.
14. Rembrandt, *Old Man with a Beard and Beret*, 1645, oil on canvas, 112.3 × 84.1 cm, Gemäldegalerie SMB, Kat. Nr. 828A.
15. On the deattribution of this painting, discussed in greater detail below, see, among other publications, Tümpel 1986: 240, no. A42; Bock et al. 1996: 102; Bahre and Kleinert 2006: no. 41; *Corpus VI* [2015]: no. 203.
16. See the Rembrandt Database, <https://rkd.nl/explore/technical/5010610>, file nos. 0001512476, 0001512479 and 0001512497.
17. Rembrandt, *Jacob Wrestling with the Angel*, 1659/60, oil on canvas, 140 × 119.8 cm, Gemäldegalerie SMB, Kat. Nr. 828.
18. See the Rembrandt Database, <https://rkd.nl/explore/technical/5010482>, file nos. 0001512080 and 0001512081.
19. This process also created a third dimension of structure, as cutting through the colour reveals a complex and subtle layering of which the viewer would otherwise not be aware; Da Sancha 2022: 38.
20. Writing on Arent de Gelder, Houbraken notes about this technique, 'Somwylen smeert hy ook de verf wel, als hy by voorbeeld een franje of borduursel op eenig kleed will schilderen, met een bret tempermes, op het paneel of doek, en krabt de gedaante van het borduursel, of de draden der franje daar uit met zyn penseelstok, zonderende geene wyzen uit, als zyn maar tot zyn oogmerk behulpig zyn': Houbraken 1753: pt. 3, 207. ['Sometimes, for instance, when he wishes to paint a fringe or embroidery on some cloak, he also smears the paint with a broad palette knife on the panel or canvas, and scratches the pattern of the embroidery or the threads of the fringe with his maulstick, not excluding any method as long as it contributes to his goal.']
21. 'Het is bekend en in eenig schilderwerk van REMBRANDT zichtbaar, dat hij somwijlen zich van een penseelstok, een tempermes, en zelfs wel eens van een' vinger bediende, om een of ander te beter naar zijn' zin uit te drukken': Immerzeel 1839: 48. ['It is known and visible in some of REMBRANDT's paintings that he sometimes used a brushstick, a tempering knife, and sometimes even a finger, to express it according to his imagination.']
22. Kleinert and Laurenze-Landsberg 2016: 72, fig. 4.
23. Melanie Gifford was the first to note the connection between Rembrandt's handling of the paint surface and the employment of drawing tools. As she explains, Rembrandt used scratching for distinct purposes and evidently carried it out using different types of implements. See, extensively, Gifford 2022.
24. Rembrandt, *The Stoning of Saint Stephen*, 1626, oil on panel, 89.5 × 123.6 cm, Musée des Beaux-Arts, Lyon, inv. no. A 2735; *Corpus I* [1982]: no. A1. In this work, scratchmarks are visible in the mane of the horse at the left. Rembrandt, *History Painting*, 1626, oil on panel, 89 × 121 cm, Museum De Lakenhal, Leiden, inv. no. B 564.
25. *Corpus I* [1982]: no. A6; Brown et al. 2019: no. 59 [Katja Kleinert]. In this work, Rembrandt applied scratchmarks in the hair of various figures and the fur collar of the man standing at the centre.

26. Only in rare cases, as here, is it possible to deduce what tool was used to work the surface. In Rembrandt's late period, however, one can assume that he used a palette knife to produce particular structures and textures. On this, see [Bikker and Krekeler 2014](#): 147–51.
27. [Dietz and Penz 2018](#): 293.
28. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5001764>, file nos. 0001493509, 0001493510, 0001493547 and 00014935.
29. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5000781>, file nos. 0001492306 and 0001492307.
30. Rembrandt, *John the Baptist Preaching*, 1634–5, oil on panel, 62.8 × 81.3 cm, Gemäldegalerie SMB, Kat. Nr. 828K.
31. [Bomford et al. 1988](#): 63, 78, 84; [Van de Wetering 1998](#): 30.
32. See e.g. Arent de Gelder, *Esther, Ahasuerus and Haman*, canvas, 103 × 150 cm, Dordrechts Museum, inv. no. DM/994/761; Arent de Gelder, *Portrait of Herman Boerhaave and his Family*, c.1722, canvas, 104.5 × 173 cm, Rijksmuseum, Amsterdam inv. no. SK-A-4034; Arent de Gelder, *The Holy Family*, canvas, 80.5 × 97.3 cm, Gemäldegalerie SMB, Kat. Nr. 806D.
33. [Van de Wetering 1998](#); [Hadjinicolaou 2018](#); [Hadjinicolaou 2019](#).
34. As one of the few examples of the involvement of chance in Rembrandt's work, Van de Wetering cites the painting *The Jewish Bride* in the Rijksmuseum, inv. no. SK-C-216: [Van de Wetering 1998](#): 33.
35. [Bikker and Krekeler 2014](#): 145.
36. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5001764>, file no. 0001493509.
37. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5001681>, file nos. 0001493166–0001493180.
38. [Brown et al. 2019](#): 204–9, no. 91–2 [Katja Kleinert].
39. Rembrandt, *Minerva*, c.1631, oil on panel, 60.6 × 49.2 cm, Gemäldegalerie SMB, Kat. Nr. 828C.
40. See the Rembrandt Database, <https://rkd.nl/explore /technical/5000781>, file nos. 0001492211, 0001492283–0001492285.
41. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5010610>, file no. 0001512501.
42. Rembrandt, *Susanna and the Elders*, 1647, oil on panel, 76.6 × 93 cm, Gemäldegalerie SMB, Kat. Nr. 828E.
43. See the Rembrandt Database, <https://rkd.nl/explore /technical/5010610>, file nos. 0001508249–0001508251 and 000150852–000150854. On the alterations by Reynolds, see [Kleinert and Laurenze-Landsberg 2015a](#), esp. 23; and [Kleinert and Laurenze-Landsberg 2016](#): 73.
44. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5010708>, file nos. 0001512770–0001512775.
45. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5010482>, file nos. 0001512073–0001512075.
46. Previous studies of Rembrandt's signatures have mainly been devoted to typographical and iconographical aspects and to the stylistic development of the signatures. Signatures that were added later or supplemented have usually been identified as retouchings by later hands. Among other publications on this topic, see [Bruyn 1982](#); [Bruyn 1986](#); [Bruyn 1989](#); [Froentjes et al. 1991](#); [Grimm 1991](#); [Gludovatz 2011](#): 77–92; [Franken and van der Veen 2022](#).
47. [Kleinert and Laurenze-Landsberg 2023](#).
48. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5001684>, file no. 0001493360.
49. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5001684>, file no. 0001493362.
50. This can be observed on the following Rembrandt paintings in the Gemäldegalerie, Berlin: *Samson Threatening his Father-in-Law*, 1635 (Kat. Nr. 802); *Old Man with a Beard and Beret*, 1645 (Kat. Nr. 828A); *Susanna and the Elders*, 1647 (Kat. Nr. 828E); *Moses Breaking the Tablets of the Law*, 1659 (Kat. Nr. 811).
51. Etching by Georg Friedrich Schmidt (1712–1775) after Rembrandt, *Samson Threatening his Father-in-Law*, 32 × 22.8 cm (plate), 1756, The British Museum London, inv. no. 1848,0911.105. However, unlike in the original, in the print the date is placed beneath the name, presumably because the inscription would have been obscured by the hatching that represents shadow here. Etching by Daniel Berger (1744–1824) after a drawing, the etching signed 'Rembrandt pinx. – D. Bergher Filius, del. et Fecit, Berolini 1767'; below that, inscribed, 'Le Prince de Gueldre Menaçant son Pere / Peint sur toile par Rembrandt van Rijn / 5. pieds de hauteur 4. pieds de largeur / Dans la Grande Gallerie Royale à Sans. Soucie', 32 × 22.8 cm (plate), Kupferstichkabinett, SMB, inv. no. 807-4
52. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5011205>, file no. 0001514293.
53. [Gerson 1968](#): 499, no. 242.
54. [Tümpel 1986](#): 240, no. A42.
55. [Bock et al. 1996](#): 102; [Bahre and Kleinert 2006](#): no. 41.
56. *Corpus VI* [2015]: no. 203.
57. [Kleinert and Laurenze-Landsberg 2023](#): 162–4.
58. [Kleinert and Laurenze-Landsberg 2015b](#).
59. See the Rembrandt Database, <https://rkd.nl/explore/technic al/5010724>, file no. 0001512814.
60. [Bikker and Krekeler 2014](#): 145.

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