



Brueghel Enterprises

Ludion



Brueghel Enterprises

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Bonnefantenmuseum, Maastricht
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Abbreviations

ICN Instituut Collectie Nederland
IRPA Institut Royal du Patrimoine Artistique
(Brussels)
IRR infrared reflectogram
KMSK Koninklijk Museum voor Schone Kunsten
(Antwerp)
MRBAB Musées Royaux des Beaux-Arts de Belgique
(Brussels)
RBK Rijksdienst Beeldende Kunst
RKD Rijksbureau voor Kunsthistorische
Documentatie (The Hague)
SRAL Stichting Restauratie Atelier Limburg

Cover and frontispiece (front) Pieter Brueghel the Younger, *The Census
at Bethlehem*, detail. Brussels, Musées Royaux
des Beaux-Arts de Belgique;
(back cover and frontispiece) Details from
different versions of Pieter the Younger's
The Census at Bethlehem

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fig. 1 Pieter Bruegel the Elder, *The Census at Bethlehem*, 1566.
Brussels, Musées Royaux des Beaux-Arts de Belgique: motifs



- 'Save Garde' inn
- church
- slaughtering of boar
- axe
- hens
- central house
- dog
- Joseph
- figure picking up snowballs
- Virgin
- 'In De Swaen'
- tree with inn
- house of variable position
- house under construction
- house of leper
- ruined castle

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**Demystifying the Process:
Pieter Brueghel the Younger's
*The Census at Bethlehem***

A technical study

Christina Currie

Introduction

Pieter Brueghel the Younger's copies of *The Census at Bethlehem* [cat. 1–13] are among his most astonishing serial reproductions of his father's original work. Over the past three years, technical examinations of ten of the thirteen known copies have been carried out by teams from the Institut Royal du Patrimoine Artistique (IRPA), Brussels, and the Bonnefantenmuseum, Maastricht, in collaboration with their owners, curators and conservators.¹ This included infrared reflectography, dendrochronology, x-radiography and the analysis of paint samples. The material was studied with a view to answering some of the key questions surrounding the series and the artist. Debates revolve around the exact nature of the relationship of the copies to Pieter Bruegel the Elder's original painting, the copying process, the organization of the workshop and the level of contribution of studio hands. A fresh interpretation of these issues is presented here in the light of the new documentation.

One of the most remarkable things about Pieter Brueghel the Younger's copies of his father's paintings is their close fidelity to the original compositions. Since the copies were made many years after the death of Bruegel the Elder, there is no guarantee that Brueghel the Younger actually saw the original paintings. By the time Brueghel the Younger started making his copies, most of his father's works were in private collections, some of them possibly abroad. *The Magpie on the Gallows*, 1568 (Darmstadt, Hessisches Landesmuseum, inv. ck 165) may still have been in the possession of the family, as Bruegel the Elder left it in his will to his wife.² In addition, a small monochrome painting, *Christ and the Woman Taken in Adultery*, 1565 (London, Courtauld Institute Galleries) was owned by Jan Brueghel.³ It is likely that Brueghel the Younger had access to certain other works, but there is no documentary evidence to prove this (see Dominique Allart's essay in this volume).

It is not known whether Pieter Brueghel the Younger owned drawings by his father that may have guided him in the creation of the copies. It is possible that his artist grandmother, Mayken Verhulst, retained drawings and other working documents from Bruegel's studio which she later gave to her two grandsons, Pieter and Jan. Unfortunately, no preparatory drawings for Bruegel the Elder's major compositions have survived and, as far as it is known, no detailed engravings were made after his large-scale works.

In 1585 Pieter Brueghel the Younger was registered at the Guild of Saint Luke in Antwerp

as a 'meesterssoon' (master's son) under the name 'Peeter Brugel'⁴ after having apprenticed with Gillis van Coninxloo in 1579 or 1580.⁵ He ran an active studio, as the registers of the Antwerp Saint Luke's Guild mention nine apprentices as having passed through. The guild registers record the entry of Franchois de Grooten in 1588, Fransken Snyders and Hans Tripou in 1593, an unnamed pupil in 1596, Andries Daniels in 1599, Hans Garet in 1608, Jasper Breydel in 1611, Gillis Placquet in 1615 and Gonzales Coques in 1626 or 1627.⁶ His son Pieter also studied with him before registering at the Guild of Saint Luke in 1608 as 'meesterssoon' (master's son).⁷ The dates of entry of students suggest that he is likely to have accommodated one or two students at a time, each remaining with him for a few years before setting up their own independent practices or working as journeymen. Ex-apprentices may indeed have remained in Brueghel's studio as journeymen – whose names were not required to be registered – because it was quite expensive to register as an independent master for candidates whose father was not a guild member.

In what capacity and to what extent Brueghel employed his assistants is totally unknown. Works attributed to Brueghel the Younger vary considerably in quality of execution, and there is no consensus of opinion as to which are definitely by his hand, which are by studio assistants, and which might be a combination of the two. Both signed and unsigned works vary in quality, as will be demonstrated in this study. Intriguingly, there are no extant signed and dated works by Brueghel the Younger until the year 1593, although he had been registered as an independent master since 1585 and had already taken on several apprentices.

Brueghel changed the spelling of his signature during the course of his career. He signed his works 'P. BRVEGHEL' until 1616, during which year he changed the spelling definitively to 'P. BREVGHEL'.⁸

The two most significant art-historical studies of the *œuvre* of Pieter Brueghel the Younger are Georges Marlier's seminal work, *Pierre Brueghel le Jeune*, 1969,⁹ annotated and edited by Jacqueline Folie, and Klaus Ertz's comprehensive *Pieter Bruegel der Jüngere 1564–1637/38. Die Gemälde mit kritischem Oeuvrekatalog*, 1998/2000.¹⁰ Other interesting contributions on the artist include Jacqueline Folie's essay on Brueghel the Younger in *Bruegel – Une dynastie de peintres*, 1980¹¹ (reprinted in the brochure for the exhibition, *Pieter Brueghel de Jonge*, Bonnefantenmuseum, 1993),¹² Hélène Mund's account on Brueghel the Younger's

copies of *The Proverbs*¹³ (1976), and Hélène M. Verougstraete and Roger A. van Schoute's *The Triumph of Death by Pieter Bruegel the Elder and Pieter Bruegel the Younger* (1993).¹⁴ Earlier studies include Gustav Glück's introduction to the artist in the P. de Boer Gallery exhibition catalogue, *De Helse en de Fluweelen Bruegel*¹⁵ (1934) and the Robert Finck exhibition catalogue, *Trente-trois tableaux de Pierre Bruegel le Jeune dans les collections privées belges* (1969).¹⁶ An interesting and well-illustrated catalogue of paintings from the Coppée collection, *The World of Bruegel*, was published in Japan in 1995.¹⁷ More recently, Klaus Ertz authored a useful catalogue on Bruegel the Elder's two sons for the exhibition, *Pieter Breughel le Jeune—Jan Bruegel l'Ancien. Une famille de peintres flamands vers 1600* (1998).¹⁸ Yoko Mori published a fascinating comparison of the two Bruegel brothers and of Pieter Bruegel the Younger's copying practice in the recent exhibition catalogue, *Masterpieces of Flanders' Golden Age, 2001*.¹⁹ A more technical approach is taken by Françoise van Hauwaert in two articles, *La copie chez Pierre Bruegel le Jeune* (1978) and *La véritable signature de Pierre Bruegel le Jeune: son dessin sous-jacent* (1985)²⁰ where she discusses Bruegel's technique, including the underdrawing in relation to certain copies of Pieter Bruegel the Younger's *Wedding Dance* and in her unpublished *mémoire de licence, Pierre Bruegel le Jeune (1564/5–1638) et la copie aux Pays-Bas*.²¹ In 1995, Françoise van Hauwaert together with Jacqueline Folie published a revealing study of a series of copies of the *Triumph of Death* by Pieter Bruegel the Younger as well as copies of the same composition by his brother Jan.²² In the same publication Molly Faries gives an interesting analysis of the underdrawing of the Cleveland version of *The Triumph of Death*, while Nicholas Eastaugh presents a brief scientific analysis of the painting.²³ In 1999, at the biennial conference for the study of the technique and underdrawings of paintings, Hélène Verougstraete presented an interesting account of a previously unknown version of Bruegel the Younger's *Winter* (from the series of the 'Seasons').²⁴ During the same conference, the present author revealed technical findings on a version of *The Wedding Dance*²⁵ and more recently presented a rediscovered version of *The Census at Bethlehem*.²⁶ Important technical research is currently being carried out by Rebecca Duckwitz on Bruegel the Elder's *Proverbs* and copies of the same composition by Pieter Bruegel the Younger (see her essay in this catalogue).

The Census at Bethlehem: the original and the copies

Pieter Bruegel the Elder's original version of *The Census at Bethlehem*²⁷ signed and dated 'BRUEGEL/1566' (fig. 1; Musées Royaux des Beaux-Arts de Belgique [MRBAB], Brussels, inv. 3637), was examined in conjunction with the copies so as to explore more closely the similarities and differences between them and to search for clues regarding the copying process and the nature of the original model. The painting had already been the subject of a technical study at IRPA prior to a large Bruegel exhibition at the Brussels Musées Royaux in 1969²⁸ while its technique was analysed more recently in two publications by Dominique Allart.²⁹

The original painting was cleaned and restored at IRPA in 1968–9 by Albert Philippot. The conservation report published at the time states that despite minor losses, the paint layer was relatively intact.³⁰ The cleaning process did not seek to remove every trace of old varnish; hence the painting still retains a slight 'patina' of previous varnish and dirt³¹ rendering the blues a little greenish in places. A recent examination of the painting has shown that the paint layer is still in good condition and the new varnish applied in 1969 is not significantly yellowed. The influence of the thin patina of older varnish and dirt is so minimal that comparisons of colour and composition can be made between the original and the copies without much danger of misinterpretation.

The original version's support is an oak panel comprising four horizontal boards, measuring 115.3 cm in height by 164.5 cm in width.³² With the exception of the Lille and privately owned [cat. 12] versions, which are on canvas, the copies are all painted on oak panels composed of four to six horizontally joined oak planks of similar dimensions to the original.

The panel is primed with a white chalk ground layer. The same type of ground was also identified in several of the copies and is entirely typical of Northern European painting in the fifteenth and sixteenth centuries. This is overlaid with a thin, roughly applied white *imprimatura* layer, principally composed of lead white.³³ In the x-radiograph the wide, randomly applied brushmarks of this layer are visible over the entire painted surface. An *imprimatura* is also noted in many of Bruegel the Younger's copies of *The Census at Bethlehem*; however, it is generally more medium-rich, with only a low lead white content, and therefore barely, if at all, registering in x-radiography.

In the original version there are *barbes* (ridges of ground material) and unpainted borders along the right and left edges, whereas the ground and

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imprimatura extend right up to the panel edges on the upper and lower sides. There is no evidence to suggest that the upper and lower edges of the panel have been cut down. Interestingly, Pieter Brueghel the Younger's panels also frequently display *barbes* and unpainted borders along the lateral sides but not along the top and bottom edges (fig. 4).

In the original version, as with the copies examined, an underdrawing was detected with infrared reflectography and in places with the naked eye. The majority of the painted composition is laid out in the underdrawing including the main figures, the architecture, the carts, the trees and the landscape contours. It is mostly an outline drawing, with occasional short lines to indicate creases or folds in draperies; no hatching or other notations for tone were detected. These outlines are mostly followed closely in the paint layer, except for small branches of trees, which are only loosely indicated in the underdrawing. It is difficult to assess whether certain small-scale background figures are underdrawn as they are usually outlined during painting in dark black paint. These black painted outlines absorb infrared in the same way as the underdrawing, thus concealing any underdrawn lines; none the less, as no traces of underdrawing are visible beyond the painted edges of the figures, it is unlikely that they were underdrawn. Large figures are underdrawn, but their outlines are often concealed by the paint layer and visible only where draperies are light in tone or where the paint layer is slightly adjusted in relation to the underdrawing. Small details are sometimes underdrawn, for example the footprints of the leper in the snow, 'The Swan' inn sign,³⁴ and the post with a bowl to collect alms to the left of the leper's house³⁵ (see fig. 1 for location of motifs).

One of the criteria to determine whether the actual model for the copies was the original painting or a drawing of some kind is the answer to the question of whether or not Bruegel the Elder included any motifs in the underdrawing of the original version that he subsequently dropped during painting (see also Rebecca Duckwitz's essay in this catalogue). Several small features in the underdrawing, not followed through to the paint layer, can be observed (fig. 2); these include fine tree branches in the upper left sky, represented by fine, scallop-like, loose drawing lines to the left of the painted tree; the beginning of a form, possibly a tree trunk, located on the edge of the roof of the inn on the far left; a thick side branch to the large tree, to the left of the sun; two upside-down 'v's on the snowy roof of a house on

the upper right, possibly representing small dormer windows; a small tree and side branch crossing the snowy roof of a house just behind the tree with 'The Swan' inn sign; and a side branch and possible small tree crossing a rooftop to the left of the sun. With the exception of the fine tree branches, none of these elements is observed in the copies, neither at the level of the underdrawing nor the paint layer.

The figure putting on his skates in the lower right is absent in all the copies but evidently not a last-minute addition to the original, as underdrawing lines were detected for the crease of the figure's right knee, the outline of the left knee and the mittens.

In the original painting, no major adjustments were made to the composition or individual motifs during the underdrawing stage or during painting. Again, this is important while considering the possible original model for the copies. Minor adjustments to outline do occur; for example, the diagonal roof line of the small wooden building to the left of the gatepost in the upper left, moved slightly to the right of its underdrawn line during painting; the small branches of a pollarded tree profiled against the leper's house, moved to the left during painting (unless these branches represent a separate tree, dropped during painting); the position of a woman's shoe in the lower right, adjusted several times during underdrawing; and one of the mule's hooves, outlined at least twice during underdrawing and shifted downwards during painting.

In terms of painting technique, one obvious example of a method employed by both Bruegel the Elder and his son Pieter is the use of reserves. During the painting process, Bruegel the Elder often left unpainted spaces in the background paint for the forms to come. However, certain trees, smaller forms and medium- and small-sized figure motifs were applied directly on top of the background paint without being reserved, for example the central groups of figures playing in the snow, and a small girl on the ice near the lower bank of the pond in the centre left. In the copies by Brueghel the Younger, many more forms and figures are systematically reserved in the surrounding paint, including several minor details (fig. 15).



**Copies of The Census at Bethlehem
by Pieter Brueghel the Younger**

Of the thirteen known copies of *The Census at Bethlehem*, only three are signed and dated, the Vaduz version [cat. 9], dated 1607, the Brussels Musées Royaux version [cat. 4], 1610, and a privately owned version [cat. 10], 1604.³⁶ Also signed, but not dated, is the copy in the Koninklijk Museum voor Schone Kunsten (KMSK) in Antwerp [cat. 1]. Since this signature carries the 'Brueghel' rather than the 'Breughel' spelling, it can be assumed that the painting was executed in or before 1616. The Caen version [cat. 5] is also signed, but the signature is not in the style of Brueghel the Younger and was clearly added later.

Apart from three paintings in private collections,³⁷ every known version of *The Census at Bethlehem* was studied in considerable detail thanks to the generous collaboration of the owners. All but one form part of public collections:³⁸

- 1 Antwerp, Koninklijk Museum voor Schone Kunsten (inv. 776), wood panel, 113.6 x 165 cm; signed on a fallen door in the centre foreground to the left, 'P. BRUEGHEL.', Marlier 4, Ertz E213 [cat. 1].
- 2 Antwerp, Museum Mayer van den Bergh (inv. 54), wood panel, 121.4 x 171.5 cm, Marlier 5, Ertz E214 [cat. 2].
- 3 Arras, Musée des Beaux-Arts d'Arras (inv. 934.2), wood panel, 118.7 x 168.1 cm, Marlier 6, Ertz E215 [cat. 3].
- 4 Brussels, Musées Royaux des Beaux-Arts de Belgique (inv. 2903), wood panel, 121.8 x 167.5 cm; signed and dated on the left-hand barrel in the centre foreground, '1610./P. BRUEGHEL.', Marlier 2, Ertz E212 [cat. 4].
- 5 Caen, Musée des Beaux-Arts (inv. 22), wood panel, 108.5 x 160.5 cm, Marlier 8, Ertz E217 [cat. 5].
- 6 Lille, Palais des Beaux-Arts (inv. P.863), canvas, 112 x 163 cm, Marlier 9, Ertz E218 [cat. 6].
- 7 Lons-le-Saunier, Musée des Beaux-Arts (inv. 5), wood panel, 117.7 x 170.4 cm, Marlier 10, Ertz E220 [cat. 7].
- 8 Maastricht, Bonnefantenmuseum (inv. 677), wood panel, 122 x 174 cm, Marlier 11, Ertz E221 [cat. 8].
- 9 Vaduz, Sammlungen des Fürsten von Liechtenstein (inv. G720), wood panel, 122.5 x 169.5 cm; signed and dated on the right-hand barrel in the centre foreground, 'P. BRUEGHEL. 16.7' [1607], Marlier 3, Ertz E211 [cat. 9].
- 10 Private collection, wood panel, 118 x 168.4 cm, signed and dated on the left-hand barrel in the centre foreground (as in Brussels version),

'P. BRUEGHEL./1604', most probably the same painting as Marlier 1 (collection F. de Meester de Heyndonck) and Ertz F223 (also signed and dated 1604) [cat. 10].

Support

Like the original painting by Bruegel the Elder, eleven of the thirteen known copies of *The Census* are painted on oak panel, the standard support for paintings by Brueghel the Younger. Only the Lille version and a privately owned copy [cat. 12] are on canvas, which is quite unusual for him, and may point to a production specifically for export.³⁹

Panel sizes and construction

Panel sizes across the series are very similar and vary from approximately 114–122 cm in height to 165–174 cm in width.⁴⁰ This panel format corresponds closely to that of the original by Pieter Bruegel the Elder (115.3 x 164.5 cm). It is also one of Brueghel the Younger's most common panel formats for larger-scale works. The Lille canvas measures 112 cm in height by 163 cm in width.

The Census at Bethlehem series' format corresponds approximately to 4 x 6 Antwerp feet, or 114.7 cm x 172 cm, the Antwerp foot measuring 11 inches or 28.68 cm.⁴¹ Whether this was a standard size during the period is not known. New regulations regarding the manufacture of panels issued on 11 December 1617 by the Joiners Guild include the obligation to conform to a certain range of named standard panel formats, models of which were kept at the guild;⁴² unfortunately, the actual measurements for these formats are not given in the list of rules, so there is no means of correlating *The Census* paintings' format with a named standard.

The panels consist of four to six horizontally disposed planks, five being the most common number.⁴³ In the Bonnefantenmuseum, Brussels and both Antwerp versions, the planed-down reverse sides of the paintings reveal the presence of open channels in the wood between the joins, normally hidden from view in the thickness of the panel, accommodating wooden dowels. The dowels would have been applied by the panelmaker to hold the planks in place during assembly and gluing with animal glue. This type of panel construction is characteristic of Flemish painting from the fifteenth to the early part of the seventeenth century. Bruegel the Elder's panel for his original version of *The Census* is similarly joined with the aid of dowels. The panels may have been made by one of an increasing number of specialized *tafereelmakers* for easel painting.

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Branding

The Lons-le-Saunier version displays the symbol of a clover, cold-hammered into the reverse of the panel, to the left of the second plank from the bottom (fig. 3). This mark would normally be associated with panelmaker Michiel Claessens.⁴⁴ There are no brand marks of the Antwerp Guild of Saint Luke;⁴⁵ however, it is not unusual to find maker's marks unaccompanied by the guild stamp.⁴⁶ Interestingly, on the Lons-le-Saunier panel, the clover mark is larger in size than that on the reverse of Brueghel the Younger's *Wedding Dance* (unsigned; Ghent, Museum voor Schone Kunsten, inv. 1914.C-J).⁴⁷ This does not pose a problem for the identification of the mark as, according to Jørgen Wadum, Claessens used at least two punches, one bigger than the other.⁴⁸

The aforementioned new guild rules of 1617 obliged all guild members, on penalty of a three-florins fine, to have their finished panels inspected and branded by the dean, as well as marked with their personal stamp,⁴⁹ before the panels left their studios. As a result, branding is not normally found on panels executed before 1617. However, some panelmakers were already marking their panels before this date; for example, an unidentified maker using an RB monogram was marking his panels in 1612.⁵⁰ Michiel Claessens' working dates were 1590–1637⁵¹ and it is not known at what date he started to apply his characteristic clover mark. Gilberte Gepts, in her article on panelmaker Michiel Vriendt, cites a panel monogrammed RB, attributed to Pieter Balten (*Ecce Homo*, Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 869), with a clover mark on the reverse.⁵² The author does not mention the presence of guild marks. If the attribution to Pieter Balten is correct, the clover mark must have been applied before about 1598, the presumed year of his death.

Unfortunately, until more is known about Michiel Claessens' use of particular punches during certain years,⁵³ the mark on the Lons-le-Saunier panel cannot be used to situate the painting within a specific time period.

Marks were not observed on the reverse of any other panels in the series, but it should be noted that several of these have been planed down for cradling, which would usually eliminate any traces of branding.

Dating by dendrochronology

To obtain more information regarding the panel supports and the dates during which they may have been manufactured, dendrochronological analysis of the Mayer van den Bergh, Antwerp

and Bonnefantenmuseum versions was carried out by Pascale Fraiture (see her detailed report in this catalogue).⁵⁴ For the Mayer van den Bergh version, the youngest tree ring identified dates from 1585. Taking into account missing sapwood rings and seasoning time, 1596 is the earliest date at which the panel could have been ready for painting. Dendrochronology was also performed on the KMSK version in the hope of narrowing down the possible range of dates of execution for the painting. In this case, the youngest tree ring was found to date from 1593, giving 1604 as the earliest date for painting. For the Bonnefantenmuseum version, the corresponding dates are 1584 and 1595, respectively.

Prior to the recent analysis, dendrochronology was also carried out at IRPA by Joseph Vynckier on the Brussels version to see how closely the signed date of 1610 on the painting corresponds to the age of the panel.⁵⁵ The analysis showed that the youngest tree ring is a single sapwood ring dating from 1592. Taking account of the missing sapwood rings and the seasoning of the wood, 1602⁵⁶ is the earliest date at which the panel could have been ready for painting.

Dendrochronology also revealed interesting information regarding the provenance of the wood planks. All four panels analysed were manufactured using wood originating in the Baltic region.

Ground

The paintings all appear to have a white ground. In the case of the Belgian public collection versions⁵⁷ calcium carbonate, or white chalk, is identified as the main constituent. The binding medium was determined as gelatine glue in the KMSK version.⁵⁸

Cross-sections from the Mayer van den Bergh and KMSK copies appear to suggest that the ground may have been applied in two or more sessions, although separate layers are not distinguishable in the Brussels version (fig. 18).⁵⁹

After drying, the ground would have been planed and smoothed down, and perhaps finished off with an abrasive made from the stalks of a plant commonly known as 'mare's tail' (*Theophilus*).

Although it is possible that the ground layer was applied in Brueghel the Younger's own studio, the priming process may have been outsourced to a professional *witter* or primer, or alternatively – if he used the services of a panelmaker for the manufacture of his panels – to his panelmaker. Jørgen Wadum describes how panels





with ready-made grounds were available to painters from the late sixteenth century onwards and that panelmakers were taking over panel preparation as well.⁶⁰ Nico van Hout cites examples of *witters* and panelmakers combining the activities of *tafereelmaker* and *witter* listed in the Antwerp guild registers in the early seventeenth century.⁶¹

White chalk grounds were traditionally used in Flemish panel painting from the fourteenth to the seventeenth century. They were valued for their ability to reflect the light through thin paint layers, imparting a jewel-like luminosity. Bruegel the Elder used the effect to its full potential.

Barbes and unpainted edges

In the KMSK, Vaduz and private collection [cat. 10] versions (fig. 4), the ground extends to the upper and lower edges but stops approximately 1 cm from the lateral edges, culminating in a ridge of ground known as the *barbe*.⁶² The Mayer van den Bergh version shows partially ungrounded and unpainted lateral edges but these are neither pronounced nor even. The Caen version shows an ungrounded border and a *barbe*

along the left edge only; its right edge has been cut down.⁶³

Ungrounded and unpainted edges on the lateral sides of panels are frequently observed in larger paintings by Pieter Bruegel the Younger, although paintings where grounds and paint layers extend right up to the edges on all sides are also common.⁶⁴ These ungrounded edges are most likely the physical traces of the presence of temporary grooved battens (channel edge supports). These supports would have been placed at right angles to the grain of the wood during priming and painting to serve as restraints against warping.⁶⁵ The end grain edges of the painting would have been slotted into prepared grooves in the battens without nails or screws. The battens would have been removed prior to framing, the frame itself providing a measure of resistance to warping. Interestingly, four examples of paintings of diverse subjects by Bruegel the Younger with ungrounded and unpainted lateral borders – including the private collection version of *The Census at Bethlehem* – also present deep square cuts running the entire length of their lateral reverse edges and corresponding to the unpainted edges on the front.⁶⁶ These cuts are most likely an original adaptation of the panel to facilitate the application of the channel edge supports, although it is conceivable they were made to facilitate framing.

Imprimatura

Several of the *Census* copies have an overall pigmented layer between ground and paint, commonly described as the *imprimatura*. This thin layer can sometimes be perceived with the naked eye through light paint layers but is generally clearer in infrared. Occasionally it can be detected with x-radiography, providing it contains a significant proportion of lead white. The layer is applied in various directions with a thick brush.

An *imprimatura* is particularly evident with the naked eye in the Bonnefantenmuseum version, its sweeping brushstrokes clearly visible in most areas through the thin paint; the conservator's report describes it as having an orange-beige colour.⁶⁷ The brushstrokes are mostly diagonal, in the upper left-to-lower right direction, but there are vertical strokes along the left and right edges and some horizontal strokes along the lower edge. The Brussels version's *imprimatura* has a similar ochre appearance, but the brushstrokes are mostly vertical. A light-toned, multi-directional *imprimatura* layer is also

easily detected with the naked eye in the Caen, Arras, Mayer van den Bergh and Lons-le-Saunier versions. In the Lons-le-Saunier copy it is executed in mostly sweeping horizontal strokes, with some vertical strokes at the edges. The Brussels and both Antwerp versions show an *imprimatura* in the cross-sections (fig. 18); however, it is not easily detectable in infrared or x-radiography. Neither the private collection, Lille nor Vaduz versions reveal an *imprimatura* in infrared reflectography, but since no samples were taken, its absence cannot be proven.

Cross-sections of the Brussels version reveal the *imprimatura* as a medium-rich, ochre-coloured layer with black particles. Scanning electron microscopy⁶⁸ has detected lead, calcium and iron indicating the presence of lead white, chalk and earth pigments.⁶⁹

The *imprimatura* in the *Census* paintings was most likely applied in the artist's studio. It probably served both practical and aesthetic functions.⁷⁰ It would have sealed the chalk-glue ground layer, reducing its absorbency and any unevenness in absorbency. In some cases, it would have provided a slightly toned surface on which to paint. In many instances the *imprimatura* is left exposed or lightly scumbled as a mid-tone; for example, in the Brussels version, the unpainted *imprimatura* forms the river in the distant landscape vista (fig. 30).⁷¹

The *imprimatura* layer in the copies of *The Census* in the exhibition is quite different in nature and appearance from that of Pieter Bruegel the Elder's original version. In the original version, unlike the copies, there is a pure white *imprimatura*, densely pigmented with lead white, which served as a sealing layer for the ground but also as a reflector of light through the thin paint layers above.

Underdrawing

Infrared reflectograms were made of the ten copies of *The Census* to facilitate a comparison of their respective underdrawings.⁷² Reflectograms are images of details resulting from the use of a camera for infrared reflectography, which are assembled into so-called IRR mosaics or IRR computer assemblies. The quality of the reflectograms varies from painting to painting; differences are due to a combination of factors, including the type of equipment used, the size of the images captured and the material condition of the painting.⁷³

The underdrawing is a drawing lying underneath the surface of the paint which distinguishes

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fig. 5 Underdrawing of hens, lower foreground.

- Details of IRR assemblies
a Mayer van den Bergh
b private collection [cat. 10]
c Vaduz
d KMSK
e Brussels
f Bonnefantenmuseum
g Arras
h Lons-le-Saunier

it from other, separately made preparatory drawings or cartoons. In all cases where carbon black pigments have been used, an underdrawing clearly registers in infrared and is often discernible with the naked eye.

Location and drawing material

The underdrawing was most likely applied after the *imprimatura* layer.⁷⁴ In some of the copies, drawing lines appear to skip the texture of an underlying layer in places which could well be the *imprimatura*. In all the underdrawings the nature of the line and the manner in which it skips over the underlying texture in places suggest a dry material rather than ink or paint. The lines are neat and relatively fine, suggesting graphite or black chalk rather than charcoal. Graphite and black chalk are composed mainly of carbon, and therefore easily visualized in infrared reflectography. It is unlikely that the drawing lines would show up so clearly in infrared if they were carried out in metal-point, for example silver- or lead-point. Furthermore, analysis of a similar-looking underdrawing layer in one of Brueghel's copies of the *Massacre of the Innocents* (Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 832) and one of his versions of the *Wedding Dance* (Ghent, Museum voor Schone Kunsten, inv. 1914-CJ) identified carbon as the basis for the underdrawing material.

Common characteristics

In the ten versions of *The Census at Bethlehem* examined, the underdrawing consists of a detailed outlining of the figures, animals, architecture and still-life details, and a looser indication of landscape contours and trees. The drawing line varies slightly in thickness and density, but is usually finest for figures. (However, it is important to take into account that the resolution of the underdrawing lines in the various infrared reflectograms is affected by the differing equipment and conditions in which they were made.)

Medium-sized and large figures are invariably outlined in detail and drapery folds are often indicated. Occasionally, hatching denotes shadow areas, and sometimes sets of curved lines suggest rounded contours. Hands are frequently abbreviated as mittens and shoes in the snow as oval shapes, for example in the Lons-le-Saunier version (fig. 13). Smaller-scale figures in the upper left of the composition are also carefully outlined, with the exception of tiny figures on the ice in the far distance near the horizon, which were added during painting.

Animals, such as the Virgin's mule and ox,

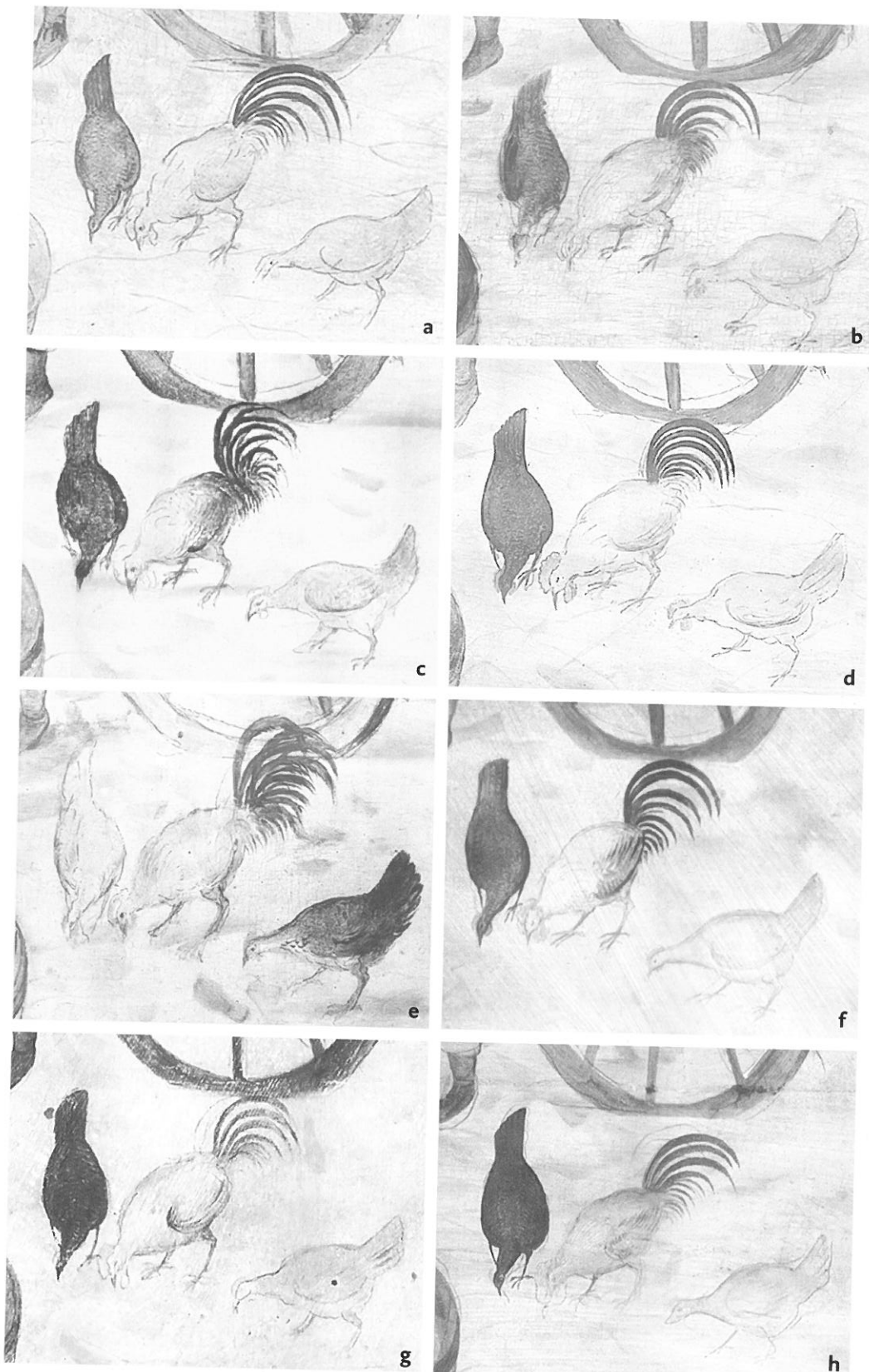
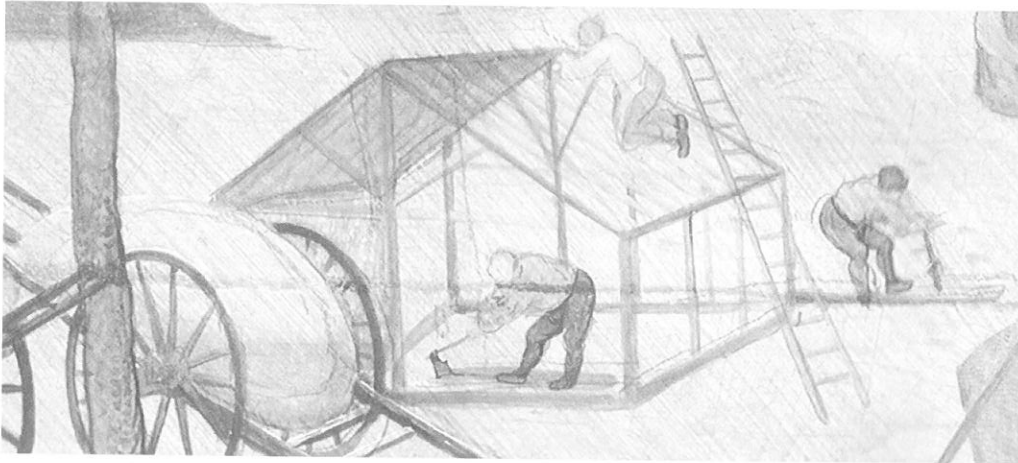


fig. 6 Detail of IRR assembly of underdrawing, Bonnefantenmuseum: house under construction and cart. Note the cursory indication of the house and the enlargement of the cart load during drawing.

fig. 7 Underdrawing wicker basket and icicles. Details of IRR assemblies. Note that the wicker basket is not underdrawn in the private collection version [cat. 10] unlike all the others.

- a Brussels
- b Lons-le-Saunier
- c KMSK
- d Bonnefantenmuseum
- e private collection [cat. 10]
- f Mayer van den Bergh



are drawn in considerable detail in every copy, with short lines or hatching strokes to suggest anatomical features, for example in the Mayer, Lons-le-Saunier and Brussels versions (figs. 34, 40). Smaller animals, such as the dog (fig. 10) and the horses in the upper right are drawn more loosely. The hens in the lower foreground are often indicated with a greater measure of freedom than other motifs (fig. 5).

Buildings are generally outlined in considerable detail, although verticals and horizontals are rarely drawn straight, often veering towards the diagonal. There are no signs of the use of a ruler or straight edge, and outlines often undulate. The house in construction in the upper right is sometimes indicated quite roughly with short, cursory strokes as, for example, in the Bonnefantenmuseum version (fig. 6).

Wheels of carts and the curved contours of their loads are often clumsily executed in the underdrawing layer, marked by frequent hesitations and corrections along the line, for example in the Bonnefantenmuseum version (fig. 6). Spokes of wheels are summarily indicated and their underdrawn positions usually bear no relation to the final painted spokes.

Where a layer of snow covers a cart or other object, a wavy line often marks the junction of the snow with the visible part of the form.

Large trees silhouetted against the sky are often drawn in a more rudimentary fashion than the rest of the composition, although the same drawing material appears to have been employed. The lower, thicker parts of tree trunks are usually outlined carefully, but smaller side branches are only loosely sketched in and rarely followed precisely in the paint layer. The underdrawing of trees can only have served as a rough guide, their positions and appearance varying considerably from painting to painting. In the Arras, Caen, Brussels, Lille and both Antwerp copies,⁷⁵ sketchy lines for the trees extend right to the top of the panel, whereas in the private collection version, outlines for tree trunks and other branches stop abruptly a little above the horizon. It is probable that the model was only approximate in these areas, the copyist being free to follow his own whims to a certain extent. Tops of trees in the far distance and bushes silhouetted on the horizon are merely suggested in the underdrawing with freely applied, short vertical and diagonal dashes, for example in the Mayer van den Bergh version (fig. 14).

Landscape contours are indicated with sketchy and often wavy or scribbled lines that vary widely in thickness along the strokes. As

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fig. 8 Changes made during drawing and painting of gable and chimney of central house, Bonnefantenmuseum. Detail of IRR assembly



fig. 9 Underdrawing of cooking pot, Arras. Detail of IRR assembly. Tapering, probably freehand, underdrawing lines in a dry drawing medium. Drawing lines appear to skip over the diagonal texture of an imprimatura layer.



with the trees, these approximate guidelines were drawn in quickly, probably with only cursory adherence to the model, resulting in considerable variation in the position of the underdrawn lines from version to version.

Other details, such as still-life accessories, are often drawn in a loose and spirited manner, for example the straw bales in the lower left foreground. The flames of the fires in the upper left and against the central house are indicated by random, curved, loose, freehand lines. The wicker basket being passed above people's heads in the lower left varies in the level of underdrawn detail from copy to copy and is not always underdrawn, for example in the private collection version (see fig. 7). The cooking pot seems to be drawn freehand in most versions, including the Arras version (fig. 9). Icicles are summarily indicated, for example in the Arras, Caen, Lille and Bonnefantenmuseum versions, or absent at the underdrawing stage (private collection, Lons-le-Saunier, KMSK, Mayer van den Bergh and Brussels versions).

Adjustments during underdrawing stage

Although none of the copies shows major changes to the composition, small adjustments were often made during drawing, particularly in the architecture where lines are frequently rein-

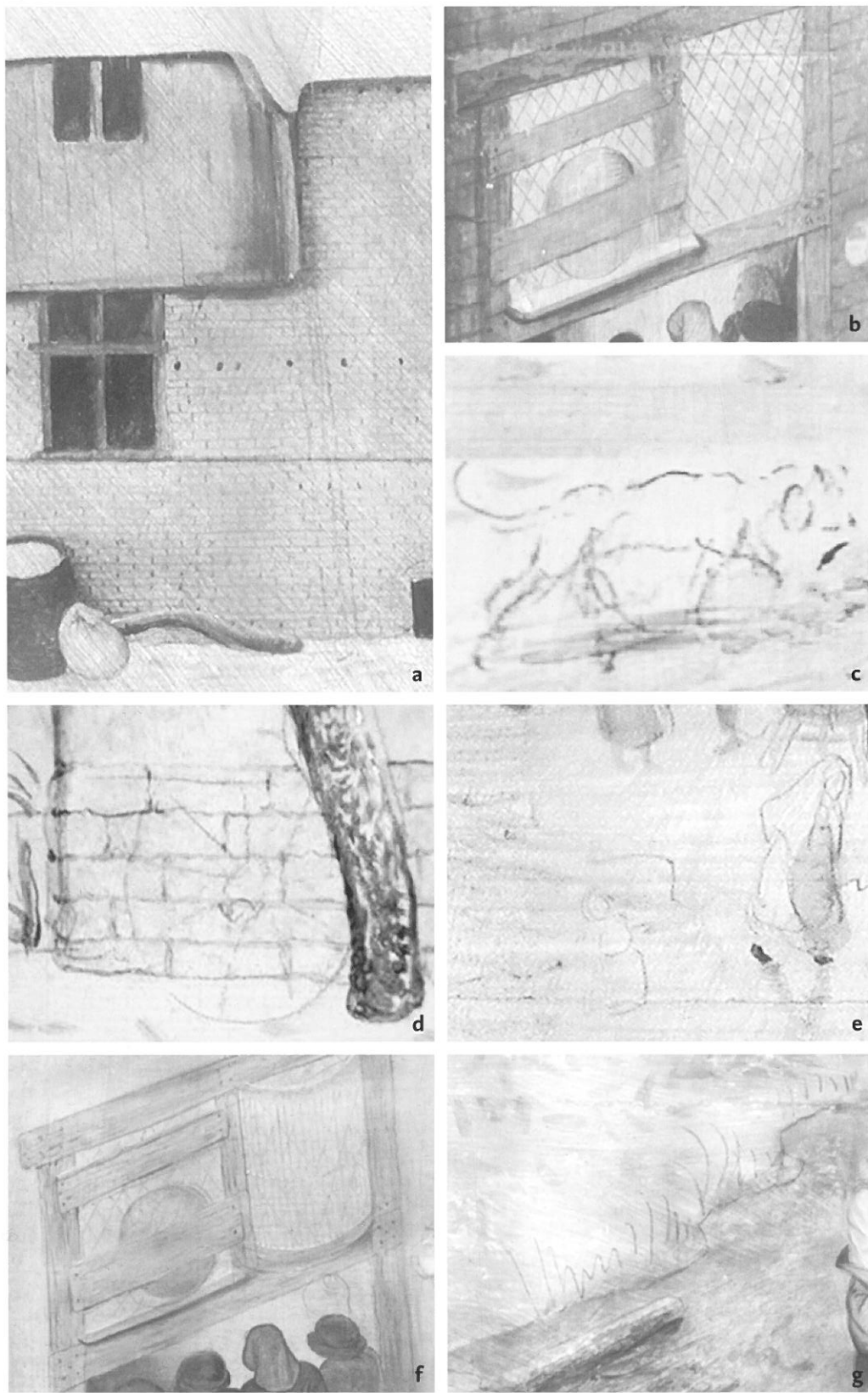
forced, gone over more than once or adjusted in some minor way.

Sometimes more significant alterations occurred during underdrawing, for instance in the Brussels version, where the artist adjusted the legs of a figure picking up snowballs at least twice and redrew the head of one of the hens in the centre foreground. In the Vaduz version, the lower left step of the gable in the central house has been moved to the right. In both the Brussels and Vaduz versions, the horns of the ox behind the Virgin were adjusted during drawing. In the private collection version [cat. 10], the artist adjusted the position of a gable in the upper right. In the Bonnefantenmuseum version, there are a number of quite significant changes at the underdrawing stage. These include an interesting change to a figure in the middle of the group huddling around the fire against the central house (fig. 33). The artist first drew the figure with a knee-length coat, but then changed his mind and added a long cloak, the latter overlapping the figure to the left slightly. There are several sketchy outlines for the chimney and the top step of the gable of the central house (fig. 8). There also appears to be two small-scale figures in front of the church to the left of their final position. A cart load in the upper right has been significantly

fig. 10 Motifs in underdrawing, dropped during painting.

Details of IRR assemblies

- a poles (Bonnefantenmuseum)
- b rounded grille (Arras)
- c dog (Brussels)
- d wheel (Vaduz)
- e small girl (Lons-le-Saunier)
- f hatted head (Lons-le-Saunier)
- g reeds around pond, lower right (Caen)



enlarged in size, the first drawing lines quite sketchy in appearance (fig. 6). There is also a change to the shape of the top of a ruined wall in the upper right. The Lons-le-Saunier version shows some important reworkings during underdrawing as well, including the uppermost step of the gable of the central house and the outlines of many figures. In the Mayer van den Bergh version, the outline of Joseph's tool basket has been enlarged at the underdrawing stage. In the KMSK version, there is a clear change in position to the diagonal of a rooftop in the upper right. In the Arras, Caen and Lille versions no significant adjustments of outline during underdrawing are noted, but this may be due to the relatively poor visualization of their underdrawings.

Omission of underdrawn motifs during painting

Some minor motifs were drawn and subsequently dropped at the painting stage (fig. 10). These vary from copy to copy; none was observed in the private collection or Lille versions and there is only one clear example in the Vaduz version.

- An interesting example of a dropped motif is a roughly drawn circle near the central house in the Brussels, KMSK, Bonnefantenmuseum and Vaduz versions; its identification as a wheel is only clear in the Vaduz version (fig. 10d), where the spokes are drawn in. The motif is not painted in any of the copies.
- The Mayer van den Bergh and Lons-le-Saunier versions each show a small girl in the same location on the frozen pond in the upper left at the underdrawing stage only (fig. 10e). Near this position, the Brussels version also reveals a girl at the level of the underdrawing, but differently posed. Girls in similar positions appear in both underdrawing and paint layer of several other copies.
- The Brussels and Lons-le-Saunier versions both have a drawn but unpainted dog in the upper centre of the composition (fig. 10c); the motif is both drawn and painted in the other copies, except for the Caen version, where the dog is omitted completely.
- The KMSK and Arras versions reveal curved lines in the underdrawing to represent a rounded metal grille in a window of the inn on the lower left (fig. 10b); this detail appears in both underdrawing and paint layers of the Bonnefantenmuseum, Mayer van den Bergh and Lons-le-Saunier copies.
- In the Bonnefantenmuseum version, there are two drawn but unpainted poles leaning against the left section of the central house, not seen in any of the other copies (fig. 10a). (It is possible

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fig. 11 Underdrawing of wheel, Lons-le-Saunier. Detail of IRR assembly. The wheel was moved to the right and its lower third dropped during painting.

that this motif is present in the underdrawing of the Vaduz version; unfortunately the paint layer is not sufficiently transparent in this area in the infrared reflectogram assembly.)

- In the Lons-le-Saunier version, there is a hatted head in the doorway of the inn in the lower left, not carried through to the paint layer and not seen in the paint layer of any of the other copies (fig. 10f). (An underdrawn but unpainted form in this location may also be present in the Vaduz version, but this is not clear enough in the reflectogram to be certain.)
- In the Caen version, there are sketchy lines in the underdrawing to suggest reeds on the edge of the pond in the lower right (fig. 10g). Reeds are seen in the underdrawing and paint layers of the Brussels version and in the paint layers of the Lille and Vaduz copies.⁷⁶
- In the Caen version and possibly the Arras and Bonnefantenmuseum versions, a small knife, attached to the belt of the man slaughtering the boar in the lower left, is present at the underdrawing stage only. This knife is painted in the Brussels, Vaduz, KMSK and private collection versions.⁷⁷

It is interesting to note that all these underdrawn but unpainted motifs are present in the paint layer of the original version by Bruegel the Elder. Their significance for the analysis of the sequence of the copies is explored in detail below.

Adjustments in outline during painting

All versions of *The Census at Bethlehem* reveal minor adjustments, corrections, refinements and straightening of outlines between the underdrawing and painting stages, for example the positions of feet in the snow, the edges of draperies, elliptical or circular shapes, such as cart wheels and loads, particularly a cart wheel to the immediate right of the tree with the 'In De Swaen' sign, Joseph's wicker tool basket and the edges of buildings, rooftops and trees. Quite often, chimneys are reduced in size slightly or modified in shape, and intricate folds are smoothed out during painting; in the private collection version, for example, the curled start of a fold in the upper right of the Virgin's robe disappears.

In the Lons-le-Saunier copy there are also some relatively important changes during painting: a figure carrying a large basket on the ice has been moved upwards by approximately a centimetre (quite significant for this small-scale motif), and the wheel in the centre is moved up and to the right (fig. 11). The latter is underdrawn in its entirety but in the paint layer its lower third is buried in snow. Many figures in the Lons-le-



Saunier version have been adjusted during painting, most probably because they are often cursorily indicated at the drawing stage. The same can be said for the figures in the Brussels version. In the Bonnefantenmuseum copy there are also numerous significant adjustments including the rightmost vertical of the central house, painted approximately a centimetre to the left of its drawn outline, and the chimney of the central house, which is considerably reduced in size in relation to its drawn outline (fig. 8).

Stylistic variations among the copies

As has been shown, the same fundamental underdrawing technique is displayed in all the copies. The fact that the paintings are copies probably attenuates particularities of style, while interpretation is sometimes made difficult by the uneven quality of the infrared reflectograms. Still, idiosyncrasies of style can sometimes be identified.

Brussels The underdrawing appears more naturalistic and spontaneous than most of the other copies, the artist probably following his own artistic instincts as well as the model. The figures are well understood from an anatomical point of view. Outlines are often quite nervous, wiry and composed of lengths of short, jerky lines. Hatchings, where present, are loose and spontaneous.

fig. 12 Underdrawing of male heads, lower left. Details of IRR assemblies. Note the similarly loose drawing style in both paintings.

- a Vaduz
- b Brussels



fig. 13 Underdrawing of slaughtering of boar, lower left, Lons-le-Saunier. Detail of IRR assembly. Note the rapid, slick and confident drawing style.



Vaduz There are many areas in the underdrawing of the architecture that are sketchy and nervous in quality and close to the Brussels version. Equally, for large- and smaller-scale figures, the underdrawing style is compatible with the Brussels underdrawing (fig. 12). The group of hens is drawn in a similar manner to the Brussels version, using short, sketchy strokes (fig. 5). Joseph's hat is drawn likewise. Taken together, these similarities in style suggest the same hand may have been responsible for the underdrawing in the Brussels and Vaduz versions; none the less, the fact that the Vaduz paint layer strongly absorbs infrared masks the underdrawing in many places and prevents a comprehensive comparison.

Lille The underdrawing line is not as clear as the others in infrared, probably owing to the canvas support; nevertheless, where it is visible, it can be described as fine, precise in places, but undulating significantly in the architecture, especially in the upper right. Clothing has loosely applied hatching for shadow in places.

Lons-le-Saunier The underdrawing is unlike any of the other copies. It appears slick, confident and

rapidly executed, the artist abbreviating finer details in places, including the legs and hands of figures (fig. 13), the timbering on a house in the upper right (fig. 14) and the hens (fig. 5). The presence of these shortcuts implies that a model was also referred to at the painting stage. Architecture is swiftly indicated, with undulating and often incomplete outlines (fig. 14). The large waggons in the lower centre are outlined in a more summary fashion than in most other versions. The landscape contours are also indicated in a more scribbled manner than in other copies (fig. 30).

fig. 14 Timber-framed house. Note the abbreviated notation for the timber frame in the Lons-le-Saunier underdrawing. In the Mayer version, the underdrawn timber frame conforms to the layout in the paint layer.

- a underdrawing Lons-le-Saunier
- b underdrawing Mayer van den Bergh
- c paint layer Mayer van den Bergh

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Bonnefantenmuseum The underdrawing is difficult to characterize, especially as the infrared reflectogram is dominated by diagonal markings from the *imprimatura*. The underdrawing is sketchy in places, the artist working out his outlines while drawing, and more precise in other areas. In the architecture, the outlines of buildings towards the centre and right are more 'wobbly' and 'sketchy' than the outlines for buildings on the left. Buildings in the centre and right include various revisions at the underdrawing stage (fig. 8). In the figures, there is not much detailing of folds and hatching is rare, but there are a few, short contour lines in places, for example on the hat of the male figure in the lower right corner. The underdrawing is quite schematic and stylized in places, with little regard for naturalism, as can be seen in the underdrawing of the hens (fig. 5).

KMSK The underdrawing is carefully executed and clearly not rushed. The artist searches for the correct outline while drawing and reinforces lines in places. An idiosyncratic way of suggesting contour using a notation that could be described as joined hatchings is seen in many motifs, such as a round building in the upper left and the back of the man in the lower right corner (fig. 35). Long, straight strokes are used to denote shadow on the roof of the oriel window of the central house.

Mayer van den Bergh In this version, outlines are confidently and quickly executed (fig. 14); however, the underdrawing does not show a good understanding of the construction of forms or the anatomy of figures. There are no undulations or nervousness in the outlines for architecture, unlike most of the other copies. The artist clearly searches for the correct outline during drawing, for example in the central house, the loads of the large waggon in the lower centre, the lower edge of the coat of the small figure watching the pond in the lower right, and the outline of the barrel in the lower right. Some forms are quickly and schematically drawn, for example the hens (fig. 5). Shadows in figures are often indicated by hatchings. In the landscape contours, the underdrawing line loops around itself whimsically in places. The underdrawing style is not unlike that of the KMSK version, although the forms are indicated a little more coarsely.

Private collection The underdrawing is quite detailed and confident but rarely captures anatomy correctly. There are many small revisions and reinforcements of the line during drawing in the

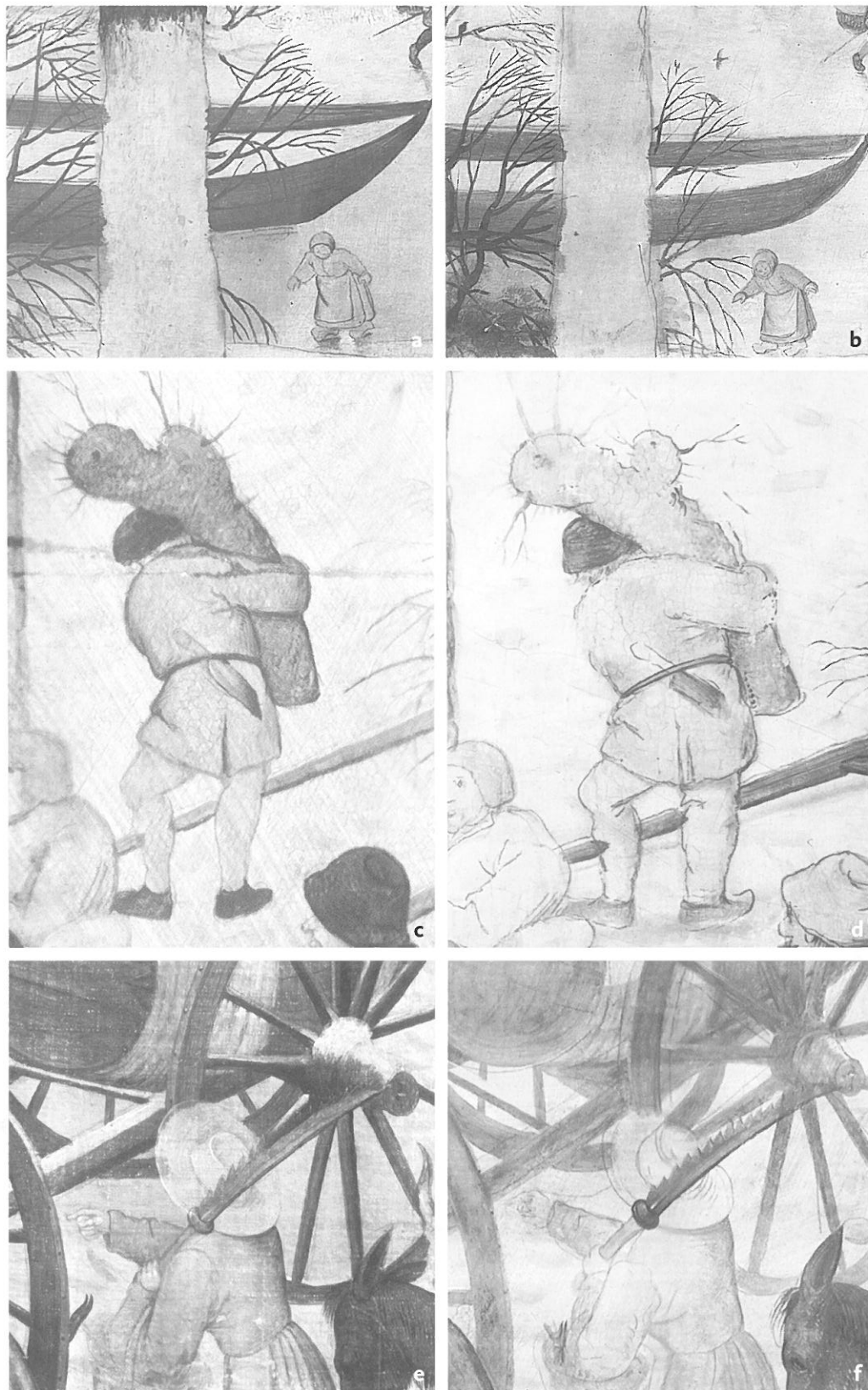
architecture and the figures. With the Arras version, this is the only underdrawing to fill in deep shadow with closely spaced scribbled lines, for example the church door (fig. 36), the top of a tower and the inner part of the bottom tip of the man's coat in the lower right corner (fig. 35). Interestingly, the artist did not bother to indicate certain features at the underdrawing stage, such as tree trunks or branches from a certain level above the horizon, a wicker basket being handed over heads in the lower left (fig. 7) and icicles.

Caen The style of the underdrawing is difficult to truly assess owing to the poor condition of the paint layer, which affects the quality of the infrared image. Distinguishable underdrawing lines are fine, wiry and often tapering. There is not much visible reworking during underdrawing. In the architecture there are no sweeping undulations in outlines but the lines are often jittery and not straight.

Arras Although difficult to visualize in many places, the underdrawing can be described as simple and hesitant, the artist strengthening and adjusting certain outlines during underdrawing. A good example of the Arras underdrawing style is provided by the hens motif (fig. 5). Architectural outlines 'wobble' in places but are usually relatively straight. As in the private collection version, the artist filled in the deep shadow of the door of the church with drawing lines. In a few draperies, hatching is present for tone.

Reflections on attribution Stylistic variations in the underdrawings among the copies suggest that more than one artist was involved in this phase of the production of the series. The mastery of form and similar character of the underdrawing lines in the Brussels and Vaduz versions may indicate they were executed by the same hand, although the underdrawing in the Vaduz version is not revealed sufficiently in the infrared reflectogram mosaic to allow a comprehensive comparison. The confident and rapidly executed underdrawing of the Lons-le-Saunier version reveals another artistic personality, not identified in any other copy. The other versions show various idiosyncrasies of style but their attribution to clearly distinct hands is problematic and merits further study.

fig. 15 Reserves in the paint layer. Details of IRR assemblies
 a–b tree reserved in boat paint: private collection [cat. 10] and
 KMSK
 c–d leg reserved in handle of cart: Bonnefantenmuseum
 and Brussels
 e–f hat reserved in cart wheel: Lille and Lons-le-Saunier



Paint layer

The various versions vary considerably in their material condition,⁷⁸ and therefore necessitate careful judgement when comparing their respective painterly qualities; despite this, the recent restoration of the majority of the paintings will greatly facilitate comparative examination of their painting techniques and style during the exhibition.

Use of reserves

In each copy, the artist carefully applied his paint layers according to the outlines in the underdrawing, reserving spaces for the forms to follow. This working method is clearly revealed in x-radiography and infrared reflectography⁷⁹ and helps deduce the order in which the various compositional motifs were painted (fig. 15).

The background sky and zones of snow (landscape and rooftops) were applied first, leaving spaces for all the large- and medium-scale figures, architecture, waggons, major tree trunks and some side branches, and for small motifs such as inn signs and the grain-pecking hens in the lower foreground. Even relatively insignificant motifs, such as the jug on the wall of the inn in the lower left, are sometimes reserved in the surrounding paint. Certain forms, however, were probably considered too small to reserve, even though they were planned in the underdrawing. These include the small-scale figures above and on the pond in the upper left. Certain tree branches were not reserved either; in both Antwerp versions, a large side branch of the tree in the centre is clearly painted over the roof and chimney paint of a house, and slight abrasion of the tree branch reveals the thicker brushstrokes of the underlying roof paint. This observation also confirms that the rooftop was painted before the tree. The boat in the centre left of the composition was also obviously painted before the trees, as the boat paint slightly overlaps the space reserved for the tree. Joseph's hat was clearly painted after the foreground waggons, for its space is carefully reserved in the darker paint of a waggon wheel, and the paint of the latter slightly overlaps into the space reserved for the hat; likewise, a figure carrying a tree stump to the left of the central waggon group was painted after the waggon handles, because the paint from the latter overlaps into the reserved space for the man's legs. In the Brussels version, a small figure in the upper right is reserved only for the top half of his body, which has the effect of giving the figure a strangely lighter-toned lower half where the snow paint shines through.

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fig.16 Setting sun, paint layer of original painting. Detail of fig.1

fig.17 Sun, paint layer KMSK. Detail of cat.1

In some versions, reserves in the snow paint are left unpainted or lightly scumbled to suggest distant landscape features; in these instances the *imprimatura* layer acts as the final paint layer, for example the pathway near the church and the river near the horizon (fig. 30).

The technique of leaving reserves in the initial paint layers preserves the effect of luminosity coming from the underlying ground and *imprimatura* layers, while on a more practical level it avoids lengthy drying times between layers. Pieter Brueghel the Younger's workshop used a system of reserves both in small- and larger-scale paintings and over a wide range of subjects.⁸⁰ The practice of reserving spaces for motifs in the background paint was also employed by Brueghel the Elder, although less systematically.

Palette

Brueghel the Younger's palette in his *Census* copies is intrinsically different from his father's original version. Rather than the muted display of colour and subtle tonalities in Brueghel the Elder's composition, where the figures blend into and form part of a cold, emotive landscape lit by the last rays of the red setting sun, the son's versions offer a tonally contrasted scene enlivened with figures dressed in bright red, yellow, blue, green and white, while the time of day is unspecified in the absence of the setting sun.⁸¹

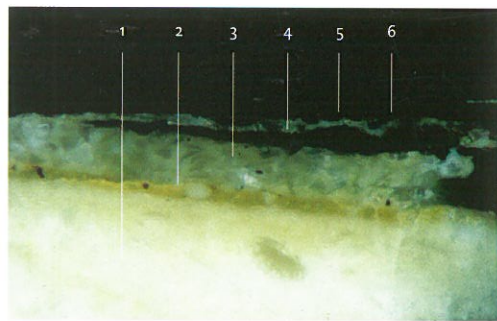
The only figure for which Brueghel the Younger consistently retained the original colour scheme of his father is that of the Virgin, whose robe is blue in both the original and the copies, although this could be due to traditional Marian colour symbolism. Nevertheless, she wears a light creamy-coloured undergarment in the original, which is transformed to red in the copies. The bundle carried by the male figure in the lower right is red in the original and also remains red in the copies.

For the most part, the figures in Brueghel the Younger's *Census* copies have differently coloured draperies as compared to the original version. These new colours are often repeated in all the copies. The large pair of figures in the lower right corner provides an example of this. In the original version the male figure is dressed in dark grey-black, while the female figure wears a dress with a black bodice, red skirt, green underskirt, white apron and a black hat over a white headdress. In the copies, the male figure wears a brown coat and the female figure's colours are almost a reverse of the original – green dress, red underskirt and blue apron. Her bodice and hat remain black and the headdress remains white. Another example is the

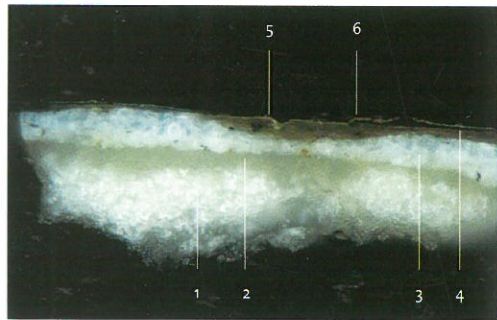


figure tending plants in the leper's garden in the centre right of the painting. In the original picture the figure wears a long greenish-blue cape, white shirt and white circular hat; in the copies the figure is dressed in a highly decorated yellow cape, a dark blue or green shirt and a white circular hat with markings.

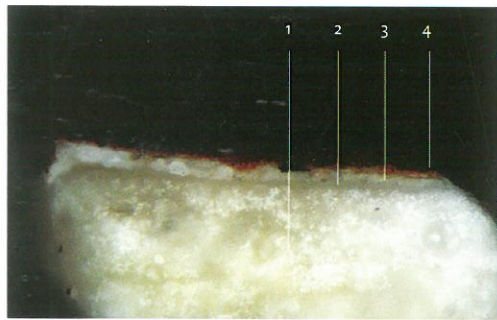
Changes in colour between the original and the copies also apply to other motifs. The most obvious change is the red setting sun, absent in all the copies except the KMSK version, where it is painted yellow (figs. 16, 17). The group of hens above the sunken boat in the upper left are picked out with bright colour in the copies, whereas they appear a dull brown in the original. In the copies, the flames of the two small fires are painted in bright red and yellow paint, as opposed to the original's white with a yellowish tinge. In addition, the red blood of the pig in the lower left is more abundant in the copies than in the original.



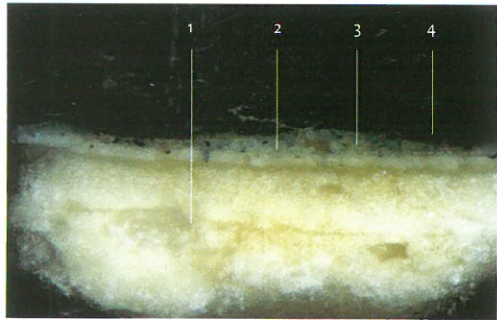
A Brussels: snow-covered tree branch in sky
 6 snow (lead white, calcium carbonate, earth pigment)
 5 snow (lead white)
 4 tree (earth pigment, umber, copper-based pigment)
 3 sky (smalt, lead white)
 2 imprimatura (lead white, calcium carbonate, earth pigment, umber)
 1 ground (calcium carbonate)
 (original magnification: x400)



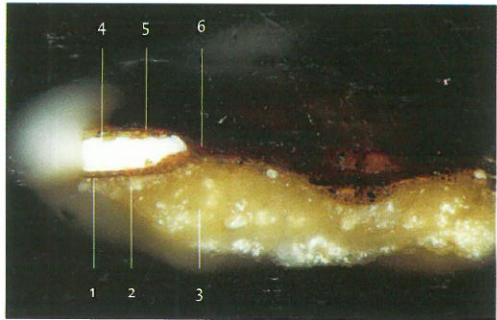
B KMSK: sky
 6 varnish
 5 tree (black particles)
 4 sky (smalt, lead white)
 3 grey underlayer, probably continuation of imprimatura (lead white, calcium carbonate)
 2 thin imprimatura (charcoal, ochre)
 1 ground (calcium carbonate)
 (original magnification: x400)



C KMSK: red brickwork of inn
 4 red brick colour (red earth, black particles)
 3 grey underlayer, probably imprimatura (lead white, calcium carbonate, black particles)
 2 layer of medium
 1 ground (calcium carbonate)
 (original magnification: x400)



D KMSK: frozen pond, lower right
 4 bluish-white ice (lead white, azurite, yellow ochre)
 3 grey underlayer, probably imprimatura (lead white, calcium carbonate, earth pigment)
 2 layer of medium
 1 ground (calcium carbonate)
 (original magnification: x400)



E Mayer van den Bergh: snow on tree, upper edge
 6 brown layer (earth pigment, vermilion, lake, lead white, calcium carbonate, earth pigment)
 5 brown, medium-rich layer(s) (earth)
 4 white snow highlight (lead white)
 3 brown layer (umber, earth pigment, calcium carbonate, lead white)
 2 grey underlayer, probably imprimatura
 1 ground (calcium carbonate)
 (original magnification: x320)

Certain draperies vary in colour from copy to copy. These mostly concern small- and medium-sized figures. For example, women's and children's aprons alternate between white and blue, and reds alternate with light brown or dark grey in trouser hoses, head caps and skirts. When these colour variations are seen in the context of the entire series of the thirteen known copies, certain groupings of similar copies appear to emerge (see below, *The copying process*).

Paint layer structure and pigment analysis

Cross-sections⁸² were taken from the three copies in Belgian public collections and show just one or two thin paint layers on top of the ground and imprimatura layers (fig. 18).

In the sky and snow, cross-sectional analysis⁸³ revealed similar pigments and paint layer structure. In the three versions analysed, the light blue sky proved to be composed of a single, thin paint layer containing mainly lead white and the blue pigment smalt, lying over the imprimatura and ground layers (figs. 18A and 18B). Interestingly, the restoration of the Brussels version revealed a light blue strip of paint along the upper edge, in an area protected from light by the frame. The rest of the sky has a grey colour, perhaps due to the fading of the smalt.⁸⁴ The snow paint in all samples was revealed as a simple mixture of mainly lead white and black particles, with some samples showing in addition a little chalk and azurite.

In the KMSK version, the red brick of the inn is composed of thin paint layers (fig. 18C). The lower layer, either the imprimatura or an underpaint, consists of lead white and chalk. An iron oxide pigment and a few black particles were identified in the upper red layer. The former is probably responsible for the red coloration of the upper layer, since no vermilion was detected.

The frozen pool of water in the lower right of the KMSK version consists of a thin, light blue layer containing azurite, lead white and yellow ochre (fig. 18D).

A snowy highlight of a tree in the sky zone of the Mayer van den Bergh version revealed a complex layer structure (fig. 18E). The tree paint consists of several thin layers containing umber, ochre, chalk and small grains of lead white, some layers more medium-rich than others. The highlight of pure lead white is superposed on these layers and surmounted by a thin brown transparent layer containing vermilion, a few tiny lead white particles, an iron oxide pigment, a lake and a few black particles. In the Brussels version, a sample from a snow-covered tree branch in the upper right sky showed a single layer of sky paint, composed of

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lead white and smalt, followed by a single, brown paint layer representing the tree, containing a copper-based pigment, an iron-containing pigment and an umber, superposed by the snow paint, consisting of a thin layer of lead white followed by a bluish-white layer containing lead white, an iron-containing pigment and calcium (fig. 18A).

Draperies and figures were not studied by cross-sectional analysis for ethical reasons.⁸⁵ None the less, visual analysis suggests that draperies generally comprise a single opaque layer of paint, surmounted in places by linear details in transparent and opaque paint for decorative patternwork and outlining.

In most versions, the bright reds show a discoloration to mauve or black to a greater or lesser extent, which is typical of a physical change in the pigment vermilion on ageing. This discoloration is particularly disturbing in the Brussels, KMSK, Bonnefantenmuseum and Lille versions, while it does not seem to affect the Vaduz and Mayer van den Bergh copies. Certain red draperies in the original version of *The Census at Bethlehem* by Bruegel the Elder are also affected. The problem has been linked to a change in the crystalline structure of the pigment vermilion to its black form. A variety of contributory factors may be responsible for this change, such as mineral impurities, heat and light.⁸⁶ Pieter Bruegel the Younger's paintings frequently display this phenomenon. The discoloration of red to mauve has been observed by the author in works of other Flemish painters, including *Tavern* (Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 875) by Jan van Amstel (1500–1540) and *Before a Tavern* (Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 345) by David Teniers the Younger (1610–1690); however, it seems to affect the work of Bruegel the Younger more often and to a much greater extent than that of other artists.

Painterly brushwork

As with their respective underdrawings, the ten *Census* copies all share certain brushwork techniques to a greater or lesser extent. Taken together, these techniques characterize Bruegel the Younger's workshop style. A characteristic expression of this style is the outlining of motifs with a fine painted line to clarify form and gesture, in a manner similar to modern comic strip illustrations. Most colours have brown or black outlines except red draperies, which are usually outlined in a transparent red. Features of male faces are often 'drawn on' with fine dark paint strokes. Female faces typically have fine

white vertical brushstrokes to accentuate the lower edges of the eye sockets. Other common features include wet-in-wet brushwork for minor details, for example the small trees in the far distance, which are often painted into still-soft sky paint (fig. 30), and footprints in the snow, made by introducing a little grey paint into the still-soft white snow paint. Occasionally, seams of clothing are suggested by incising a line into soft paint with a pointed instrument, without introducing fresh paint. Certain deep blues often show a similar 'brushy' application and the back of the brush or another hard instrument may have been used in some cases to introduce texture (fig. 19).⁸⁷ Highlights and other small details, such as embroidered decoration on certain garments, are often added on top of dry paint, late in the painting process.

Stylistic variations among the copies

Despite similarities in brushwork, some key stylistic differences between the ten copies suggest that they were not all painted by the same hand.

Brussels The Brussels version shines out as one of the most accomplished of the series in terms of paint handling, anatomy and comprehension of gesture. Faces are particularly expressive. These qualities are seen over a wide range of motifs. Despite significant paint loss, the recent restoration of the painting reveals a refinement and subtlety in the application of paint, previously masked behind a thick layer of yellow varnish and discoloured overpaint.

Vaduz The Vaduz copy, clearly in better condition than the Brussels version, shows a similar painting style. Faces and gestures are equally expressive and well understood. Draperies are likewise painted in a delicate, painterly manner.

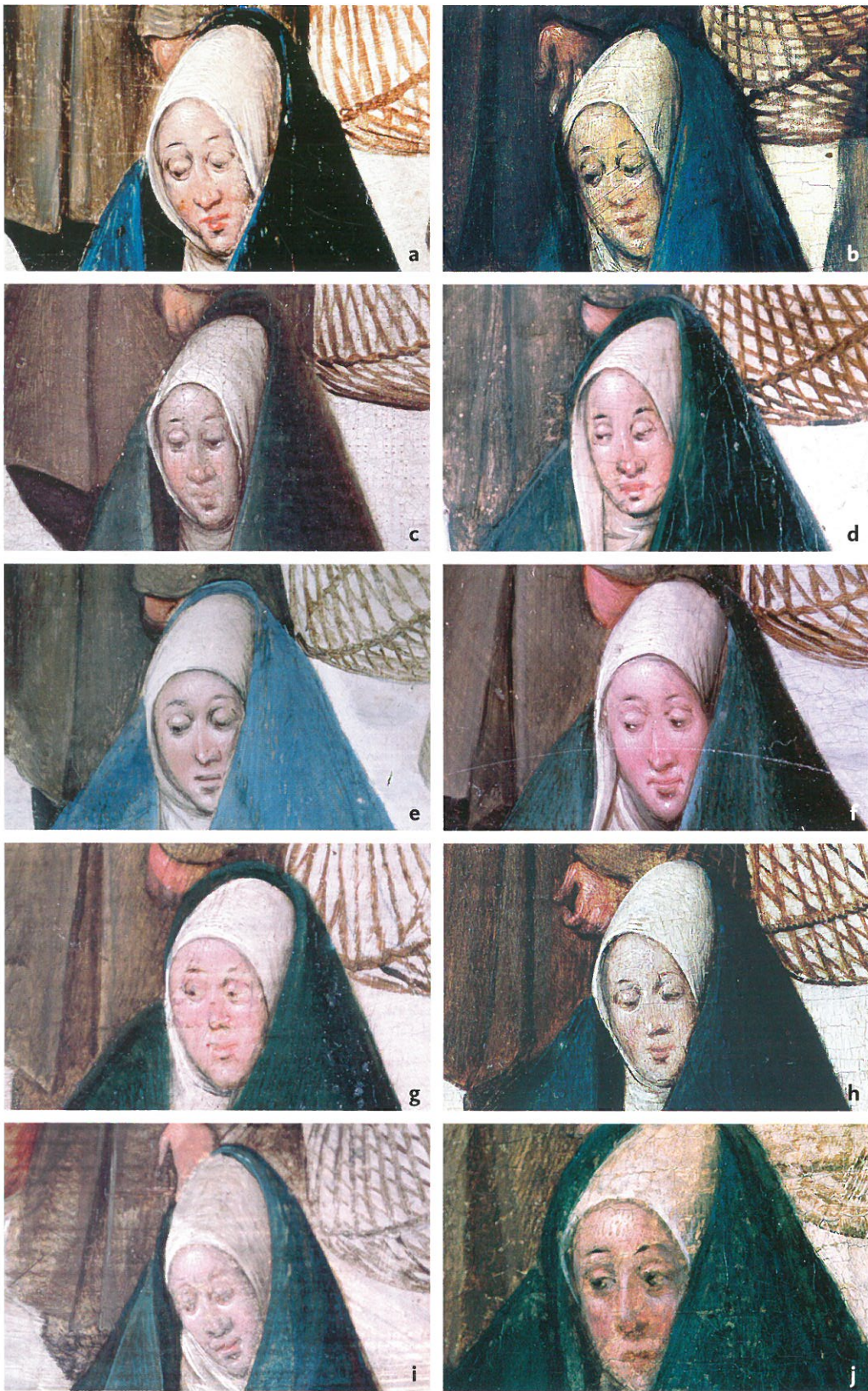
Lille Like the Brussels and Vaduz versions, the Lille version shows an excellent three-dimensionality in the figures, anatomy is generally well mastered and fine detail is rendered with delicate brushwork and subtle modelling. Faces are often quite expressive. There are nevertheless problems of proportion in certain motifs, for instance the figure carrying a basket on his back, to the rear of a group of three on the lower right of the frozen pond in the upper left. The Lille version also shows less spontaneity in the application of paint than the Brussels and Vaduz versions. However, the painterly style of the Lille version might be influenced by the use of canvas rather than wood as support.

fig. 19 Woman holding pan, paint layer KMSK. Detail of cat. 2 (seen in raking light). A pointed instrument may have been used to create texture in the blue paint of the apron.



fig. 20 The Virgin's face. Details of paint layer of ten copies

- a Vaduz
- b Brussels
- c Lille
- d Mayer van den Bergh
- e KMSK
- f Bonnefantenmuseum
- g Lons-le-Saunier
- h private collection [cat. 10]
- i Caen
- j Arras



Lons-le-Saunier Of all the copies, the Lons-le-Saunier version shows the most slickly stylized treatment of forms and figures, with little attempt to portray true anatomy. The figures are painted swiftly and confidently, using fluid outlines, while the corners of draperies are often rounded off. The result is a formulaic and polished appearance. The artist also simplified the folds in headdresses and made frequent use of hatching strokes during painting.

Bonnefantenmuseum The Bonnefantenmuseum version has roundly modelled, expressionless faces with shiny cheeks, chins and foreheads. Figures are fairly stereotyped and drapery folds unconvincing. Anatomical proportions are often impossible, heads are squashed down on the necks or too small relative to the bodies.

KMSK The KMSK version is highly accomplished in many respects; however, figures are often weakly proportioned and lacking the subtlety of the Brussels and Vaduz versions.

Mayer van den Bergh The Mayer van den Bergh version shows relatively unrefined detail with coarser brushwork than the majority of copies. Faces are formulaic and inexpressive and figures often awkwardly posed, with unconvincing proportions. Despite all this, the brushwork style and structure of draperies strongly resemble the KMSK version in many areas.

Private collection The private collection version shows certain idiosyncrasies of painterly style which distinguish it from the others; these include thicker paint build-up and a particularly high level of finish in the brushwork. However, the artist often fails to understand the meaning of gestures and motifs and his portrayal of anatomy is not convincing.

Caen The paint layer of the Caen version is quite abraded, which makes a comprehensive assessment of its painterly style impossible. Even so, it is clear that faces are portrayed in a relatively painterly manner and to a fairly high level of anatomical detail; figures, however, are often caricatured and poorly proportioned, appearing elongated or thin in places. The painted outlines of figures are sometimes overly bold and stylized.⁸⁸

Arras Like the Caen version, the poor condition of the Arras version prevents a proper evaluation

fig. 21 Male figures playing snowballs. Details of paint layer of ten copies
 a KMSK
 b Arras
 c Bonnefantenmuseum
 d Caen
 e Lille
 f Lons-le-Saunier
 g Mayer van den Bergh
 h private collection [cat. 10]
 i Vaduz
 j Brussels

of its style. None the less, the Arras copy shows strongly modelled faces, with thickly impastoed highlights. However, as with the Caen version, poses of figures are often weak, stiff and caricatured, with little attention to fine detail.

Cross-comparisons and reflections on attribution Cross-comparison of selected details points up differences in mastery of form, anatomical correctness and expression among copies.

The Virgin's face provides a good example of the high artistic achievement of the Brussels, Vaduz and Lille versions (fig. 20). In these three copies, she casts a sweet and intimate glance at the viewer and the face is well proportioned. Stylistically, the Brussels and Vaduz copies share a simple, loose, unblended manner of modelling with similar short, painterly, vertical brushwork under the eye sockets. The Lille version, although well executed, exhibits a slightly different style with tighter, more blended modelling. The Bonnefantenmuseum and KMSK copies display delicate, softly blended brushwork and convincing proportions, but the Virgin's expression is blank and insipid. The Mayer van den Bergh version does not master the proportions of the face. Here, the artist has clearly sought to imitate the Brueghel workshop style using short, vertical lines under the eye sockets; however, these strokes are rather studiously applied and lack the natural spontaneity of the corresponding strokes in the Brussels and Vaduz versions. The Virgin's face in the Lons-le-Saunier version is a virtual caricature, crudely rounded and totally lacking in expression. In the Caen copy, the Virgin's face is placed at an interesting angle and appears to be relatively well proportioned; however, abrasion of the surface prevents a full appreciation of its qualities. The Arras version is impossible to judge owing to the presence of later retouching. The Virgin's face in the private collection version has been carefully and diligently executed, in spite of some problems of proportion.

The motif of two male figures playing snowballs in the upper centre of the painting reveals significant differences in painterly style and anatomical mastery (fig. 21). The Brussels and Vaduz versions' figures are executed in the most painterly manner, with considerable spontaneity of brushwork. Furthermore, the figures are soundly constructed from an anatomical point of view and show a natural sense of movement. The Lille version shows careful and delicate modelling and also a good understanding of anatomy. Both the private collection and the Mayer van den Bergh versions give the snowball



fig. 22 Hens. Details of paint layer of nine copies

- a private collection [cat. 10]
- b Brussels
- c Vaduz
- d Lons-le-Saunier
- e Mayer van den Bergh
- f KMSK
- g Bonnefantenmuseum
- h Arras
- i Caen

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thrower impossible anatomical proportions, the torso being too big for the legs. The head of the crouching figure in the KMSK version appears too small for its already strangely proportioned body; however, the snowball thrower shows a good sense of forward movement and sound anatomy. The Bonnefantenmuseum version shows a reasonably well-constructed snowball thrower but the pose of the stooping figure is poorly mastered and somewhat caricatured. The Caen and Arras versions depict simply conceived figures, with no naturalistic detail. The figures in the Lons-le-Saunier copy are slickly painted in a formulaic manner, lacking detail and sense of movement.

The dog in the upper centre of the composition provides another interesting comparison, the Vaduz and Lille versions' dog being the most naturalistic and anatomically correct (the Brussels and Lons-le-Saunier dog is only present at the level of the underdrawing). None of the other copies' dogs exhibits the sense of movement of these two versions.

The group of hens in the lower centre of the painting highlights the more painterly style of the Brussels and Vaduz versions (fig. 22). In these versions, delicate and lively brushwork gives the birds a pleasing, naturalistic appearance. In the other copies, the hens are painted in a more formulaic manner.⁸⁹

Suggesting attributions from the stylistic evidence is not straightforward, as differences between the copies may also be influenced by other factors, such as speed of working, date of execution and the material condition of the works of art, all of which could affect the level and quality of detail. Nevertheless, the comparison of details suggests that the Brussels and Vaduz versions were painted by a highly accomplished hand distinct from the other copies. These two copies show a consistently good understanding of anatomy, sense of movement and characterization of gesture as well as a unique and pleasing spontaneity in the handling of paint.

Could the Brussels and Vaduz versions represent the hand of the master himself, at both the level of the underdrawing and paint layers? The fact that these two versions are signed and dated would seem to support this hypothesis, even if the private collection version and the KMSK version, clearly not of the same calibre, are also signed. Matching the Brussels and Vaduz versions in many places, the Lille copy, although clearly executed with infinite care and considerable skill, appears to have a more 'polished' and blended brushwork style, while certain forms do not show the same high level of anatomical

mastery. Further study is therefore necessary before a reasoned judgement can be given as to its attribution. The other versions may represent the work of a variety of students and journeyman painters, each differing in style and artistic capabilities.

Evidently, the bringing together for the first time of most of the known versions of the composition during the exhibition presents an ideal opportunity for re-evaluating the difficult question of attribution, particularly regarding the Lille version.

Hidden signatures of workshop assistants?

The private collection version presents an original painted inscription on the door of the house of the leper (fig. 23). The lettering is tiny, mostly illegible and written in a stylized calligraphic manner quite unlike the handwriting of Pieter Brueghel the Younger's signature, which appears on the flat end of a barrel in the centre foreground of the composition. The letters do not resemble any known alphabet; however, when the inscription is examined in a mirror, the words 'van kan...' seem to appear, followed possibly by one or two illegible letters.⁹⁰ This might be the hidden signature of the artist responsible for this particular panel, because the words do not seem to relate to the motif of the leper or his abode.

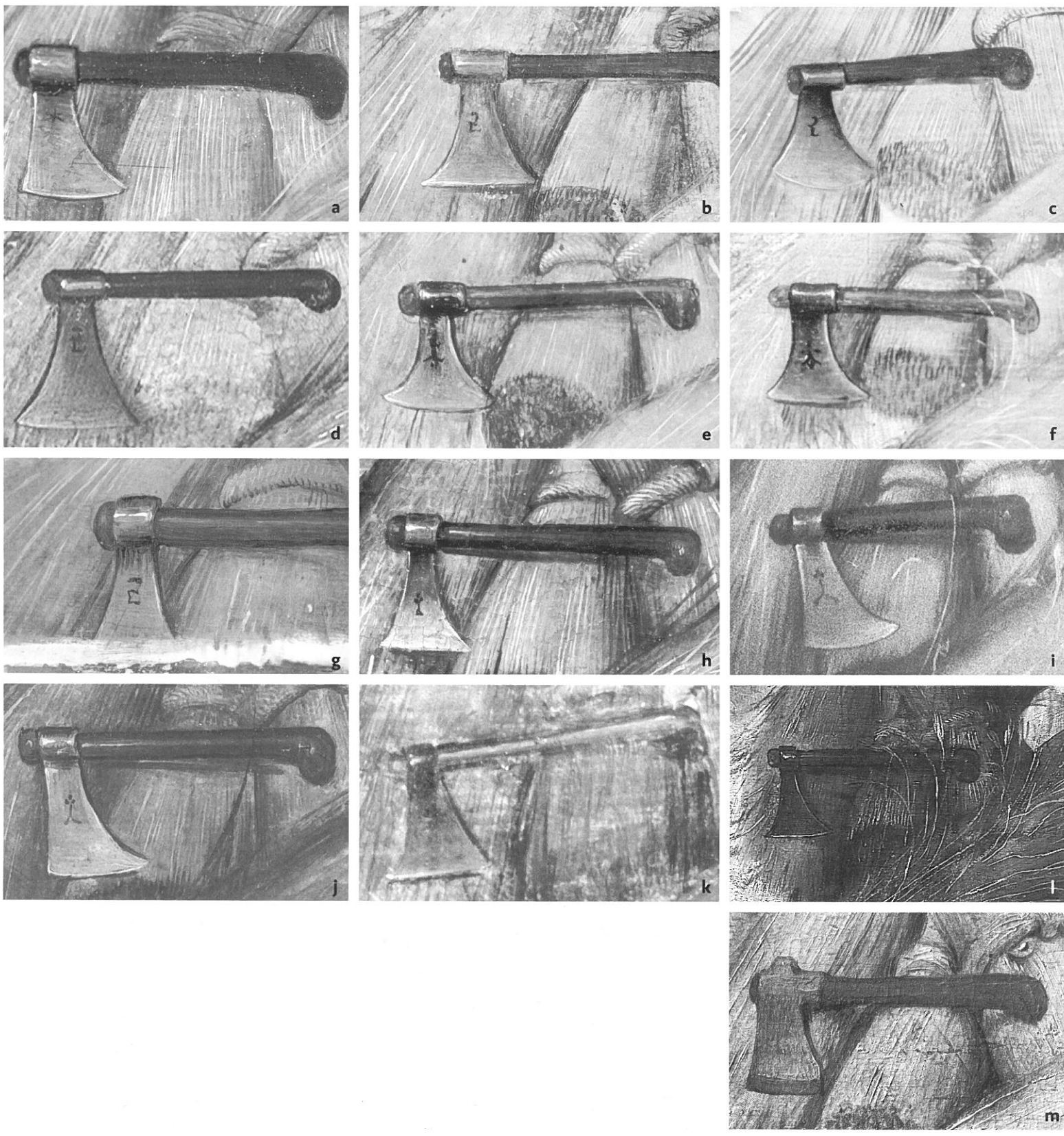
On almost every version of the *Census* paintings, there are small painted symbols on the axes in the lower left foreground (fig. 24).⁹¹ These symbols might at first glance be interpreted as marks or 'signatures' of studio hands; however, they may merely illustrate a practice dating from after 1300 whereby tools were sometimes stamped with the personal mark of the maker. This was to certify the quality of the product, to identify the maker in case of problems and to distinguish the tool from those made in competing towns.⁹² Axes would have only been made by the *witwerkers*, who were part of the Blacksmiths Guild. Imports were strictly controlled. The individual smiths had their own marks, plates of which were kept at the guild, together with the names of the artisans. Unfortunately, no such plates have survived, so it is impossible to identify individual workers. Some regulations, which varied from town to town, date as far back as the fifteenth century.⁹³ Whether or not the axe in Bruegel the Elder's original version is similarly marked is not clear; ambiguous dark brushstrokes on the axe may represent some form of marking. Markings are also painted on the axe in the foreground of various versions of Brueghel the Younger's



Autumn. Of the versions of *Autumn* where illustrations could be consulted, the symbols can be seen to vary from copy to copy, and are unlike any of those observed in the *Census* series.⁹⁴ A further argument against the interpretation of these markings in the *Census* copies as hidden signatures is that they appear not to follow the division of the copies into groups according to motif and colour.

fig. 24 Axe. Details of paint layer of twelve copies and original painting. The small symbols on the axes may represent the witwerkers' marks.
 a Bonnefantenmuseum
 b Mayer van den Bergh
 c Lons-le-Saunier
 d Arras
 e Vaduz
 f Lille
 g KMSK
 h private collection [cat. 10]
 i private collection [cat. 11]

j private collection [cat. 13]
 k Caen
 l Brussels
 m original painting



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The copying process

Sequence

The model for the copies: two major possibilities

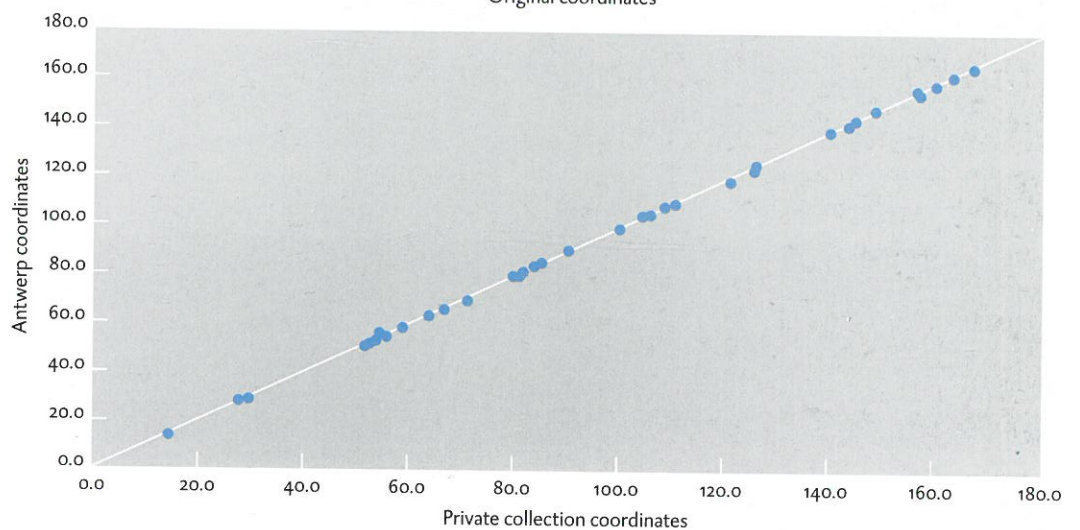
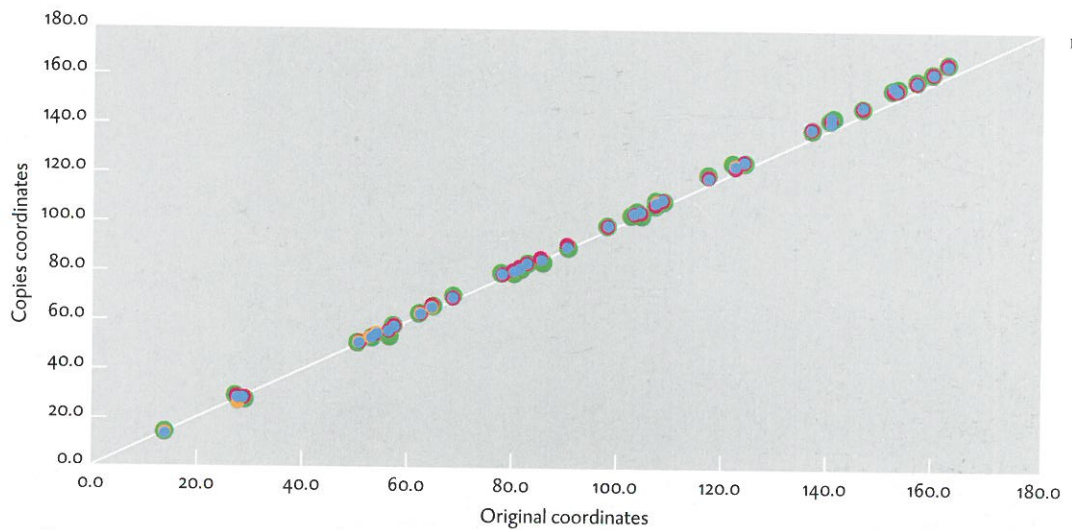
The initial model for Brueghel the Younger's *Census at Bethlehem* copies was most likely either the original painting by Bruegel the Elder or a preparatory compositional drawing by him, now lost. Other possibilities include a project for an engraving by Pieter Bruegel the Elder or an engraving taken after the painting by another artist. However, since no engravings of the composition have survived or are even referred to in the extant contemporary literature, these latter possibilities are remote, particularly as there are no known engravings of his other large-scale paintings.

It is not known whether Pieter Brueghel the Younger saw or had access to his father's original painted version of *The Census at Bethlehem*, because its provenance is unknown before the nineteenth century. It may have been in the Southern Netherlands at the time (see the contribution on provenance by Dominique Allart in this catalogue).

The case in favour of Brueghel the Younger having seen and copied the original painted composition resides primarily on the fact that the proportions and placement of the motifs in the painted compositions of at least four of the copies and the original correlate exactly (figs. 25, 26 and Appendix 1).⁹⁵ Interestingly, although these four copies are almost identical in size, they are 102 to 103% larger in scale than the original painting.⁹⁶ This suggests that Brueghel the Younger could have copied the original painting, albeit on a slightly larger scale, using an enlarging technique such as squaring-up.

The hypothesis that Brueghel the Younger worked directly after the original painting is supported by the observation that the underdrawing of the original includes a few minor motifs, which were dropped at the painting stage and none of which is included in Brueghel the Younger's copies: two small 'v's in the roof of the building in the upper right, which might represent small dormer windows; a side branch to the right of the large tree on the left; and a strange form on the roof of the inn on the left, perhaps the beginning of a tree trunk. Moreover, a few key colours in the copies correlate with those in Pieter Bruegel the Elder's version. These are the red and green garments of the large figure of a woman in the lower right,⁹⁷ the red bundle held by the male figure to her left, and the blue robe of the Holy Virgin.

fig. 25 Correlation between the proportions of the composition of the original version and four copies. The graph shows that the original version is proportionally similar but slightly smaller in scale than the copies.



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The case for a preparatory compositional drawing by Pieter Bruegel the Elder

There are even stronger arguments in favour of a preparatory compositional drawing by Bruegel the Elder as initial model for his son's copies. Although, as with all Bruegel the Elder's paintings, no preparatory material for the original composition has survived, the nature of the underdrawing on Bruegel's original panel points to the use of a preliminary drawing of the composition. The underdrawing is relatively detailed and there are no major areas of reworking or important changes, either at the level of the underdrawing or during the stage of painting. This implies that the painting was carefully planned prior to underdrawing, probably by means of a full compositional study, which may have been supplemented by detailed drawings of important motifs.

fig. 27 Man with horses. Details of paint layer

- a original painting (see fig. 1): the man is bending his body forwards in his efforts to advance the cart.
- b Mayer van den Bergh: in the absence of the cart, the man's leaning posture is odd; the slack rope now attached to the horses does not change this.

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Key elements missing in the copies The fact that certain key motifs are present in the original painting but missing in all thirteen copies could suggest that Brueghel the Younger copied a preliminary study by his father lacking these elements. The importance of these motifs to the original composition, in particular the seated figure putting on his skates and a large bird on a barrel in the lower right, is such that Brueghel the Younger would almost certainly have included them had he been aware of them.⁹⁸ Another motif absent in all copies is the red setting sun. The presence of the sun in the KMSK version, where, however, it is painted yellow, suggests that Brueghel the Younger may have seen the motif in a preliminary drawing by his father (figs. 16, 17).⁹⁹ Yet he would not have been aware of its vivid red colour and its dramatic impact in the original painting, which may explain why he left it out of his other copies. A less significant omission is a cart in the background, just behind the house under construction; in the original, a man pushes

a cart and two horses stand behind him, whereas in all the copies, the man pulls the two horses along (fig. 27).

Key elements transformed in the copies Certain features of the original composition are transformed in all the copies. These include the large tree on the left, complete in the original and missing its upper part in the copies; the tree in the centre of the composition, dead in the original and alive in the copies; the house under construction, which has no roof in the original and is partially roofed in the copies; and the chimney of the leper's house, wicker in the original and solid brick in the copies. Many more small changes are listed by Ertz.¹⁰⁰

These transformations are consistent with Brueghel the Younger copying a preparatory drawing by his father showing an earlier version of certain elements, although they may also have been purposefully introduced by Brueghel the Younger while he made his own version of the composition. In all likelihood Brueghel the Younger copied an original drawing of the composition that was incomplete or simply not detailed enough in places, and thus was forced to invent certain details in his copies.

Misinterpretation of original motifs An even stronger argument for Brueghel the Younger copying a preparatory drawing rather than the original painting is the presence of motifs in all the copies that appear to derive from a misunderstanding of the corresponding ones in the original painting.

A telling example of a misinterpreted motif is a hole in the ice in the lower right pond, transformed in the copies into a diamond-shaped patch of snow, probably concealing a rock (fig. 28). Similarly, a wheel without spokes, leaning against a barrel before the wall of the large central house, has been transformed into a sack in all the copies (fig. 29), while a narrow tree with leafless branches to the left of the aforementioned barrel is changed into a strange-looking bare pole or tree trunk. The original's male figure with a child on the river bank in the upper left has become a mother and child in the copies. A final example is provided by the brown wicker basket held by the Virgin in the original version; it is translated into an area of black paint, approximately resembling a basket in some of the copies and a more amorphous form in others. It is easy to see how Brueghel the Younger might differently interpret these features if he were following a preparatory line drawing rather than the original painting.

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Elements in underdrawing of original, dropped during painting but repeated in copies

If elements from the underdrawing of the original painting, dropped at the level of the paint layer, were found in the copies, they would straightforwardly corroborate the thesis propounded here, namely that Pieter Brueghel the Younger copied a preparatory drawing by his father. Unfortunately, no clear-cut examples were found. One possibility, however, is the large tree on the left. In the original version's underdrawing, the branches extend much further to the left than in the paint layer (fig. 2). The position of these underdrawn branches matches more closely that of the corresponding branches in the copies than their painted location. Interestingly, Rebecca Duckwitz found clearly unambiguous elements in the underdrawing of Brueghel the Elder's original version of *The Proverbs*, which were dropped during painting and taken up by Brueghel the Younger in his copies (see Rebecca Duckwitz's essay in this catalogue).

Colours A key argument to decide the issue of the model used by Brueghel the Younger is that the colour scheme in the copies is almost entirely different from that of the original and that none of the versions shows the same time of day as the original. In addition, the colours vary from copy to copy. The few coincidences of colour in the clothing of the couple in the lower right corner could be explained by the presence of colour notes on a preparatory drawing (see Rebecca Duckwitz's essay).

The evidence seems to favour the argument that Brueghel the Younger used a preliminary drawing by his father, rather than the original painting, as the initial model for his copies of *The Census at Bethlehem*. We have no way of knowing the size of this original model, although the positive correlation in proportion between the composition of the original painting and the copies suggests that it must have been a scaled drawing of some kind.

In a comparative study of Brueghel the Elder's *Triumph of Death* and copies by his two sons, Pieter and Jan, Jacqueline Folie and Françoise van Hauwaert found similar evidence to support the hypothesis that the sons did not see the original painted version, and that a missing link, probably a preparatory drawing, served as model.¹⁰¹ Hélène M. Verougstraete and Roger A. van Schoute suggested that an engraving may have been the sons' model for that painting.¹⁰² Based on her study of the underdrawing of Brueghel the

fig. 28 Detail of paint layer, lower right corner

- a Original painting: note the figure putting on his skates, the bird on the barrel and the large hole in the ice.
- b In the copies the figure and the bird are absent, while the hole in the ice is transformed into a diamond-shaped mound of snow.



fig. 29 Central house. Details of paint layer

- a Original painting: note the ring leaning against the barrel and the poles and wheel leaning against the wall.
- b In all the copies the ring is transformed into a sack, while the wheel and poles are absent in all the copies' paint layers.



Elder's *Sermon of Saint John the Baptist*, Suzanne Urbach tentatively suggested, pending further research, that a cartoon might have been used by Brueghel to transfer the main figures and that this same cartoon might have been reused by his sons for their copies of the composition.¹⁰³ Moreover, Rebecca Duckwitz's recent findings regarding Brueghel the Elder's *Proverbs* and their relation to the copies by Brueghel the Younger show that the son must have copied some form of preparatory drawing by his father rather than the original painting (see also Rebecca Duckwitz's essay in this catalogue).

Six variants of copies

The copies of *The Census at Bethlehem*, although extremely similar, show minor variations in drapery colour and motifs. Even though a cursory view of the series might convey the idea that these differences are totally random, closer study reveals remarkably close affiliations between certain versions that sort them into four distinct groups, with two paintings lying outside (Appendix 2).

Within each group, drapery colours and motifs are virtually identical, with minor exceptions. Motifs varying across the entire series, but usually remaining the same within a group include: the group of figures huddling around the fire in front of the central house and the small group of figures to the right of it (fig. 33); the small group of soldiers and civilians near the

fig. 30 Willow trees, upper left landscape vista. This series of details illustrates how the *Census at Bethlehem* copies divide into four groups, with two paintings lying outside.

- a Arras, underdrawing
- b Lons-le-Saunier, underdrawing
- c Mayer van den Bergh, paint layer
- d KMSK, underdrawing
- e private collection [cat. 10], paint layer
- f private collection [cat. 11], paint layer
- g private collection [cat. 13], paint layer
- h Vaduz, underdrawing
- i Lille, paint layer

- j Brussels, paint layer
- k Caen, underdrawing
- l private collection [cat. 12], paint layer
- m Bonnefantenmuseum, paint layer

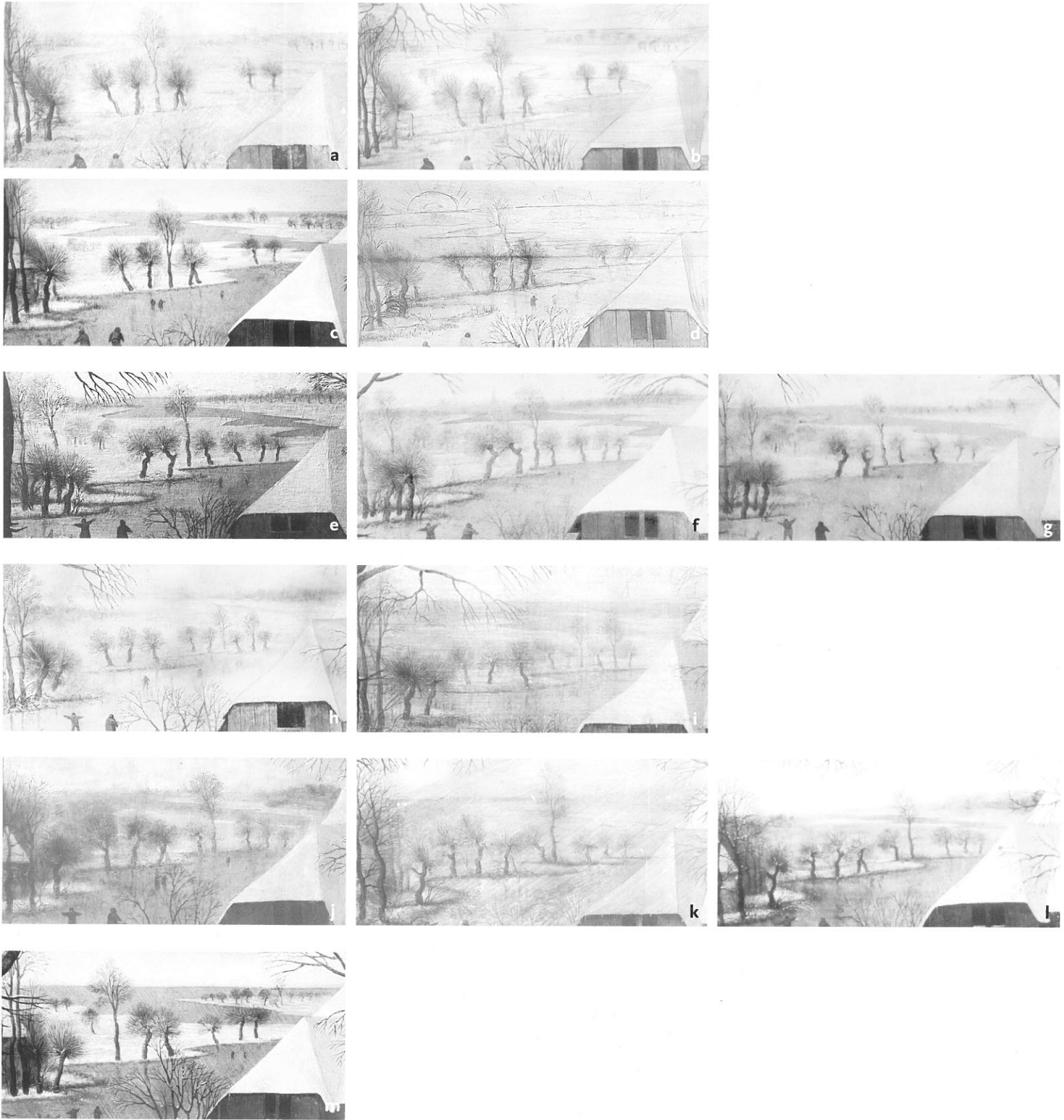


fig. 31 Diagram showing the copying process hypothesis
 Group 1: Mayer van den Bergh, Lons-le-Saunier, Arras
 Group 2: three private collections [cat. 10, 11, 13]
 Group 3: Vaduz, Lille
 Group 4: Brussels, Caen, private collection [cat. 12]

□ Drawing
 ■ Painting

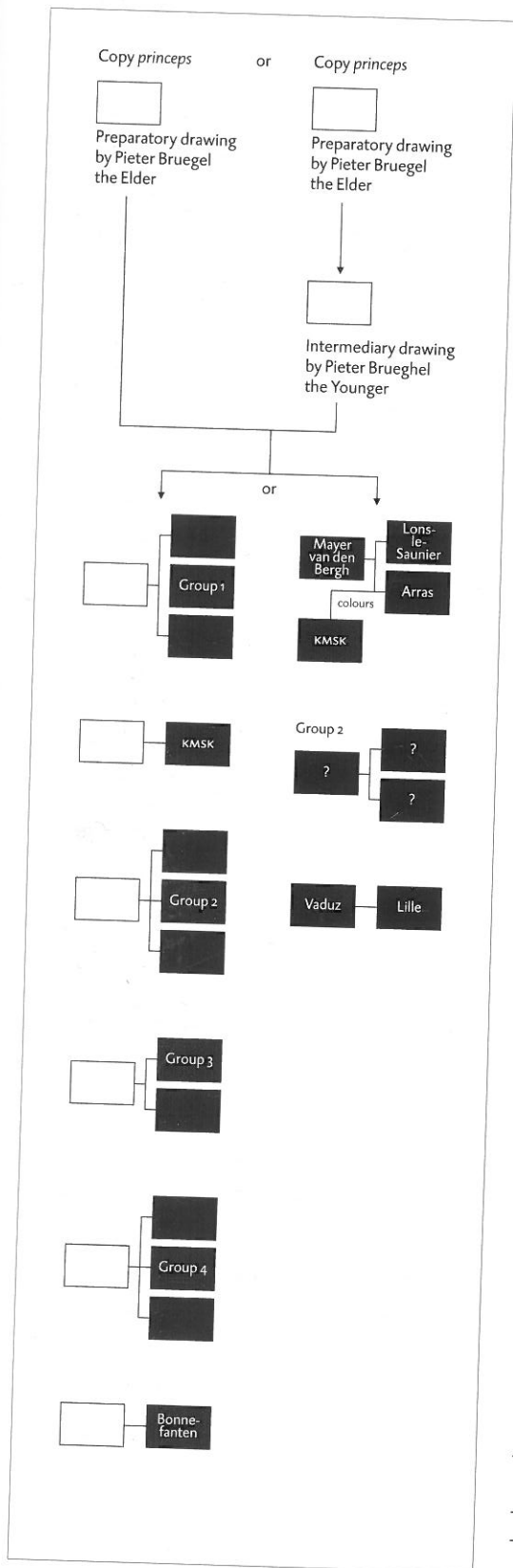
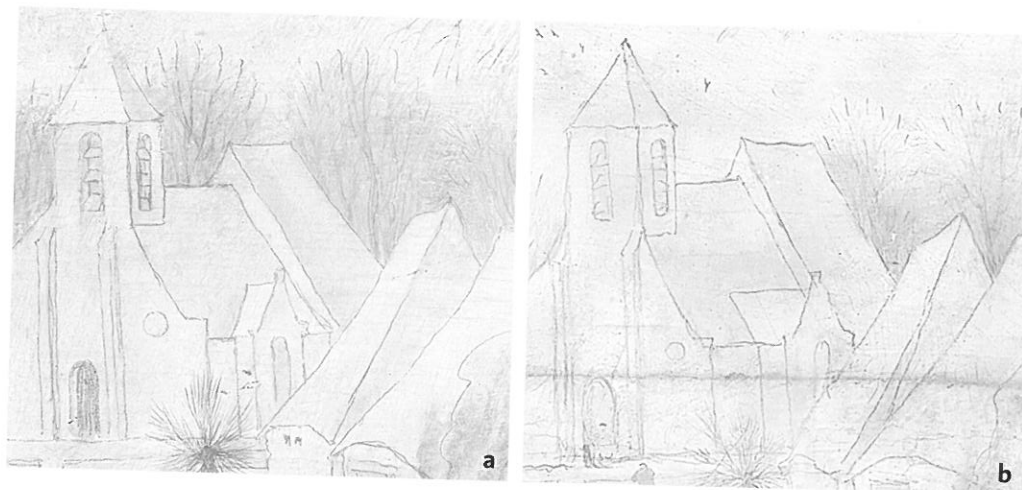


fig. 32 Underdrawing of the church. Detail of IRR assemblies.
 Note the differently shaped side gable.
 a private collection
 b KMSK



centre right edge; the set of small willow trees bordering the frozen river in the upper left landscape vista (fig. 30); the arrangement of small-scale figures above and on the pond in the upper left; the finishing of the façade of the central house; the position of a house in the upper right, whose left gable is seen in some copies and whose right gable is seen in others; the distribution of shuttered windows in the central house; the number of children (one or two) on toboggans in the lower right; the number of wooden stakes (one or two) bordering the pond in the lower right; and the number of logs on the ground in the lower right (two or three). Interestingly, the small painted symbols on the axe in the lower left foreground, where visible, remain consistent according to group. This supports the idea that, rather than representing the personal sign of the artist responsible for a particular copy, they relate to axe-makers' marks (fig. 24). In addition, the following motifs are absent in some groups: the diamond-shaped snow mound in the lower right; the half-sunken barrel in the lower right; the dog in the upper centre; the bowed grille on a window of the inn in the lower left; a small tree crossing a rooftop in the upper right; a document held by a figure in the lower left corner; the knife on the belt of the boar slaughterer; the town on the horizon; and a side turret on the rightmost ruined tower in the upper right.

The groups are composed as follows:

- Group 1: Lons-le-Saunier, Mayer van den Bergh and Arras;
- Group 2: three private collection versions [cat. 10, 11, 13];
- Group 3: Vaduz and Lille;
- Group 4: Brussels, Caen and a private collection version [cat. 12].

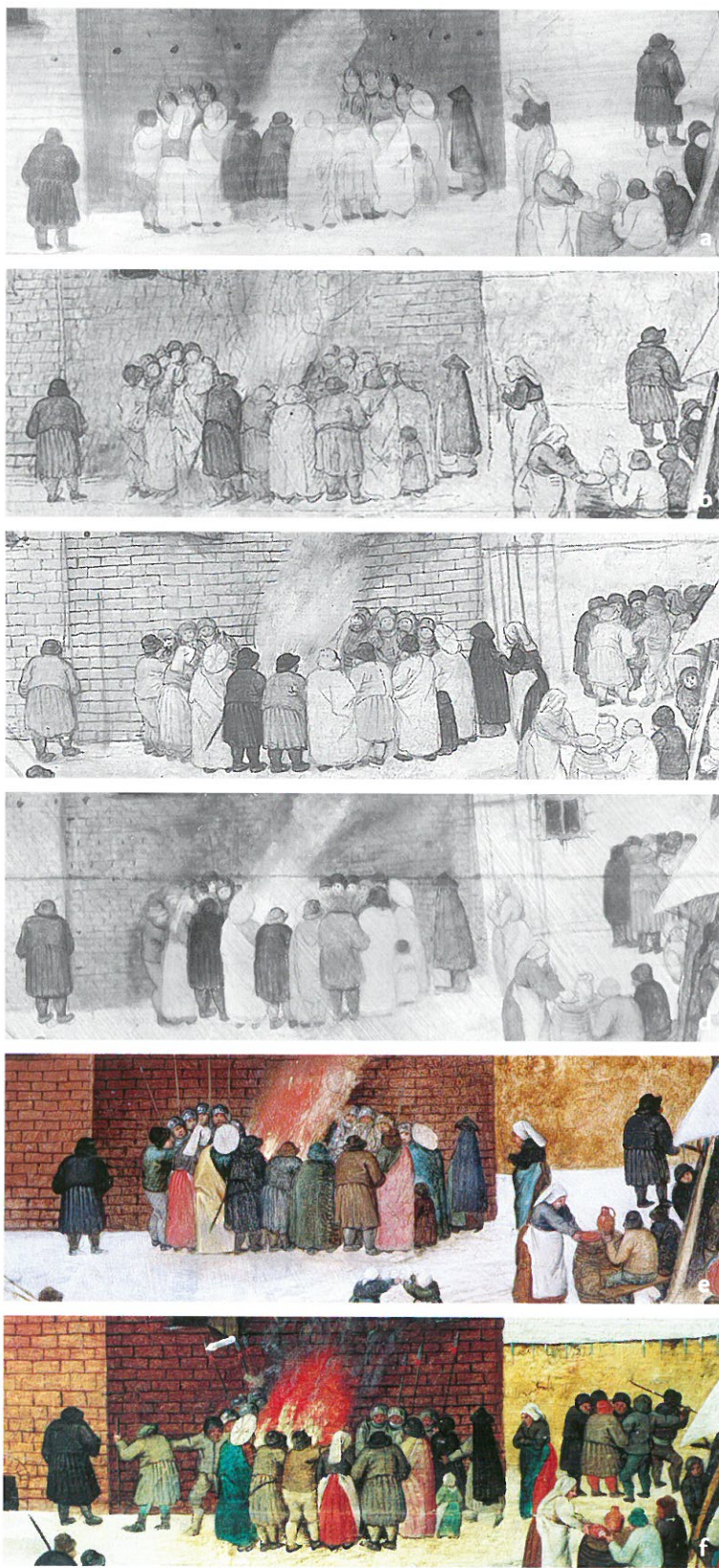
The KMSK and Bonnefantenmuseum versions fall outside these groups; both show unique motifs not seen in any of the other copies. In the KMSK version, there are three such motifs, the first and most striking being the yellow three-quarter sun on the horizon, the second, a man with a stick and a dog making his way down the river bank in the upper left, and the third, a large basket hung sideways under the roof of the inn on the left.¹⁰⁴ In the Bonnefantenmuseum version there is a tiny isolated male figure on the ice to the left of the central house, in a spot normally occupied by a small girl. Despite its idiosyncrasies, the KMSK version shares a similar, although not identical, colour scheme with Group 1, and some motifs are the same. The Bonnefantenmuseum version, however, is difficult to associate with any group, as it has many unique variants on the diverse motifs.

Out of the four groups, the paintings in Group 3 show the closest internal affiliations of all. Interestingly, this is the only group showing a partially plastered section on the central house's walls, as in the original painting. In Group 1, the arrangement of small-scale figures in the upper left differs from painting to painting and there are numerous other small inconsistencies. In Group 2, one version [cat. 11] is not quite as close in colour and motif as the other two copies in the group. Likewise, the Brussels version in Group 4 also contains a number of motifs that differ slightly from the other two copies in the group.

Examination of the underdrawings of ten of the copies proves that the variations in motif between groups were not introduced during painting but had already been established at the underdrawing stage. An example is the church motif (figs. 32, 36, 37) for which the Group 2

fig. 33 Figures huddled around the fire, central house. Underdrawn hatching is identically placed in the Mayer van den Bergh and Lons-le-Saunier versions. There is a change to the outline of the central figure during the drawing stage in the Bonnefantenmuseum version.

- a Lons-le-Saunier, underdrawing
- b Mayer van den Bergh, underdrawing
- c KMSK, underdrawing
- d Bonnefantenmuseum, underdrawing
- e Mayer van den Bergh, paint layer
- f private collection [cat. 10], paint layer



paintings show a differently shaped side gable to the other groups. This feature is present in the underdrawing of the private collection version but not in the underdrawings or paint layers of paintings in any other group. Another example is provided by the set of figures huddled around a fire against the wall of the large house in the centre of the composition, plus the nearby set of small figures to the right behind the large tree (fig. 33). The number, position and colour of these figures vary from group to group, and the differences are already established at the level of the underdrawing. The figure picking up snowballs illustrates how subtle the differences between the groups can be; variations in pose, feet positions and the distance between the arms are already present in the underdrawing.

The close affiliations in motif between copies of a single group at the level of their underdrawings suggest that a different model was used per group; the coincidences in colour within groups seem to indicate that paintings within a group were painted simultaneously or one after another, using the first completed painting as model for the colours of the next. The colour scheme of the KMSK version may either have been copied from a painting of Group 1 or vice versa.

Dating

If, as is likely, paintings in a particular group were executed at or around the same time, then paintings of known dates can help situate undated works. Group 1 does not contain any dated paintings. Dendrochronology of the Mayer van den Bergh panel indicates that it could have been ready for painting in 1596, which makes a relatively early execution possible for the three paintings of its group. However, dendrochronology on the KMSK version places it in 1604 or later, and its similarities with Group 1, particularly its identical colour scheme, suggest that at least one of the Group 1 paintings was in the studio at the same time. Group 2 contains the private collection version, dated 1604, which raises the possibility that certain paintings from Groups 1 and 2 may have been present in the studio during the same period. Group 3, comprising the Lille and Vaduz panels, the latter signed and dated 1607, was probably next in sequence, followed by Group 4, comprising the Caen, privately owned and Brussels versions, the latter signed and dated 1610. The Bonnefantenmuseum version is not dated but dendrochronology established that the panel could have been ready for painting in 1595, close enough to

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The affiliations between dated copies and undated versions help situate the entire *Census* series between about 1595 and 1610 or a little later, i.e. during the artist's mid-career, when he was in his thirties and forties.

It is, of course, possible, and even likely, that there were other paintings in the *Census* series that have been destroyed or lost over the years. The Bonnefantenmuseum and Antwerp versions may have formed part of separate groups of paintings, now lost. Groups 1 to 4 may have included additional paintings. Several copies that are mentioned in the literature have subsequently disappeared. A version from the Bayerische Staatsgemaldesammlungen (Marlier 12, Ertz F224) was deaccessioned on 7 November 1938,¹⁰⁵ and there is no further trace of the painting. The present whereabouts of another copy, sold in the J. M. Birkenstock sale in Vienna in 1811 (lot 101; Marlier 13, Ertz F225), is also unknown. Glück mentions yet another copy, sold at Frederik Muller's in Amsterdam in 1913 and again in 1927 (25–26 November 1913, lot 328; 5 June 1927, lot 34).¹⁰⁶ In the absence of photographs of these 'lost' versions, it is impossible to know whether they correspond to one or more of the thirteen known copies, or represent additional paintings.

No evolution of the composition over the years

When the motifs of the various groups are compared among themselves and with those of Bruegel the Elder's original version of *The Census at Bethlehem*, it becomes clear that there is no evolution of the composition over the years (Appendix 2). Certain motifs change back and forth. In the original, for example, the uppermost house to the right of the tree with inn is painted so that its left gable is visible. The timber frame is not indicated. In Group 1 of the copies (fig. 14), the corresponding motif likewise displays its left gable but with visible timberwork. In Group 2, the house shows its right gable but without a visible timber frame. In Group 3, the same house displays its left gable and there is no visible timberwork. In Group 4 the right gable is shown again, also without a timber frame. In both the KMSK and Maastricht versions the left gable of the house is displayed with a visible timber frame. The timber frame, when painted, is always indicated in the underdrawing. This supports the notion that individual models were made for each group, but that they were all derived from the same original copy *princeps*.

Secondary models: drawing, underdrawing or finished painting?

Having suggested the principle of several groups of copies, each based on a different model, we can investigate further into the nature of these secondary models. Were they each time a drawing, or could they have been the first painting in a group, which would have served as copy *princeps* for the rest of the group?

Similar underdrawn notations within groups

A close examination of the figure group huddling around the fire against the central house reveals common notations in the underdrawings in two versions of Group 1 (fig. 33). The corresponding central figure in the Mayer van den Bergh and Lons-le-Saunier versions has diagonal hatching lines for modelling in exactly the same place. Although the hatching lines are differently spaced in each copy, their very presence on this particular figure implies that, rather than a finished painting, a common drawing, or the underdrawing of one of the two paintings with corresponding hatching in the central figure, was used as a model. Interestingly, the KMSK version, which at first glance appears to have an identical central group of figures, does not have hatching lines in the underdrawing of the central figure, while the disposition of the figure's drapery folds is entirely different. Moreover, the male figure immediately to the right of the central figures faces a different direction to the equivalent figure in Group 1. This supports the assertion that the model for the KMSK version, although extremely similar, was not the same as that for Group 1. For the other groups, the general outlines of figures in the underdrawings are similar within each group, but there are no visible idiosyncratic drawing notations that can be compared.

Again, for the Virgin and ox motif, the Lons-le-Saunier and Mayer van den Bergh versions are obviously copied from the same model drawing or underdrawing, as the small squiggles and short hatching lines on the ox are identical (fig. 40). The folds of the Virgin's robe are also drawn in exactly the same way. No other versions show this identical distribution of drawing notations. The Arras version, which also forms part of Group 1, does not show as many notations, but the underdrawing is compatible, if less detailed. It is also noteworthy that the Lons-le-Saunier, Mayer van den Bergh and Arras versions are the only ones where the mule has one rather than two visible ears. The other versions show longer diagonal lines, either single or grouped, to describe the

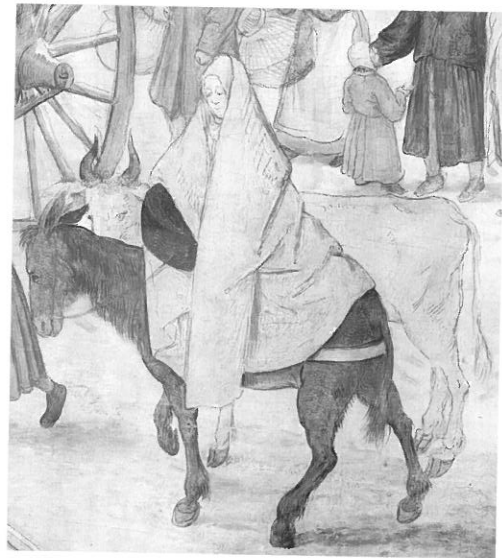


fig. 35 Lower right couple. Details of IRR assemblies. There are rounded contour lines on the brim of the man's hat in both underdrawings. In the private collection version, there are also drawing lines for shadow on the inside edge of the tip of the man's coat.

- a KMSK
- b private collection [cat. 10]



musculature of the back leg of the ox, for example the Brussels version (fig. 34).

In all the underdrawings examined of the large-scale couple in the lower right, with the exception perhaps of the Bonnefantenmuseum version,¹⁰⁷ the crown and brim of the hat worn by the male figure has similar rounded contour lines (fig. 35). The similarly located hatching in the Mayer van den Bergh and Lons-le-Saunier versions once again supports the hypothesis that the copies were based on drawings or underdrawings rather than finished paintings.

Another good example of identically placed hatchings in the Lons-le-Saunier and Mayer van den Bergh versions is found in the set of figures in the centre right. No other copy imitates this same distribution of hatching marks.

Inconsistencies within groups There are small inconsistencies of motif within groups. It is useful to examine these to see whether any evolution of motifs within a group can be established that

might suggest that the underdrawing or paint layer of one may have served as the model for the underdrawing of the next and so on.

Within Group 1 (Mayer van den Bergh, Lons-le-Saunier, Arras), there are many minor inconsistencies of motif. For instance, the bowed metal grille covering a window in the lower left is present in the underdrawing and paint layer of the Mayer van den Bergh and Lons-le-Saunier versions, but only in the underdrawing of the Arras version (fig. 10b). Consequently, it is impossible that the Arras version's paint layer served as model for the group. Furthermore, the horses' motif in the upper right is present in the paint layers of the Mayer van den Bergh and Lons-le-Saunier versions, but only at the underdrawing stage in the Arras version. Likewise, the dog motif is present in the paint layer in the Arras and Mayer van den Bergh versions but only in the underdrawing of the Lons-le-Saunier version, excluding the Lons-le-Saunier paint layer as model for the group. The figure of a small girl on

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the river bank making her way down to the frozen pond is present in the Mayer van den Bergh and Arras versions, but absent from the underdrawing and paint layers of the Lons-le-Saunier version. Further examples of why the Lons-le-Saunier version could not have been the primary model in the group include the figure of a small girl walking towards a male figure on the pond in the upper left, present in the underdrawing and paint layers of the Mayer van den Bergh and Arras versions, but in neither underdrawing nor paint of the Lons-le-Saunier copy. Another example is a hatted head in the lower left doorway of the inn in the Lons-le-Saunier underdrawing (fig. 10f), which is not carried through to the paint layer but appears in a hatless form in the underdrawing and paint layers of the Mayer van den Bergh and Arras versions. That the Lons-le-Saunier version's underdrawing could not have served as model for the Mayer van den Bergh version is proven by the presence of a motif appearing in an abbreviated form in the Lons-le-Saunier version's underdrawing but more fully worked out in the underdrawing of the Mayer van den Bergh version: the timbering on a house in the upper right is suggested in the Lons-le-Saunier version by a simple vertical line, crossed a couple of times, whereas in the Mayer van den Bergh version, it is fully worked out in the underdrawing, corresponding to the final paint layers of both paintings (fig. 14). A further example of an inconsistent motif is the figure of a small girl walking towards a half-sunken boat on the upper left pond, present in the Mayer van den Bergh and Lons-le-Saunier underdrawings only, not carried through to the paint and not present in the Arras version (fig. 10e). Yet another inconsistency is the array of tools in Joseph's basket, similar in the Lons-le-Saunier and Mayer van den Bergh versions but different in the Arras copy. Finally, what may be the underdrawn indication of a knife, on the belt of the man slaughtering the boar, is present in the underdrawing of the Arras version, not carried through to the paint layer and not present in underdrawing or paint layers of the other versions. This also makes it unlikely that the Mayer van den Bergh or the Lons-le-Saunier versions would have served as models for the Arras version.

These inconsistencies seem to indicate that no single painting or underdrawing in Group 1 served as the model for the others and that rather a common model drawing was referred to. However, if the knife motif, seen in the Arras underdrawing only, is considered an anomaly or the underdrawing lines are not in fact those of a

knife, there is a case for the Mayer van den Bergh version being the first copy, copied separately in the other two versions; even so, for the Lons-le-Saunier version, the Mayer van den Bergh underdrawing would have to have been the model rather than the finished painting, owing to the presence of many identically positioned drawing notations in the two underdrawings and the presence of the little girl making her way towards the sunken boat in the underdrawing stage only of both the Mayer van den Bergh and Lons-le-Saunier versions. For the Arras version, however, where the underdrawn notations are not identical to the Mayer van den Bergh and Lons-le-Saunier versions, the finished painting of the Mayer van den Bergh version could have served as model. A possible problem for this hypothesis is the different array of tools in Joseph's basket in the Arras version, the latter including a square unlike the other versions. However, this may have something to do with the relationship of Group 1 to the KMSK version (see above). The KMSK version also has a square in Joseph's tool basket. It is therefore possible that the Arras version's 'square' was added as an afterthought, following the example of the KMSK version. Supporting this hypothesis is the observation that the 'square' in the Arras version does not appear to be underdrawn, unlike that of the KMSK version.

In Group 2 (three private collections, cat. 10, 11, 13) the full underdrawing could only be studied for one private collection version. It is none the less clear that the version that was auctioned at Sotheby's is not quite as close in motifs and colour as the other two copies in the group. There is, for example, an extra figure in the doorway of the church, one in the doorway above the chickens, and an additional tree motif crossing a rooftop in the upper right, while – unlike the other two versions – the town motif on the horizon appears to be present, and one figure appears to be missing from the central group huddling around the fire. However, in the absence of full infrared reflectograms of two versions, it would be premature to draw conclusions from this.

Of the four groups, the paintings in Group 3 (Lille, Vaduz) show the closest affiliations of motif. There are only minor differences, such as the shape of the wheel in the Vaduz underdrawing (fig. 10d), not carried through to the paint layer and absent in both underdrawing and paint layer of the Lille copy. Since the wheel shape is never carried through to the paint layer in the other versions, where it is present in the underdrawing, the artist of the Lille version may have simply chosen not to include it in his under-

drawing. Another difference is the motif of a hatted head in the doorway in the lower left in the Vaduz underdrawing, not carried through to the paint layer and not visible in the paint layer of the Lille version.¹⁰⁸ Yet there does appear to be a differently styled head, without a hat, in this position in the Lille paint layer. A further variation is the number of spokes in a cart wheel half buried in the snow, in the centre of the composition. For the Lille version, therefore, a common model drawing or the underdrawing of the Vaduz version may have served as model.

As far as **Group 4** is concerned, there are only two motifs in the underdrawing stage of the Brussels version, that do not appear in the other versions' (Caen, private collection) underdrawings or paint layer: the figure of a little girl on the ice in the upper left and a roughly indicated wheel, placed against the wall of the central house. This implies that neither the Caen nor the privately owned version could have served as models for the Brussels copy. Moreover, the dog motif is included in the Brussels underdrawing, but is not carried through to the paint layer and not present in the paint layer of the other two paintings (fig. 10c); but there are cursory lines in the underdrawing of the Caen version, possibly the beginnings of a dog, which – if this really is the case – would suggest that both paintings refer to a common model drawing. In the Brussels version, there is also a horse in the upper left, at the level of both underdrawing and paint layer, which was replaced in the other versions by a single figure. This important difference indicates that the Brussels version cannot have served as model for the other two versions and vice versa. The fact that, unlike the other two versions, a figure in the lower left of the privately owned copy does not carry a letter, eliminates this version's paint layer as model for the two other versions (unless the motif was overpainted during restoration).¹⁰⁹ The Brussels and Caen versions have roughly indicated reeds on the edge of the lower right pond in the underdrawing, but because only the Brussels and privately owned copies show these in their paint layers, the Caen paint layer must be eliminated as model for the other two (fig. 10g). Likewise, the knife on the belt of the boar slaughterer in the lower left is visible in the underdrawing only of the Caen version but present in the paint layer in the others. In the privately owned version there is also a small painted tree in the upper right that is only present in the underdrawing of the other two copies, which would appear to eliminate the Brussels and Caen paint layers as models for the privately owned version. (Since the Brussels painting has been

harshly cleaned in the past, the tree might have been removed; however, there would probably be some trace left of it.) The Brussels version shows one important colour difference to the other two copies: the apron of the lady holding the pan in the lower left is blue, whereas in the other two copies it is white.

The evidence is weighted towards the likelihood of a common drawing as model, although the artist of the Brussels version takes liberties with this model in places and introduces different motifs from memory. This would make sense if a more independent mind, perhaps Pieter Brueghel the Younger himself, were responsible for it.

Summary It is possible that a common secondary model drawing was copied per group, each in turn derived from a copy *princeps* drawing by Bruegel the Elder or an intermediary drawing by Brueghel the Younger (see diagram, fig. 31). These secondary models would introduce variants of certain motifs. At the painting stage, the drapery colours would be reinvented for each group and the finished paint layer of the first painting in a group would serve as model for colours of the rest. Slight variations of motif and colour within groups at the underdrawing and painting stages could be explained by choice, memory of previous groups or carelessness on the part of the artist or artists.

Nevertheless, alternative scenarios remain possible, still starting from the assumption of an initial copy *princeps* drawing by Bruegel the Elder or an intermediary drawing by Brueghel the Younger. For Group 1, the underdrawing of the Mayer van den Bergh copy may have been copied for the Lons-le-Saunier version, and the final paint layer of the Mayer van den Bergh copy may have served as model for the Arras version. For Group 3, on the other hand, the underdrawing of the Vaduz painting could have served as model for the Lille copy.

Copying technique

Copying techniques identified in paintings of the sixteenth and seventeenth centuries for the transfer of a design from one work to another include pouncing, tracing and squaring-up.¹¹⁰ The use of the pantograph, a mechanical method of transfer described by Christophorus Scheiner, a German Jesuit, in his book, *Pantographice seu ars delineandi res quaslibet per parallelogrammum lineare*, 1631, has not been linked to artists before the nineteenth century,¹¹¹ but is currently being tested as a possibility.¹¹² No obvious clues

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fig. 36 Superposition of the Lons-le-Saunier underdrawing over the underdrawings of the Mayer van den Bergh and Arras versions clearly shows that the three drawings could not have been copied from a common model using a tracing technique.

- a Lons-le-Saunier
- b Mayer van den Bergh
- c Arras
- d superposition Lons-le-Saunier/Mayer van den Bergh
- e superposition Lons-le-Saunier/Arras

regarding the transfer method, such as pouncing dots or an underdrawn grid that would indicate squaring, were found on the *Census* paintings themselves. Therefore, the question as to whether the copies were made using a precise mechanical technique of transfer, such as tracing, or by using a less accurate method, such as squaring-up, can only be settled through careful cross-comparison of the underdrawings and experimentation with superpositions.

Character of underdrawn lines

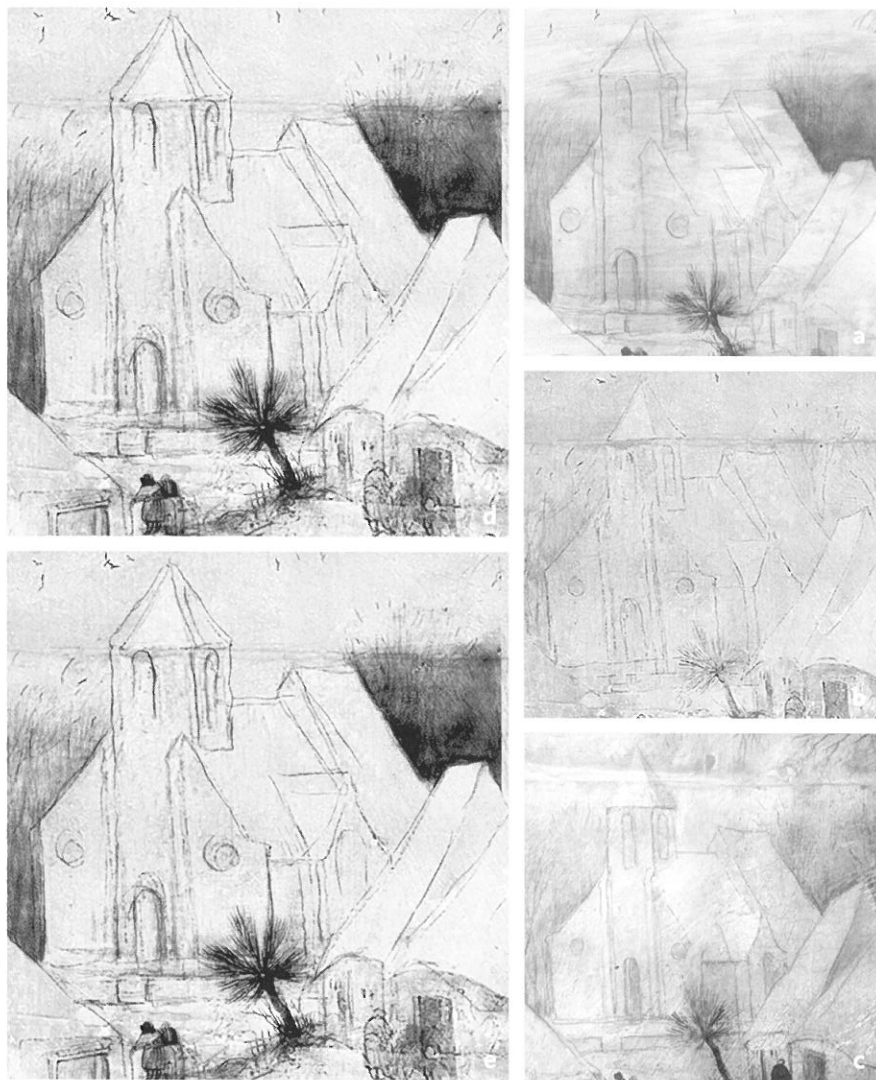
Certain areas in all the underdrawings, owing to their spontaneity and sketchy qualities, clearly betray freehand drawing. These include the loosely applied notations for tree branches against the sky, landscape contours, and certain smaller motifs such as the cooking pot and the sheaves of straw in most versions.

In the Brussels version, changes during drawing in the positions of one of the legs of a figure picking up snowballs and the position of one of the hen's heads also point to freehand drawing and exclude the possibility of tracing for these motifs. In the Vaduz copy, the hesitations and reworkings for a cart load in the upper right are likewise indicative of freehand drawing, and the same can be said of the cart wheels in many versions, which are drawn hesitantly, with several corrections during underdrawing.

The rapid, confident style of the Lons-le-Saunier underdrawing, in particular, gives the impression of being applied freehand in its entirety, notwithstanding reference to a drawn model. For that matter, the existence of numerous reworkings during drawing also argues in favour of the squaring-up method.

Correspondence of motifs

The author's tracings of the composition of the Brussels, KMSK, Mayer van den Bergh and private collection versions, when superposed and corresponding points measured, show that they are all drawn to the same scale (figs. 25, 26, Appendix 1). However, as no elements coincide exactly, the possibility that tracing was used to transfer either the composition as a whole or any particular details from a common drawing must be altogether eliminated. Unfortunately, these copies all form part of different groups, and tracings could not be made and compared for any two copies within a group. Still, it is clear from visual comparisons of the overall compositions within groups that there are small discrepancies in the positions of corresponding motifs. For example, in Groups 2 and 4, the significant differ-

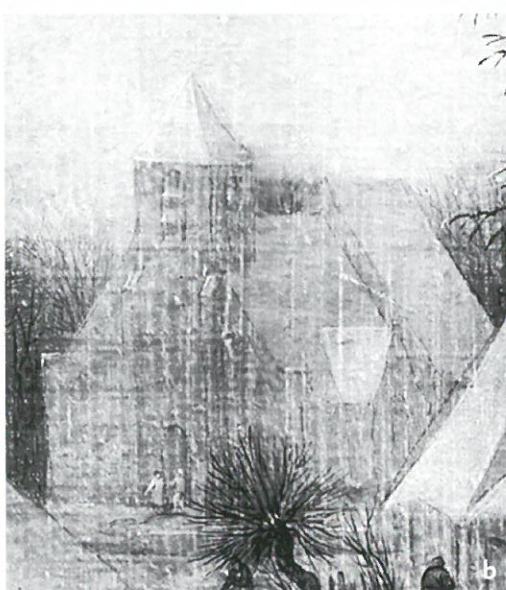


ences observed among the paintings of each group in the relative heights of the church and the building to the left of it make it impossible that they were copied in their entirety using an accurate transfer technique such as tracing.

To test whether specific areas of the composition could have been copied by tracing, comparisons were also made using photographic details and by superposing¹¹³ the underdrawings of selected motifs where visual comparisons were not sufficiently clear. The remote possibility remains that tracing has been used for certain details, but in a drawing medium invisible to infrared reflectography, such as red chalk. This would subsequently have been reinforced freehand with the carbon-based material detected in infrared. We have no means of testing this hypothesis.

fig. 37 Superposition of Vaduz underdrawing over paint layer of Lille version shows (as in fig. 36) that these two details could not have been transferred from a common model using a tracing technique.

- a Vaduz, underdrawing
- b Lille, paint layer
- c superposition



Church Within Group 1, significant differences in proportion between the various elements at the level of the underdrawing argue against the use of tracing to transfer the design from a common drawing (fig. 36). However, the coinciding position and size of the motifs suggest that squaring-up may have been used to aid transfer of the design. The same conclusion was reached after superposing the motifs in Group 3 (fig. 37). In Group 4, a visual comparison of the Brussels and Caen underdrawings of the church motif is enough to conclude that they could not have been transferred by tracing from a common drawing.

Central house Within Group 1, clearly visible differences in form and proportion of elements in the motif eliminate the possibility that they were all traced from a common model.

In Group 2, the motif appears very similar in appearance, but in the absence of infrared documents or photographic details, there is no means of testing whether they may have been traced from a common model.

Within Group 3, it is impossible that the corresponding motifs in both paintings were meticulously traced from a common model, given that the house has a varying number of steps in the gable on the right.

The small discrepancies in proportion

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between the Brussels and Caen versions (and cat. 12 where the paint layer is compared) of Group 4 exclude the possibility that they were traced from a common model.

The central house motif in the KMSK version, finally, has small differences to all the other copies.

Small figures above and on the pond in the upper left Of all the underdrawings, the paintings of Group 3 show the closest visual correspondence for this motif, the figures being identical and their relative positions appearing the same. However, overlaying their respective underdrawings did not produce a perfect match, and no more than one figure motif could be successfully superimposed at any one time; the surrounding architecture did not correspond exactly either, which argues against the use of a tracing technique to transfer the model drawing (fig. 38).

Within Group 1, it is clear from examining the underdrawings without recourse to superpositions that tracing could not have been employed to transfer the design from a common model drawing. For Group 4, a superposition was tried for the Brussels and Caen versions; likewise – even allowing for one shift – a common drawing could not have been traced (fig. 39). Although the Bonnefantenmuseum version displays a similar array of figure motifs to the Mayer van den Bergh copy, the relative positions of the corresponding figures are different. Those in the Mayer van den Bergh version are slightly larger in scale relative to their surroundings than the corresponding figures in the Bonnefantenmuseum, thus again excluding the possibility that they were both traced from a common model.

Virgin and ox Despite the fact that all the copies appear to match closely at first glance, there are differences in the position and proportions of the various outlines in all the underdrawings examined. This implies that no two versions could have been copied by tracing a single model. Within Group 1, superposition of the Mayer van den Bergh and Lons-le-Saunier versions shows that the ox coincides almost exactly, while the rest of the motif does not, even if we make allowances for slight shifts in the tracing paper (fig. 40).

Pair of figures lower right This motif, like that of the Virgin, is extremely similar in all the copies; even so, minor discrepancies in outline, differing shapes to the lowermost tip of the male figure's coat and varying positions of the folds lead to the

fig. 38 Small figures, upper left. Superposition of Vaduz underdrawing over paint layer of Lille version, female figure in lower centre lined up. Although very similar, this clearly shows that the two compositions could not have been transferred from a common model by tracing.
a Vaduz, underdrawing
b Lille, paint layer
c superposition

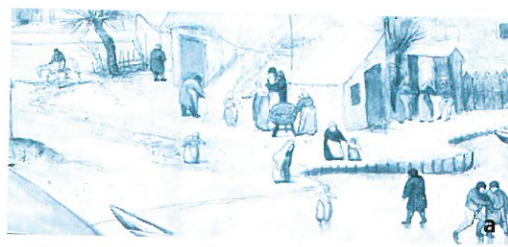
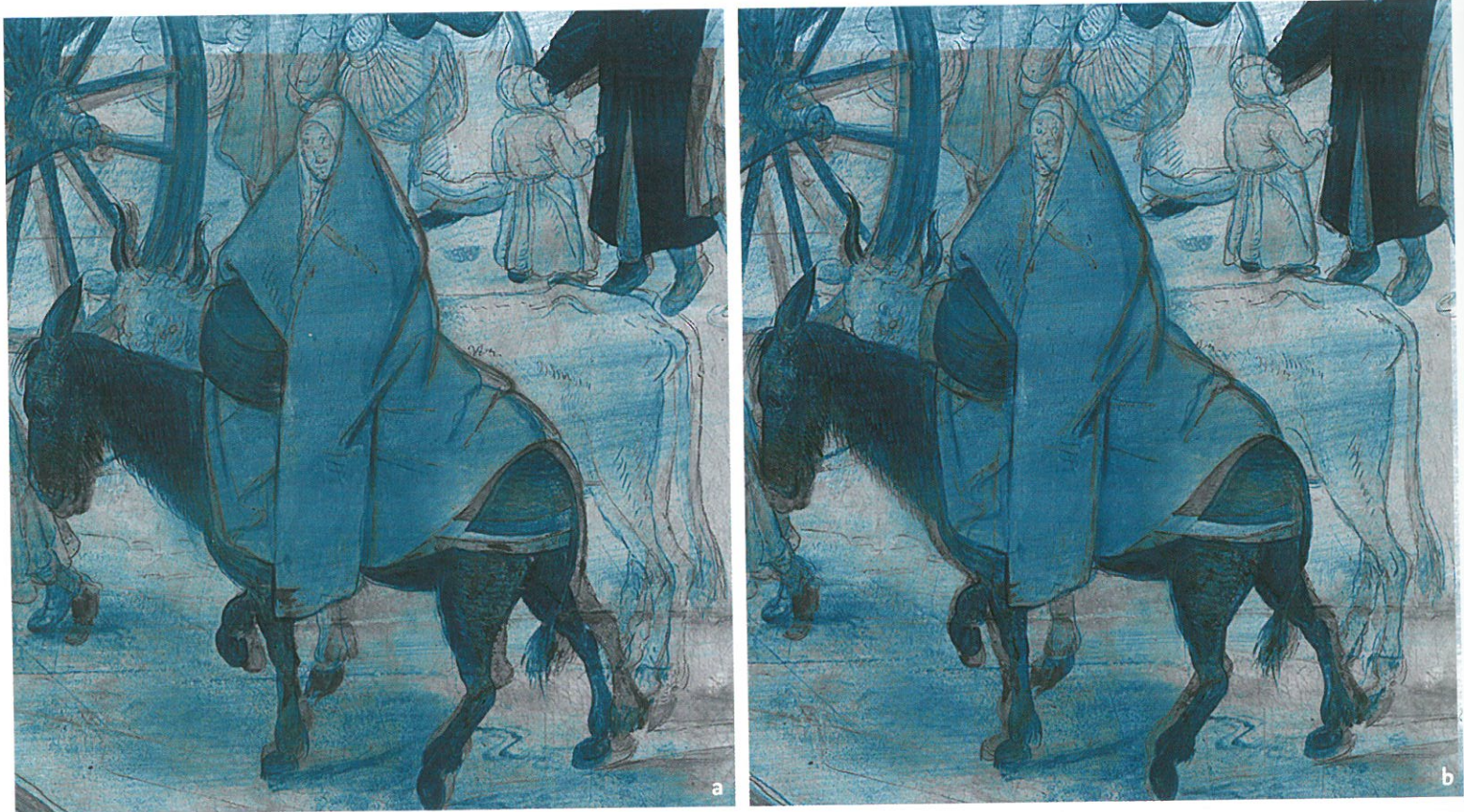


fig. 39 Small figures, upper left. Superposition of Brussels underdrawing over paint layer of Caen version, female figure in lower centre lined up. As in fig. 38, this clearly shows that the two compositions could not have been transferred from a common model by tracing.
a Brussels, underdrawing
b Caen, paint layer
c superposition



fig. 40 Virgin and ox. Superposition of Mayer van den Bergh underdrawing over underdrawing of Lons-le-Saunier version (Lons-le-Saunier version has false blue coloration for contrast; a = aligned on Virgin; b = aligned on ox). The two alignments show that the underdrawings, although obviously copied from the same model drawing, could not have been transferred using a tracing technique as their correspondence is not great enough.



same conclusion as reached with the Virgin and ox, namely that the motif was probably copied with the aid of a less precise method of transfer than tracing, such as squaring-up. (Groups 2 and 3 could not be compared in detail.)

For the motifs tested, there is no clear evidence of the use of a tracing technique to transfer any two designs from a common drawing; this does not exclude the possibility that any one drawing may have been transferred by tracing. The correlation between certain key motifs is often so close that some sort of aid to the copying process must have been employed, such as squaring-up or another mechanical method, possibly the pantograph. Another possibility – already hinted at above – that cannot be excluded altogether is that indeed a cartoon was used, but one in a drawing medium not registering in infrared reflectography.

Conclusion

Pieter Brueghel the Younger's copies of *The Census at Bethlehem* are remarkably standard in their materials and techniques. Apart from the Lille version, on canvas, the copies examined are painted on oak panels with a white ground, *imprimatura*, highly detailed underdrawing and one or two thin paint layers using a system of reserves. The techniques and materials are typical of Flemish painting of the fifteenth to early seventeenth centuries, and parallels can be drawn with the original version by Bruegel the Elder.

Despite similarities in technique, the study reveals several distinct artistic personalities in the *Census* series, at the level of both the underdrawing and the paint layer. The Brussels and Vaduz versions [cat. 4 and 9], both signed and dated, stand out as the most accomplished in terms of handling of paint and mastery of anatomy and proportion. Similarities in style between these two versions suggest they may have been painted by the same hand, perhaps Brueghel himself. If this same style is identified in any of Brueghel's other paintings from different periods

in his career, the case for their attribution to the master will be strengthened. The Lille version is also particularly well painted and merits further study regarding its attribution. The other *Census* copies, including two further signed versions, display varying degrees of competence. The Lons-le-Saunier copy [cat. 7] has a particularly rapid, confident and slick style of underdrawing and painting that distinguishes it from all the other versions. The manner of underdrawing in the Brussels and Lons-le-Saunier versions can also be favourably compared to the style of their respective paint layers. This suggests that at least in these cases, rather than various artists in the workshop working together, one and the same artist may have been responsible for the work from the underdrawing through to the painting stage.

The fact that there are key elements in the original painting missing in the copies; that several motifs were transformed or misunderstood in the copying process; that one feature (tree branches), present only in the underdrawing of the original, appears to a greater or lesser extent in the copies; and, last but not least, that the colour scheme and time of day in the original painting are entirely different from the copies leads to the hypothesis that the original model for the copies was a detailed preparatory drawing by Bruegel the Elder rather than the painting itself. However, the classification of the thirteen known copies into distinct groups, each with its own particular variations of motif and colour, implies that the copies were not copied directly from the copy *princeps* drawing but were instead based on a series of secondary models, either separate drawings or one of the paintings in each group. These intermediary models would each have been based on the initial copy *princeps*, but would have included numerous variants of motifs, perhaps those not clear or detailed enough in the original model drawing. Cross-comparison of underdrawings shows that for at least the Mayer van den Bergh [cat. 2] and Lons-le-Saunier versions, which have similarly located hatchings in their respective underdrawings, the secondary model must have been either a drawing or an underdrawing.

The presence of dated paintings in every group of copies except Group 1 may help place undated paintings in an approximate time period. For Group 1, comprising the Mayer van den Bergh, Arras and Lons-le-Saunier panels [cat. 2, 3 and 7], dendrochronology on the Mayer van den Bergh version makes a relatively early dating possible, but certainly not before 1596. Dendro-

chronology of the Bonnefantenmuseum panel [cat. 8] established that the panel could have been ready for painting in 1595, suggesting the painting may have been executed in a time period similar to the Mayer van den Bergh panel.

The KMSK version [cat. 1], which resembles the paintings in Group 1 in terms of colour and some motifs, could not have been painted before 1604 according to the dendrochronological evidence. Group 2, consisting of three privately owned versions [cat. 10, 11, 13], may have been painted around 1604, the date on one of the paintings [cat. 10]. Group 3, comprising the Lille and Vaduz versions [cat. 6 and 9], was most likely executed around 1607, the date on the Vaduz version. Group 4, finally, containing the Brussels and Caen versions and a privately owned copy [cat. 4, 5 and 12], was probably painted around 1610, the date on the Brussels panel.

Regarding the copying technique, visual comparison and superpositions of selected motifs demonstrate the unlikelihood of any two paintings having been transferred by tracing from a common model or, for that matter, another mechanical method. Freehand copying with the aid of squaring-up would have been a more likely method.

Appendix 1
Correlation between four copies
and the original version of *The Census at Bethlehem*

Copy	Reference	Slope	Intercept	Error	Correlation coefficient
Priv. coll. [cat. 10]	Original	102.9%	-1.03	1.09	0.9997
Mayer	Original	102.0%	0.04	0.62	0.9999
Brussels	Original	102.9%	-0.61	0.79	0.9998
KMSK	Original	102.8%	-0.79	0.65	0.9999
KMSK	Cat. 10	99.8%	0.27	0.72	0.9999
KMSK	Mayer	100.7%	-0.83	0.58	0.9999
Mayer	Cat. 10	99.1%	1.11	0.91	0.9998

Note: Cross-comparisons were not made for Brussels/KMSK, Brussels/Mayer van den Bergh and Brussels/private collection [cat. 10] due to insufficient sampling of the Brussels version.

Appendix 2
Chart showing variable motifs according to group

Variable motifs	Original version by Bruegel the Elder	Group 1 Lons-le-Saunier, Mayer, Arras	Group 2 Private collections [cat. 10, 11, 13]	Group 3 Vaduz, Lille
<i>Figures in doorway of church</i>	Two figures	Absent	Cat. 10: absent in underdrawing and paint layer; cat. 11: one figure; cat. 13: absent	Two figures
<i>Figure(s) or horse/mule motif, upper left, below church</i>	Mule	Two figures only. Horse motif in Mayer underdrawing (not in Lons-le-Saunier nor Arras underdrawing)	Horse	Horse
<i>Figure in doorway, upper left</i>	Present	Absent	Cat. 10 and 13: absent; cat. 11: present	Present
<i>Small isolated girl on ice, in upper left between central house and tree</i>	Present	Absent	Present	Present
<i>Half-sunken boat, upper left</i>	Present	Present	Absent	Present
<i>Little girl moving towards half-sunken boat, upper left</i>	Present	Mayer and Lons-le-Saunier: in underdrawing only; Arras: absent	Absent	Absent
<i>Adult and child pair, river bank, upper left</i>	Male figure and child	Absent	Mother and child	Mother and child
<i>Pair of figures, upper left frozen pond, just above men transporting barrel across ice</i>	Two men	Two men	Two men	Two men
<i>Dog, upper centre</i>	Present	Mayer and Arras: present; Lons-le-Saunier: in underdrawing only	Present	Present
<i>Wheel leaning against central house, to far left</i>	Present in paint layer	Absent	Absent	Vaduz: present in underdrawing only; Lille:

	Group 3 Maduz, Lille	Group 4 Brussels, Caen, Private collection [cat. 12]	KMSK	Bonnefantenmuseum
Underdrawing cat. 11: one figure;	Two figures	Brussels: two figures; cat. 12: one figure; Caen: one figure	Two figures	Two figures
Horse		Brussels: horse only; Caen and cat. Two figures 12: single figure		Horse
Present	Present	Present	Absent	Absent
Present		Brussels: present; Caen: absent (but could be absent due to damage); cat. 12: present	Present	Male figure in this spot
Present	Present	Present	Present	Present
Absent	Present	Present	Absent	Present
Mother and child	Mother and child	Mother and child	Absent	Absent
Two men	One man, one woman	One man, one woman	Two men	Two men
Present		Brussels: in underdrawing only; Caen and cat. 12: absent	Present	Present
cat. 12: present in under- drawing only; Lille: absent		Brussels: in underdrawing only; Caen and cat. 12: absent	In underdrawing only	In underdrawing only

Variable motifs	Original version by Bruegel the Elder	Group 1 Lons-le-Saunier, Mayer, Arras	Group 2 Private collections [cat. 10, 11, 13]	Group 3 Vaduz, Lille
<i>Figures huddling around fire against central house and small group of figures to right of large group (numbers of figures and drapery colours vary from group to group)</i>	Arrangement of figures and colours unlike any of the copies	Same number, positions and drapery colours within group	Same number, position and drapery colours within group except that cat. 11 lacks the second from left figure and another figure has a red hat unlike the other two versions	Same number, position and drapery colours within group
<i>Finishing materials used in building central house</i>	Rendering and brickwork (individual bricks undefined)	Brick and wood (individual bricks defined)	Brick and wood (individual bricks defined)	Brick, rendering and wood (individual bricks defined)
<i>Group of soldiers and civilians, centre right (number of figures and positions vary)</i>	Arrangement of figures not identical to that in any of the copies	Identical number and positioning of figures within group	Similar arrangement of figures but one more soldier in cat. 10; also the man with the oriental hat has a yellow cloak in cat. 11 and dark cloak in cat. 10 and 13	Identical number and positioning of figures within group
<i>Tree in front of rooftop of house to left of leftmost tower, upper right</i>	Present	Absent	Cat. 10: absent; cat. 11: present; cat. 13: absent	Present
<i>Diamond-shaped mound of snow, lower right frozen pond</i>	Hole in ice	Present	Present	Absent
<i>Children on toboggans, lower right frozen pond</i>	Two	Two	One	Two
<i>Wooden stakes, bank of lower right frozen pond</i>	Two	Two	Two	Two
<i>Logs, supporting 'bridge' in lower right frozen pond</i>	Probably three	Two	Three	Three
<i>Number of steps in gable of central house</i>	Eight	Mayer: nine; Arras and Lons-le-Saunier: eight	Eight	Vaduz: seven; Lille: eight
<i>'Variable' gable of house upper right</i>	Left gable shown; timbered frame not visible	Left gable shown; visible timbered frame	Right gable shown; no timbered frame	Left gable shown; no timbered frame
<i>'Basket' hanging sideways below roofline of inn on left</i>	Present	Absent	Absent	Absent
<i>Rounded metal grille on window, lower left inn</i>	Present	Mayer and Lons: present; Arras: in underdrawing only	Absent	Absent
<i>Letter held by man in doorway of inn, lower left</i>	Absent	Present	Present	Present
<i>Knife on belt of man slaughtering boar</i>	Present	Mayer and Lons-le-Saunier: absent; Arras: in underdrawing only	Present	Present

	Group 3 Vaduz, Lille	Group 4 Brussels, Caen, Private collection [cat. 12]	KMSK	Bonnefantenmuseum
tion and in group cks the second another figure the other two	Same number, positions and drapery colours within group	Same number, positions and drapery colours within group	Centre group almost identical to Group 1 but small group to right is different	Different arrangement to all groups
ividual	Brick, rendering and wood (individual bricks defined)	Brick and wood (individual bricks defined)	Brick and wood (individual bricks defined)	Brick and wood (individual bricks defined)
t of figures r in cat. 10; e oriental k in cat. 11 .10	Identical number and positioning of figures within group	Appears similar but Brussels version is very damaged in this area	Similar but not identical to Group 1	Similar but not identical to Group 1 (but different from KMSK)
1: present; cat.	Present	Brussels and Caen: in underdrawing only; cat. 12: present	Absent	Absent
	Absent	Present	Present	Present
	Two	Two	One	Two
	Two	One	Two	Two
	Three	Three	Three	Three
	Vaduz: seven; Lille: eight	Eight	Eight	Eight
	Left gable shown; no timbered frame	Right gable shown; no timbered frame	Left gable shown; timbered frame visible	Left gable shown; timbered frame visible
	Absent	Absent	Present	Absent
	Absent	Absent	Present in underdrawing only	Present
	Absent	Brussels and Caen: present; cat. 12: Absent absent	Absent	Present
	Absent	Brussels and cat. 12: present; Caen: in underdrawing only	Present	Absent

Variable motifs	Original version by Bruegel the Elder	Group 1 Lons-le-Saunier, Mayer, Arras	Group 2 Private collections [cat. 10, 11, 13]	Group 3 Vaduz, Lille
Joseph's tools and shape of wicker basket	Rounded wicker basket; one tool visible in basket	Straight-sided, narrow-bottomed basket; tools differ from copy to copy	Straight-sided, wide-topped basket; tools same in cat. 11 and 13; additional square in cat. 10	Straight-sided, wicker basket; identical to group
Side turret on rightmost tower, upper right	Present	Present	Absent	Present
Central house: shuttered/open windows, figure leans out of one window	Distribution of shuttered windows not identical to any copy; figure leans out of window	Same distribution of shuttered windows between Mayer and Lons-le-Saunier; slightly different distribution in Arras; no figure leaning out of window in any version	Same distribution of shuttered windows within group; no figure leaning out of window	Same distribution of shuttered windows within group; figure leans out of window
Reeds, lower left bank of lower right frozen pond	Absent	Absent	Cat. 10 and 13: absent; cat. 11: present	Some reeds present in versions but not a
Town or church on horizon	Present	Absent	Cat. 10 and 13: absent; cat. 11: present	Present
Small set of trees on river bank, upper left landscape vista: these vary in number and position and appearance	Arrangement unlike any copy	Same number and position within group	Same number and position within group	Same number and position within group
Marks or symbols painted in black on axe, lower left foreground	Not distinguishable	Very similar symbol within group, not seen in other groups	Very similar symbol within group, not seen in other groups	Very similar symbols within other groups

* I would like to thank Liliane Masschelein, Director of the Institut Royal du Patrimoine Artistique (IRPA), and Dominique Allart, Professor of History of Art at Liège University, for making this research possible and for their encouragement and unflagging practical support over the past three years. I would also like to thank Peter van den Brink and Ingrid van Rooy for sharing their material with me and for their constant encouragement. A special thanks goes to Jacques Debergh, librarian at IRPA, for his generous advice and support throughout the whole project. Also, to Jacqueline Folie (formerly at IRPA), art historian, whose comprehensive knowledge of the artist helped pinpoint the areas for further research. Thanks are equally due to all the directors, curators and other staff of the museums who allowed me access to their paintings and made my on-site work so pleasant, particularly Eliane De Wilde, Director, Helena Bussers, Head of Department, and Wilfried Moens, preparator at the Musées Royaux des Beaux-Arts de Belgique in Brussels, Hans Nieuwdorp, Director of the Museum Mayer van den Bergh in Antwerp, and Paul Huvenne, Director, Yolande Deckers, curator, Lizet Klaassens, conservator, and Stefan Antonis, preparator at the Koninklijk Museum voor Schone Kunsten in Antwerp. I would also like to thank the owner and the restorer of the 1604 version who allowed me to examine their painting at length. I am extremely grateful to those who examined the paintings outside Belgium and processed the infrared images, in particular J.R.J. van Asperen de Boer and Margreet Wolters. Thanks also

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1 The author's examinations of the paintings in Belgium form part of an ongoing study for a doctoral thesis, 'Etude technologique des œuvres de Pierre Bruegel le Jeune conservées dans les collections publiques en Belgique', under the guidance of Professor Dominique Allart, Liège University.
2 Van Mander 1604.
3 Marlier 1969, p. 42.
4 Rombouts and Van Lerijs 1961, 1, p. 292.
5 Marlier (1969, pp. 4-5) questions whether this Gillis van Coninxloo was indeed the famous landscapist or a family member of the same name.
6 Rombouts and Van Lerijs 1961, 1, pp. 328, 373, 374, 395, 408, 451, 478, 517, 635.
7 Ibid., p. 448.
8 Ertz 1998, p. 19.
9 Marlier 1969.
10 Ertz 2000.
11 Folie 1980.
12 Folie 1993.
13 Mund 1976.
14 Verougstraete and Van Schoute 1993.
15 Glück 1934.
16 Cat. Finck 1969.
17 Tobu 1995.

Group 3 Waduz, Lille	Group 4 Brussels, Caen, Private collection [cat. 12]	KMSK	Bonnefantenmuseum
Straight-sided, wide-bottomed basket; identical tools within group	Straight-sided basket with similar tools but not identically positioned	Basket quite like that in Group 3; tools similar but not identical to those in cat. 10	Straight-sided narrow basket; individual arrangement of tools
Present	Present	Present	Present
Same distribution of shuttered windows within group; figure leans out of window	Same distribution of shuttered windows within group; figure leans out of window	Not identical to any group; no figure leaning out of window	Not identical to any group; no figure leaning out of window
Some reeds present in both versions but not all along	Brussels and cat. 12: present; Caen: in underdrawing only	Absent	Absent
Present	Brussels: present; Caen: in underdrawing only; cat. 12: not enough detail in photograph to judge	Absent. Sun on horizon in underdrawing and paint layer	Absent
Same number and position within group	Same number and position within group	Appears to be same as Group 1	Unique arrangement of trees
Very similar symbol, not seen in other groups	Brussels: absent; Caen: star; cat. 12: Same symbol as Group 1 not distinguishable on photograph		A star, as in Caen

18 Ertz 1998.

19 Mori 2001.

20 Van Hauwaert 1978; Van Hauwaert 1985.

21 Van Hauwaert 1977.

22 Van Hauwaert-Thomae and Folie 1995.

23 Faries, Shepherd and Eastaugh 1995.

24 Van Schoute and Verougstraete 2001 (forthcoming).

25 Currie 2001a (forthcoming).

26 Currie 2001b (forthcoming).

27 A full technical examination of the original version will be published in Allart and Currie 2001 (forthcoming).

28 Musées Royaux des Beaux-Arts de Belgique, *Bruegel, le peintre et son monde*, Brussels, 1969. The posters explaining Bruegel the Elder's painting technique, which were made for this exhibition by Régine Guislain-Wittermann and Albert Philippot, were never published.

29 Allart 1993a; Allart 1993b.

30 Sneyers 1969.

31 Old varnish residues in the form of brown speckles are observed over certain areas, e.g. the blue water in the upper right.

32 These measurements do not include the two thin battens, added along the upper and lower edges during the 1968-9 restoration.

33 See cross-sections in Allart and Currie 2001 (forthcoming).

34 In the original version the lettering on the inn sign is illegible; in the copies it is clearly written as 'In de Swaen'.

35 The identification of the leper's house and the various associated attributes was made in Genaille 1981.

36 I would like to thank the owner for his kind authorization to study this painting. It was discussed for the first time in an oral communication, see Currie 2001b (forthcoming).

37 Cat. 13: sale Brussels, Finck, 1981, lot no. 6 (panel, 121 x 170 cm); cat. 10: sale London, Sotheby's, 10 December 1980, lot no. 133 (panel, 117.5 x 167.5 cm); and cat. 11: sale New York, Christie's, 10 January 1990, lot no. 217 (canvas, 117.5 x 166 cm). Colour illustrations were studied for these versions.

38 The author personally measured the paintings in Belgian public collections and the private collection version [cat. 10]. Other measurements were derived from the owner's condition reports and auction catalogue details.

39 The suggestion that the canvas paintings may have been produced for export was made by Peter van den Brink.

40 The Caen version is not included in these figures as it appears to have been cut down along the right and the top edges.

41 Verougstraete-Marcq and Van Schoute 1989, p. 76.

42 Rule number seven of the regulations lists the names given to these model sizes: a 'zesentwintich stuivers', a 'guldens', an 'acht stuivers', a 'stooters' and a 'halven stooter'. For a transcription in Dutch of the regulations, see Van

Damme 1990, pp. 235-6. For a discussion of the standardization of panel formats, see Wadum 1998a, pp. 182-3 and Wadum 1998b, p. 160.

43 Bonnefantenmuseum; 5: Caen; 6: Waduz; 5: Arras; 5: Lons-le-Saunier; 4: KMSK; 4: Brussels; 5: private collection; 5: Mayer van den Bergh; 5:

44 The clover mark, accompanied by the Antwerp brand (1590-1637) is present on a version of the *Wedding Dance*, 40 x 56.6 cm, signed and dated 1621 (coll. De Jonckheere, 1998), see cat. De Jonckheere 1998. It is noted in the

catalogue entry that the back of the panel is struck with the seal of the guild of Antwerp and that it carries the mark of Michiel Claessens. Van Damme

(1990, pp. 193-236) also lists two paintings of similar size to the *Wedding**Dance* with Michiel Claessens' mark, a *Winter Landscape* and a *Brat in front**of an Inn*. In total he lists 51 panels branded with Claessens' clover by a

variety of artists, many anonymous. Bert Cardon lists 12 panels, mostly by

anonymous artists, branded with the Antwerp brand and Claessens' clover

(see Cardon 1986-7). For another example of the clover mark, see also

Schuster-Gawlowska 1989, p. 252.

45 Daniel Jaunard, who restored the panel support, confirmed the presence of

the clover mark and did not find any sign of the Antwerp guild marks when

he removed the canvas strips along the joins on the reverse of the panel.

46 Jørgen Wadum, personal correspondence.

47 This is discussed by the author in Currie 2001a, pp. 122-4.

48 Jørgen Wadum, personal correspondence.

- 49 A list of these panelmakers' marks was kept at the guild. This list was recently rediscovered in the Antwerp municipal archives and published by Van Damme 1990.
- 50 Jørgen Wadum, personal correspondence.
- 51 Van Damme 1990, p. 299.
- 52 Gepts 1954–60. There are, however, doubts as to the attribution of the *Ecc Homo* to Pieter Balten; in an article on panels marked with the Antwerp brand and/or the maker's mark, Bert Cardon groups the painting together with other branded panels that stylistically resemble paintings from the sixteenth century but actually date from the seventeenth (Cardon 1986–87).
- 53 Jørgen Wadum, Chief Conservator at the Royal Cabinet of Paintings 'Mauritshuis', is currently researching this subject.
- 54 Dendrochronology performed on site by Pascale Fraiture from the laboratory of dendrochronology, in the Laboratoire de Dendrochronologie, Groupe interdisciplinaire d'Archéométrie at the University of Liège.
- 55 Unpublished report by Joseph Vynckier, IRPA, 28 January 1994.
- 56 This date is arrived upon using Pascale Fraiture's method, adding eight years for the missing sapwood rings and two years for the seasoning of the wood. Joseph Vynckier concluded from his evidence that the tree would have been felled around 1606, as he added the average number of sapwood rings in his calculation, fifteen, minus one for the single sapwood ring present on the panel, rather than the minimum of sapwood rings – nine.
- 57 Analysis carried out by scanning electron microscopy by Janka Sanyova at IRPA. The ground layer of the private collection version [cat. 10] is also white but the painting was not sampled.
- 58 Analysis of medium carried out by HPLC (high-performance liquid chromatography) by Karijn Lamens at IRPA. The closest match was aged collagen (match 0.994039). A sample from the Mayer van den Bergh version was also analysed by HPLC by Karijn Lamens, but no protein found, probably owing to the small size of the sample. No ground samples were analysed for the Brussels and private collection versions.
- 59 Personal examination with binocular microscope.
- 60 See Wadum 1998b, pp. 165–8, for an excellent overview of the application of grounds by specialist 'writers' and panelmakers in the early seventeenth century, with reference to contemporary manuscripts.
- 61 Van Hout 1998.
- 62 The Brussels version's *barbes* appear to have been scraped down during restoration.
- 63 The other paintings in the series were not examined unframed by the author.
- 64 Another example of a panel with ungrounded lateral edges is *The Massacre of the Innocents*, signed and dated 1604, 120.5 x 168 cm, Brussels, MRBAB, inv. 80. An example of a larger-format panel by the artist with ground and paint layers extending up to the edges on all four sides is *The Preaching of Saint John the Baptist*, signed and dated 1624, 104.5 x 169.5 cm (Lier, Stedelijk Museum Wuyts-Van Campen en Baron Caroly, inv. 44).
- 65 See definition of 'channel edge supports' in Gettens and Stout 1942/1966, p. 286. The authors describe how 'this name is given arbitrarily to a wooden channel occasionally seen attached to the end grain edges of thin panels in paintings of the studios particularly of Dutch artists of the 17th century. One is found in a work attributed to Rembrandt, *The Painter in his Studio*, formerly in a private collection in England, now Boston, Museum of Fine Arts (*Burlington Magazine*, CCLXXXII [1925], p. 264)'. See also Verougstraete-Marq and Van Schoute 1989. The authors note that sometimes paintings are seen in the sixteenth century with unpainted and ungrounded borders on two sides only. They mention the case of Maarten van Heemskerck's *Saint Luke Painting the Virgin* (Rennes, Musée des Beaux-Arts), where Saint Luke is shown painting on a small, probably single-plank panel with a channel edge support on its upper edge, at right angles to the grain. Like Gettens and Stout, they also cite the example of Rembrandt's *The Painter in his Studio* as an illustration of such a grooved batten (p. 52).
- 66 The other three cases are: *Procession to Calvary*, unsigned, 106.7 x 161 cm (Antwerp, KMSK, inv. 31); *The Preaching of Saint John*, signed (but signature appears false), 108.2 x 170.7 cm (Antwerp, KMSK, inv. 777); *The Massacre of the Innocents*, signed and dated 1604, 120.5 x 168 cm, Brussels (MRBAB, inv. 80). All the other cases examined with unpainted and ungrounded lateral edges are thinned and cradled on the reverse, as a result of which this feature is either concealed or has been removed.
- 67 Kees Schreuder and Annabelle Mills, unpublished condition report, 1997.
- 68 Carried out by Janka Sanyova at IRPA.
- 69 In a sample from a tree branch on the upper edge of the Brussels copy, both umber and an earth pigment without manganese were detected with the scanning electron microscope in the *imprimatura* layer.
- 70 For a definition of the term *imprimatura* and a discussion of its function, composition and purpose, see Van Hout 1998. The author describes that 'it is likely that the streaky *imprimatura* originated from the oil isolation layer, to which the early Netherlandish painters sometimes added pigments' (p. 205).
- 71 The colour and function of the *imprimatura* in the Brussels version were only revealed after the painting was cleaned. I would like to thank the conservator of the painting, Thanh-Nghi Pham, for taking the time to discuss it with me and for his insights on the subject.
- 72 Differences in the condition of the paintings and the equipment used to register the images account for the variable quality of the images. The underdrawing in the Lille version proved quite difficult to distinguish clearly, perhaps owing to its different support.
- 73 For the KMSK, Mayer van den Bergh, Brussels and private collection versions, the author used an Inframetrics Infracam-SWIR (short-wave infrared) camera to register the images. The mosaics for these paintings were digitally assembled by Kristof van Bellinghen using Adobe Photoshop. For the Vaduz version Daniel Fabian, Suzanne Harleman and Peter van den Brink used an FCB-IX 47 Sony CCD camera to register the images and J.R.J. van Asperen de Boer assembled the mosaic. For the other versions, the images were captured by Margreet Wolters, Lars Hendrikman and Peter van den Brink using the K.D. Hamamatsu vidicon camera and J.R.J. van Asperen de Boer assembled the mosaics.
- 74 In the case of the *Consus* copies, cross-sections including the drawing layer could not be taken. Cross-sections including the drawing layer from two other paintings by Pieter Bruegel the Younger showed the drawing clearly lying above the *imprimatura* (*Massacre of the Innocents*, Antwerp, KMSK, inv. 83; and *Wedding Dance*, Ghent, Museum voor Schone Kunsten, inv. 1914–CJ).
- 75 There is no infrared reflectogram mosaic available for the Lons-le-Saunier version in this area, while the trees strongly absorbing infrared in the Vaduz reflectogram make an assessment of the underdrawing in that same area impossible.
- 76 There is no infrared reflectogram available for the Lille version in this area and the Vaduz infrared reflectogram was not sufficiently clear to assess whether the reeds were underdrawn or not.
- 77 Since the knife motif is painted black, it is difficult to assess whether it is also underdrawn; it probably was, as traces of drawing lines do appear at the edges of the motif in all but the KMSK version.
- 78 By 'condition' is meant the state of preservation of the work. Works of art can suffer damage from bad environmental conditions, which can cause flaking and paint loss. Harsh cleaning is another factor that can result in abrasion of the paint layer and removal of delicate coloured glazes. Furthermore, discoloured retouchings and overpainting can distort the appearance of a painting significantly.
- 79 Reserves in the white lead paint are clearly visible in x-radiography, while reserves in carbon-containing black or brown paint mixtures are visible in infrared reflectography. The two methods of examination are therefore complementary.
- 80 A system of reserves in Pieter Bruegel the Younger's *Wedding Dance* (Ghent, Museum voor Schone Kunsten, inv. 1914–CJ) is described in Currie 2001a, pp. 127–9.
- 81 The sun motif is drawn and painted yellow in the KMSK version.
- 82 Samples from the KMSK and Mayer van den Bergh versions were taken and examined by the author. Samples from the Brussels version were taken by Leopold Kockaert and re-examined by the author.
- 83 Examination with the optical microscope was carried out by the author. Scanning electron microscopy was carried out by Janka Sanyova at IRPA on all samples.
- 84 I would like to thank Thanh-Nghi Pham, who conserved the Brussels panel, for pointing out this interesting colour change.
- 85 The taking of samples was confined to the edges of paintings for the most part. Figures are not generally present in these areas.
- 86 Feller 1967; Rutherford *et al.* 1993; Daniels 1987; Grout and Burnstock 2000. See the latter for a more extensive bibliography.
- 87 I would like to thank Katja Lewerentz, painting conservator at the Stichting Restauratie Atelier Limburg (SRAL), for pointing this out to me and for supplying the illustration.
- 88 E.g. the large-scale couple in the lower right corner. These outlines are perhaps later reinforcements made during restoration.
- 89 The Caen version is difficult to assess due to damage from abrasion. A photographic detail of the Lille version was not available for comparison. I would like to thank Sophie de Potter of IRPA for the suggestion to examine the inscription in a mirror.
- 90 The fact that these markings vary from copy to copy was spotted by Katja Lewerentz while conserving the Mayer van den Bergh version.
- 91 David 1997, pp. 113–14. Johan David, director of the Museum voor de Oudere Technieken, Grimbergen, also informed me that few such tools survive from the sixteenth and seventeenth centuries, and those that do are often in poor condition. He advised me that toolmarks have been published for tools in Sheffield; see 'The marks of Sheffield cutlers, 1614–1878', *The Journal of the historical metallurgy society*, 32 (1999), pp. 93–103.
- 92 I would like to thank Aimé Stroobants of the Stedelijk Museum, Dendermonde, who provided all the information regarding guild regulations. For a more general discussion of marks on tools, see also Mercuzot 1997, pp. 137–9.
- 93 E.g. Bucharest, Muzeu National de Arta al României, inv. 69.402/2282 (signed 'P.BREVGHEL'; Ertz 648a); London, Sotheby's, 12 December 1973 (signed 'P.BREVGHEL'; Ertz 651); Switzerland, private collection (signed 'P.BREVGHEL'; Ertz 654); Switzerland, private collection (signed 'P.BREVGHEL'; Ertz 657); Stockholm, Museum Hallwylska, inv. B.178 (signed 'P.BREVGHEL'; Ertz 658).
- 94 This correlation was calculated by comparing 37 corresponding sets of measurements from points near all four corners of the composition on the author's tracings of the compositions of four of the copies and the original. The original could not be traced; instead its x-radiograph was traced and measurements made from this document. The very slight distortion occasioned by the x-ray process was taken into account in the error margin. The four copies measured were the private collection version [cat. 10], the KMSK version, the Mayer van den Bergh version and the x-radiograph of the Brussels version.
- 95 Peter van den Brink took Ingrid van Rooy's tracing of the painted composition of the Maastricht version and laid it over the paint layer of the Brussels version and Pieter Bruegel the Elder's original version. He found that the two copies more or less lined up but that a few shifts were necessary to align his tracing with the original. This supports the author's findings.
- 96 Klaus Ertz pointed at this red/green combination, used in the figure of the large-scale lady in the lower right in both original and copies, to support his argument that Pieter Bruegel the Younger had seen the original of his father, but deliberately changed the majority of colours; see Ertz 1998, p. 298.
- 97 Underdrawing in the original version was clearly detected for the skater and the bird, which proves that these motifs were not last-minute additions made during painting.
- 98 The sun in Bruegel the Elder's original version does not appear to be underdrawn however. There are faint vertically ascending lines in the underdrawing, suggesting branches of a tree, traversing the lower part of the sun. Therefore, if the sun were underdrawn, we would have detected outlines through the red paint.
- 99 Ertz 1998, pp. 296–7 n. 6.
- 100 Van Hauwaert-Thomas and Folie 1995.
- 101 Verougstraete and Van Schoute 1993.
- 102 Urbach 1999.
- 103 I would like to thank Katja Lewerentz, who conserved the Mayer van den Bergh version at the Bonnefantenmuseum, for pointing out this important motif to me.
- 104 Private correspondence with Dr. Konrad Renger, Bayerische Staatsgemaldesammlungen. The painting with inv. 5012 was deaccessioned on 7 November 1938, and the museum records do not indicate what happened to it after this date.
- 105 Panel, 124 x 174 cm. See Marlier 1969, p. 64 n. 17.
- 106 An infrared image of this area in the Lille version was not available.
- 107 An infrared image of this area in the Lille version was not available.
- 108 The author did not examine this version personally.
- 109 See Peter van den Brink's essay in this catalogue.
- 110 Vallier 1970, pp. 90–97.
- 111 Results of these experiments will be published in Allart and Currie 2001 (forthcoming).
- 112 Overlays made by Sophie de Potter at IRPA using Adobe Photoshop. For each example cited, the proportions of the infrared image were verified, and corrected if necessary, by superposing the infrared image on the corresponding detail in the paint layer.

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