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COPIES, RÉPLIQUES, PASTICHES

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DESIGN TRANSFER IN PIETER BRUEGHEL THE YOUNGER'S WORKSHOP: A STEP-BY-STEP RECONSTRUCTION BASED ON TECHNICAL EXAMINATION OF HIS PAINTINGS

Christina Currie and Bob Ghys

Abstract: IRR has revealed only one clear instance in Brueghel the Younger's work where a pounced cartoon was employed for the transfer of the design. The hypothesis that pouncing was routinely used in the artist's workshop — but that all traces of the process have disappeared — was tested through a series of experiments on practical reconstructions of Brueghel's usual support and preparatory layers. These reconstructions follow Brueghel's demonstrated layer structure and materials as closely as possible whilst taking into account advice from contemporary sources. The tests show that no traces of pouncing dust should remain after underdrawing and painting under normal circumstances, making it entirely feasible that the practice of using pounced cartoons in Brueghel's workshop was indeed the norm rather than the exception.

Pieter Brueghel the Younger's workshop produced large numbers of copies, particularly after works by his father, Pieter Bruegel the Elder. An investigation into his copying process formed a key element of a recent doctoral study and included practical tests with various transfer techniques available at the time.[1] One particular method of design transfer was singled out for special attention and further confirmatory tests — the use of a pounced cartoon.

Based on the superposition of the author's tracings of the painted compositions of several series' of copies from Brueghel's studio, it is clear that a precise mechanical means of transfer must have been employed in many cases. For some compositions, the evidence suggests mechanical transfer for the entire design and in others, for key motifs and groupings only. A version of the *Battle between Carnival and Lent* from the Musées royaux des Beaux-Arts de Belgique provides unambiguous proof of the use of a pricked cartoon for transfer; in several areas, IRR[2] reveals a series of small black dots, or pounce marks, running alongside the underdrawing lines (fig. 1).[3] However, IR examination of a large range of paintings from the artist's workshop has uncovered only three other possible examples of pouncing, and none as clear as

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[1] C. CURRIE, *Technical Study of Paintings by Pieter Brueghel the Younger in Belgian Public Collections*, Ph.D. Dissertation, Liège University, 2003. Transfer techniques tested include pouncing, tracing, squaring and the use of the pantograph (Appendix 1: practical experiments with copying techniques).
[2] Inframetrics InfraCAM CAM — SWIR with narrow bandwidth filter (1,5-1,73 microns). Mosaics using Adobe Photoshop by Sophie De Potter.
[3] *Battle between Carnival and Lent*, 121,1-121,4 × 171,3-171,9 cm, unsigned, Musées royaux des Beaux-Arts de Belgique, inv. 12045. See C. CURRIE, 'The Discovery of Pouncing in a Painting by Pieter Brueghel the Younger and its Implications for the Use and Origin of Cartoons in his Workshop', in *Bulletin des Musées royaux des Beaux-Arts de Belgique* (forthcoming).

Fig. 1. Pieter Brueghel the Younger, *Battle between Carnival and Lent*, unsigned, Brussels, Musées royaux des Beaux-Arts de Belgique (inv. 12045), detail: IR (© IRPA, Brussels).

the *Carnival and Lent*.[4] Does this mean that pounced cartoons were only employed on rare occasions, or, despite the lack of evidence, could they have been used for all paintings where mechanical transfer is suspected?

To test the hypothesis that pounced cartoons formed part of Brueghel's normal practice, the current authors devised a series of experiments to be carried on reconstructions of Brueghel's usual support and preparatory layers. The latter were prepared in accordance with the results of examination and analysis of paintings from the artist's workshop as well as taking into account practical advice from diverse contemporary sources.

Oak planks were joined, lightly planed, sanded and sized with rabbit skin glue. Sizing gives the surface an even porosity prior to ground application; this is occasionally mentioned in seventeenth century treatises on painting techniques, for example, De La Fontaine's *L'Académie de la peinture*, 1679, where he recommends '*Pour imprimer le bois à peindre. Premierement il faut prendre de la colle de cuir, & en coller le bois…*'.[5].

Brueghel's ground layer, following traditional Flemish practice, consists of several layers of calcium carbonate in a glue medium,[6] for the reconstructions, five thin

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[4] The three paintings showing possible pouncing are: two versions of *Christ Carrying the Cross*, one signed and dated, *P.BRVEGHEL 1603*, the other unsigned (Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 5006 and 31 respectively) and a version of the *Flemish Proverbs*, signed and dated, *P.BRVEGHEL 1607* (Lier, Stedelijk Museum Wuyts Van Campen en Baron Caroly, inv. 46). These cases are discussed and illustrated in C. CURRIE, 2003, p. 175, 177, fig. 638 a-b, 639 and 651.

[5] [For the preparation of the wood for painting. First of all, take leather glue and size the wood…]: J.-H. DE LA FONTAINE, *L'Académie de la peinture, Seconde Partie. Des Couleurs qu'il faut pour la peinture a l'huile, & la maniere de les preparer*, Paris, 1679, transcribed in A. MASSING, 'French Painting Technique in the Seventeenth and Early Eighteenth Centuries and De La Fontaine's *Académie de la peinture* (Paris 1679)', in E. HERMENS ed., *Looking Through Paintings. The Study of Painting Techniques and Materials in Support of Art Historical Research, Leids Kunsthistorisch Jaarboek*, 11, London and Baarn, 1998, p. 383 (English transl.: C. Currie).

[6] In the cross-sections of Brueghel's paintings analysed, calcium carbonate was identified as the main constituent in the ground (analysis carried out by Janka Sanyova with a scanning electron microscope

layers were applied using a hog hair brush. For the majority of the test panels, the final layer, once dried, was smoothed down and polished with various sandpapers,[7] in one case, a more traditional method of finishing was applied using a plant from the genus *Equisetum*, commonly known as horsetail. Horsetails contain abrasive silica particles within the epidermis of their stems. Both *Equisetum hyemale* (scouring-rush, Dutch rush) and *Equisetum arvenis* (common horsetail, field horsetail, shave grass, bottlebrush) have been mentioned in the context of scouring and polishing. Horsetail is cited as far back as Theophilus for polishing leather and wood.[8] In the late 16th century, John Gerard, in the chapter 'Of Horse-taile or Shave-grasse' from his famous 'Herball' describes a 'small and naked shave-grasse wherewith Fletchers and Combe-makers doe rub and polish their worke'.[9] He also comments that 'shave-grasse' is not without cause named Asprella, of his ruggedness, which is not unknowne to women, who scoure their pewter and wodden things of the kitchen therewith, which the Germane women call "kannenkraut" and therefore some of our huswives do call it Pewter-wort'.[10] In the context of painting, De La Fontaine recommends horsetail in 1679 for polishing the grounds of panel paintings.[11] For

coupled with an energy dispersive x-ray detector (SEM/EDX)). Identification of aged collagen in several samples of ground from Brueghel the Younger's paintings using high pressure liquid chromatography (HPLC) by Karijn Lamens (see C. CURRIE, 2003, p. 51, 124).

[7] In Brueghel's day, a knife may also have been used to scrape and even out the dry chalk ground layer, as mentioned in a recipe from the Amsterdam painter Abraham Latombé, cited in De Mayerne's manuscript, *"Pour le bois. Imprimés premièrement avec la colle, susditte et craye, estant sec, grattés et equalés avec le couteau, puis faites une couche légère avec blanc de plomb & ombre"* [For the wood. Size first with the abovementioned glue and chalk; when it is dry, scrape and even out with a knife, then put on a thin layer of lead white and umber], T.T. DE MAYERNE, *Le manuscript de Turquet de Mayerne 1620-1646?*, ed. M. FAIDUTTI and C. VERSINI', Lyon, c. 1970, p. 25. Shark skin is also mentioned as a possible abrasive for the smoothing down of the ground in a painting by Michelangelo, *The Virgin and Child with Saint John and Angels* (London, National Gallery, inv. 809), in J. DUNKERTON, S. FOISTER and N. PENNY, *Dürer to Veronese. Sixteenth-Century Painting in the National Gallery*, London, 1999, p. 218, fig. 267. Ground cuttlefish bone is another traditional abrasive.

[8] *"Cumque omnino siccum fuerit, [deinde radendo cum ferro adaequa, postea] tolle herbam, quae vocatur asperella, quae crescit in similutudinem junci et est nodosa; quam cum in aestate collegeris, siccabis in sole, et ex ea fricabis ipsam dealbaturam, donec omnino plana et lucida fiat."* [Then take the grass named horsetail, that grows in the form of a rush and is knotty: it must have been harvested in summer and dried in the sun. Rub the whitened object until it becomes perfectly smooth and shiny], from *Liber primus*, Chapter XIX, 'De albatura gypsi super corium et lignum': *Théophile, prêtre et moine. Essai sur divers arts*, published by C. DE L'ESCALOPIER with an introduction by J.M. GUICHARD, Nogent-le-Roi, 1977, p. 34, re-edition Paris, 1843 (English transl.: C. Currie).

[9] J. GERARD, *The Herball or generall historie of plantes gathered by John Gerarde of London Master in Chirurgerie. Very much enlarged and amended by Thomas Johnson Citizen and Apothecarye of London*, 3rd ed., London, 1636, p. 1113 (original edition 1597).

[10] J. GERARD, 1636, p. 1116.

[11] *"Premierement il faut prendre de la colle de cuir, & en coller le bois, quand il sera sec, il faut prendre du blanc d'espagne, comme on le vend chez les Chandeliers, en mettre dedans une escuelle & y mettre un peu d'eau pour le faire délayer, & après y mettre de la colle, & mesler tout bien ensemble avec une brosse, vous en frotterez le bois, sans prendre garde qu'il soit unis: il faut charger vostre bois de trois couches l'une après l'autre, laissant seicher toûjours vos dites couleurs, quand vous voirez que tout cela sera seiché, prenéz un linge moüillé, & frottez par dessus pour abbattre ce qui ne sera uny, après vous prendrez de la prelle, & prellerez vostre blanc, vous le rendrez uny comme verre, il les faut encoler, les uns l'imprime de gris à huille, les autres se contentent de l'encoler deux fois."* [First of all, take glue and leather, and size the wood; when it is dry, take Spanish white [chalk], as is sold at the candlemakers, and put in a bowl and add a little water for mixing, and afterwards add the glue, and mix everything well together with a brush, then rub down the wood, without taking care that it is even: apply three coats [of ground] onto your wood, one

the reconstruction, horsetail was employed both as an abrasive and as a polishing agent: first, the stems were ground and used as an abrasive powder for the smoothing down of imperfections; next, a bunch of stems was bound together and employed in a vertical position for final polishing (fig. 2).[12]

Following the ground application, a thin *imprimatura* layer was applied to all the test panels. In Brueghel's works examined, a lightly pigmented isolation layer — usually referred to today as the *imprimatura* — is invariably present (fig. 3).[13] It is medium-rich and varies in tonality from almost transparent through to slightly ochrous to greyish.[14] recalling somewhat the semi-transparent, flesh-coloured *primeursel* layer described by Karel Van Mander in his *Schilder-Boeck* of 1603-4.[15] The main difference to Van Mander's *primeursel* is that Brueghel the Younger's isolation layer was applied before, rather than after the underdrawing.[16] This layer structure is made clear in two cross-sections containing the drawing layer as well as through microscopic examination of various paintings' surfaces. Scanning electron microscopy of these two samples, one from a pink drapery in a version of the *Wedding Dance* and the other from the snowy background of a version of the *Massacre of the Innocents* shows clear zones of a lead white containing layer sandwiched between the black underdrawing and the chalk ground (fig. 4).[17]

after the other, allowing them to dry; when you see that all is dry, take a damp cloth and rub the surface to remove any unevenness; afterwards, take horsetail and polish your white layer, making it as smooth as glass; then apply an isolation layer: some use grey tinted oil, others apply two layers of size], J.-H. DE LA FONTAINE, 1679, transcribed in A. MASSING, 1998, p. 383-384 (English transl.: C. Currie).

[12] Plant material gathered in France by Bob Ghys; probably common horsetail (*Equisetum arvense*).

[13] The layer was variously detected by infrared reflectography, x-radiography and cross-sectional analysis, depending on the presence of lead white and/or carbon black.

[14] Owing to the difficulty of sampling an intermediary layer for medium analysis, the presence of oil, although suspected, could only be confirmed in one case. A rare sample of *imprimatura* without overlying paint was taken from an unsigned version of *Kermis with Theatre and Procession* (Brussels, Musées Royaux des Beaux-Arts de Belgique, inv. 3592). The presence of linseed oil was identified with gas chromatography/mass spectography (analysis by Steven Saverwijns). An acid fuchsine stain for protein applied to cross-sections from several other paintings did not cause a reaction in the *imprimatura*, suggesting by default that oil might also be the medium in these cases (staining tests by Cécile Glaude under the supervision of Janka Sanyova).

[15] In Van Mander's words, *"Maer t'fraeyste was dit/ dat sommige namen/ Eeniche sme-cool swaert al fijntgens ghewreven/ Met water/ jae trocken/ en diepten t'samen/ Hun dingen seer vlijtich near het betamen: Van hebbenser aerdich over ghegheven/ Een dunne primuersel/ alwaer men even/ Wel alles mocht doorsien/ ghestelt voordachtich: End' het primuersel was carnatiachtich"* [the loveliest thing was that several of them took some finely ground charcoal, mixed with water (or even dry), and modelled their forms very meticulously and properly; over this they put, with great forethought, a thin priming, through which, however, one could still see everything, and this priming was done in flesh tones]: K. VAN MANDER, *Grondt der Schilder-Const* (Foundation of the Painter's Art), 2nd edition, Amsterdam, 1618, Chapter 12, verse 17, transcribed in R. HOECKER, *Das Lehrgedicht des Karel van Mander*, The Hague, 1916, p. 270 (English transl.: W. STECHOW, *Carel van Mander, Theoretical Writings. Foundation of the Painter's Art'*, in *Northern Renaissance Art 1400-1600. Sources and Documents*, New Jersey, 1966, p. 66).

[16] In the margin to verse 17, Chapter 12 of the *Grondt*, Van Mander added, *"Trocken hun dinghen op het wit/ en primuerden daer olyachtich over "* [They drew their things on the white ground and then put over it an oil-like priming], K. VAN MANDER, 1618, transcribed in R. HOECKER, 1916, p. 270 (English transl.: W. STECHOW, 1966, p. 66).

[17] *Wedding Dance*, 40,05-40,3 × 55,5-55,7 cm., unsigned, Museum voor Schone Kunsten, Ghent, inv. 1914 C-J; *Massacre of the Innocents*, 73,3-74,25 × 105-105,1 cm, signed .P.BRVEGHEL.. Antwerp, Koninklijk Museum voor Schone Kunsten, inv. 832. Analysis carried out by Janka Sanyova (SEM/EDX).
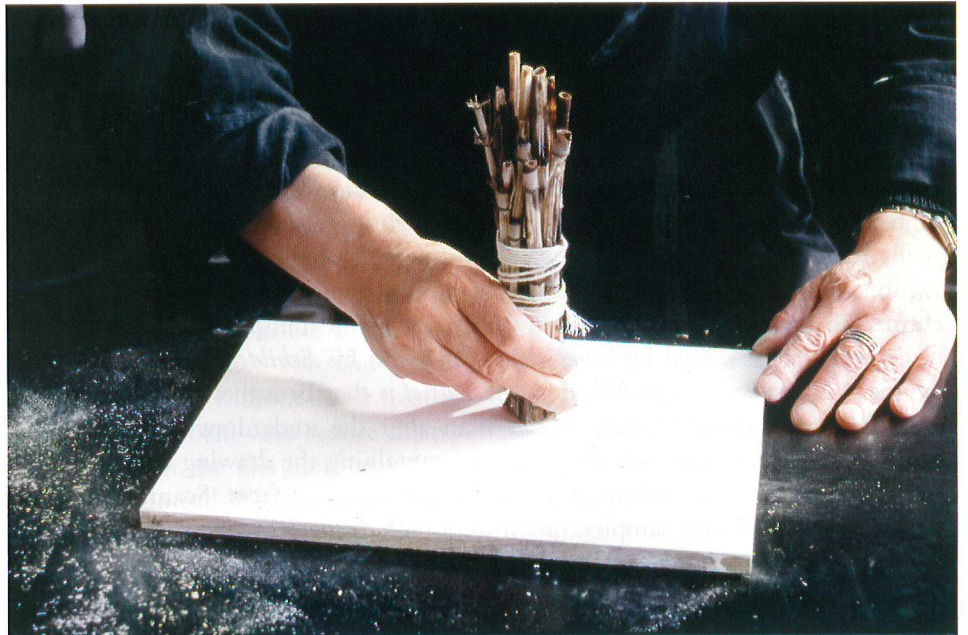
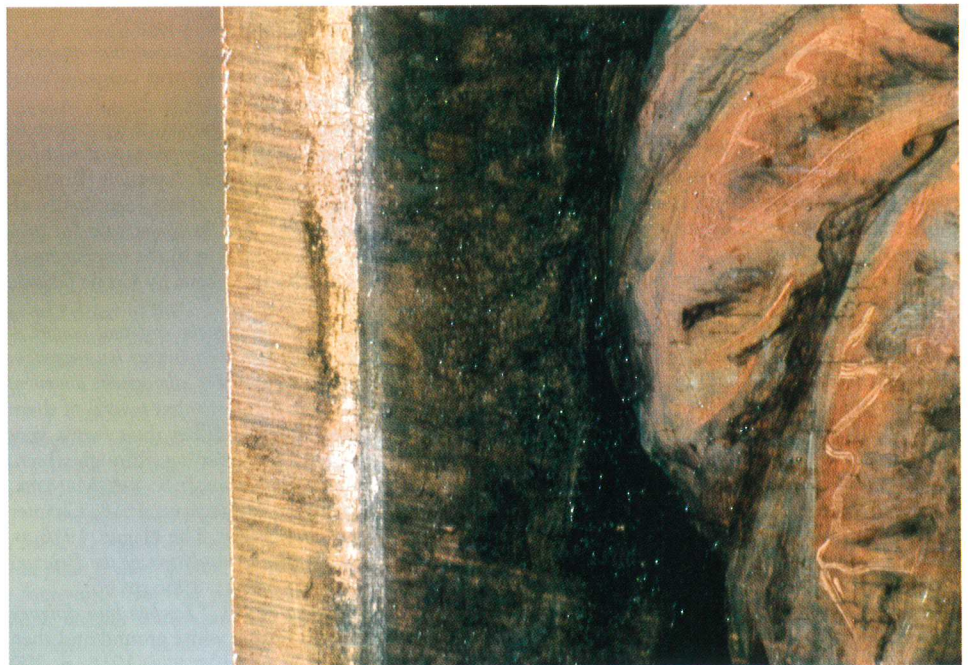Fig. 2. Polishing of ground layer with horsetail (© C. Currie, B. Ghys).

Fig. 3. Pieter Brueghel the Younger, *Sermon of Saint John the Baptist*, unsigned, Bruges, Groeningemuseum (inv. 0.1561) unsigned, detail, *imprimatura* on left unpainted edge (© C. Currie).
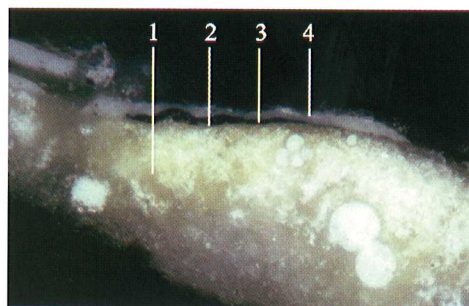
Fig. 4. Pieter Brueghel the Younger, *Massacre of the Innocents*, signed, *P. Breughel*, Antwerp, Koninklijk Museum voor Schone Kunsten (inv. 832), cross-section, snow: 1. ground, 2. *imprimatura*, 3. underdrawing, 4. paint layer (© C. Currie).

For the present reconstructions, an ochre tint was chosen for the *imprimatura*, consisting of lead white, vine black and yellow ochre. These pigments were mixed directly into a drying oil medium. De Mayerne's manuscript of 1622-46 includes various recipes on the preparation of suitable drying oil for painting, many of which recommend boiling linseed or walnut oil with 'golden litharge', which is yellow lead oxide.[18] French sources De La Fontaine and Le Blond de la Tour (1699) both suggest putting the litharge in a small bag rather than mixing it directly with the oil.[19] Many authors also propose leaving the prepared oil in the open air or sun to thicken. For the present reconstructions, pharmacy grade linseed oil, into which was suspended a small quantity of litharge in a cloth bag, was slowly heated for three hours in an enamel recipient.[20] The proportion of oil to litharge was taken from one of the recipes in De Mayerne.[21] The oil darkened to a brown colour and thickened

[18] The proportions of oil to litharge and the instructions on preparation vary considerably in the recipes cited in De Mayerne's manuscript. Some suggest slow cooking over one or two hours whilst others propose boiling the oil until it burns (on slow cooking, see below, note 21, and also a recipe from *"M. Mitens peintre flamand excellent. 1622"*; on burning the oil, see a recipe from "De M. Xolssen", dated 2 January 1640, M. FAIDUTTI and C. VERSINI, c. 1970, p. 32, 159).

[19] *"…vous prendrez de l'huille de noix, & mettrez ladite huille dedans un pot de terre sur la cendre chaude, après vous prendrez vostre litarge pillée, qui sera dedans un linge, que mettrez dedans, l'huille sans qu'elle touche le fond du pot"* [take nut oil, and put it in a earthern pot on hot cinders, afterwards take your litharge — which should be in a cloth (bag) — and add it to the oil without allowing it to touch the bottom of the pot], J.-H. DE LA FONTAINE, 1679, cited in A. MASSING, 1998, p. 380 (English transl.: C. Currie). Massing also cites other seventeenth and eighteenth century French sources on the making of drying oil including Antoine Le Blond de la Tour's recipe for *l'huille grasse* (A. MASSING, 1998, p. 345-347, particularly note 69, p. 371).

[20] Oil supplied by Federa B.P., *"huile de lin P-170203"*.

[21] Under the heading, *"huile fort siccative, qui est comme un vernis, sans corps"* [very siccative oil, like a varnish without body], *"M. Sallé chez M. de Soubize"* recommends: *"Prenés de l'huile un demy sextier de Paris, qui pèse environ demie livre, mestés le dedans un pot de terre neuf vernissé, et y jetés demie once de lytharge d'or pulvérisée très subtilement remués un peu avec une spatule de bois et laissés bouillir à lent feu, soubs une cheminée, ou à l'air dans une court, par l'espace de deux heures: vostre huile se consomme, mais peu, laissés bien rasseoir, puis versés vostre huile espaissie par inclination, et la gardés pour vous en servir à divers usages"* [Take a half Paris sextier of oil, which weighs around a half pound, put it in a new varnished earthenware pot, and throw in a half ounce of golden litharge ground finely and stir a little with a wooden spatula and allow it to boil on a slow flame, let it settle well, then pour your thickened oil by tipping it up, and keep it for yourself for various different purposes]: M. FAIDUTTI and C. VERSINI, c. 1970, p. 33 [English transl.: C. Currie]. We divided the old English commercial pound, equivalent to 492.4 grams, by 16 to obtain the equivalent of one ounce, i.e. 30.77 grams in order to calculate the correct proportions (H. DOURSTHER, *Dictionnaire universel des poids et mesures anciens et modernes, contenant des tables des monnaies de tous les pays*, Brussels, 1840, reprinted in facsmile, Amsterdam, 1965, p. 214, 366).

slightly. It was then poured into an open glass flask and left near a window in hot weather for two weeks, where it thickened further and turned golden yellow.

Using a hog-hair brush, a thin layer of *imprimatura* was applied directly onto the test panels in broad, sweeping strokes, in imitation of the corresponding layer in Brueghel the Younger's paintings. This layer was allowed to dry for approximately two weeks, after which the panels were ready to receive the cartoon.

For the cartoon, an IRR detail from the *Battle between Carnival and Lent* was printed to scale, and holes were pricked over the actual pouncing marks. The ridges on the reverse side of the sheet were sanded off to ensure the smooth and even transfer of pounce through the holes, as recommended in Paganino's *Libro Primo: De rechami* (c. 1532), an embroidery patternbook.[22]

Willow charcoal was ground for use as pouncing dust, as suggested by various Italian and French writers.[23] Three slightly different methods of application were tried: a traditional pouncing bag, made of loosely woven cotton in which the black pounce was contained, a cloth stump made from tightly bound cotton rags, dipped in the pouncing dust and again the cloth stump, but applied using more pressure.[24] All three methods worked well but the stump, wiped on gently and with minimum excess pigment, gave the neatest results (fig. 5).

After transferring the cartoon design, the pounced dots were blown lightly to remove excess dust,[25] and the markings joined up with natural black chalk,[26] SEM analysis of Brueghel's underdrawing layer gave clues as to the identification of the possible drawing material or materials used by Brueghel. In one sample, the drawing was found to consist of pure carbon,[27] which could be indicative of several materials including black chalk and graphite; in the other, carbon, and in addition silica, iron, calcium, aluminium and magnesium were identified, suggesting a clay component, as might typically be found in black chalk[28]. Charcoal was never considered a possible medium as its friable and sometimes rich, densely black markings do not resemble the neat, greyish and even outlines of Brueghel's underdrawings.

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[22] Venetian writer Paganino advised rubbing down the raised holes on the reverse of the pounced design with a soft pumice stone (C. BAMBACH, *Drawing and Painting in the Italian Renaissance Workshop. Theory and Practice 1300-1600*, Cambridge, 1999, p. 58).

[23] These include Cennini (late 1390's), Paganino (c. 1532), Armenini (1587), Perrot (1624), Baldinucci (1681), Pozzo (1693-1700) and Saint-Aubin (1770), all cited in C. BAMBACH 1999, p. 76-77. In previous trials graphite, black chalk, red chalk and ivory black were also tested as pouncing dust (C. CURRIE, 2003, Appendix 1, p. 253, 256-258).

[24] For alternative methods to the traditional cloth bag, see C. BAMBACH, 1999, p. 76-77. Bambach cites Charles Saint-Aubin (*L'Art du Brodeur*, Paris, 1770) who mentions that embroiderers could also carefully daub small pricked patterns with a rag of rolled felt that had previously been dipped into a shallow dish filled with pounce; this is not unlike the use of the stump favoured by the present authors.

[25] Light blowing to remove superfluous pounce is recommended by certain sources, for example Paganino and Saint Aubin (C. BAMBACH, 1999, p. 79 and note 294).

[26] The black chalk used in all the tests came from Kremer-pigmente from "a source in France" (Kremer catalogue 2003-2004). Kremer describes it as a natural black slate with a high carbon content comparable to the black chalk described by Cennino Cennini.

[27] *Massacre of the Innocents* (see note 17).
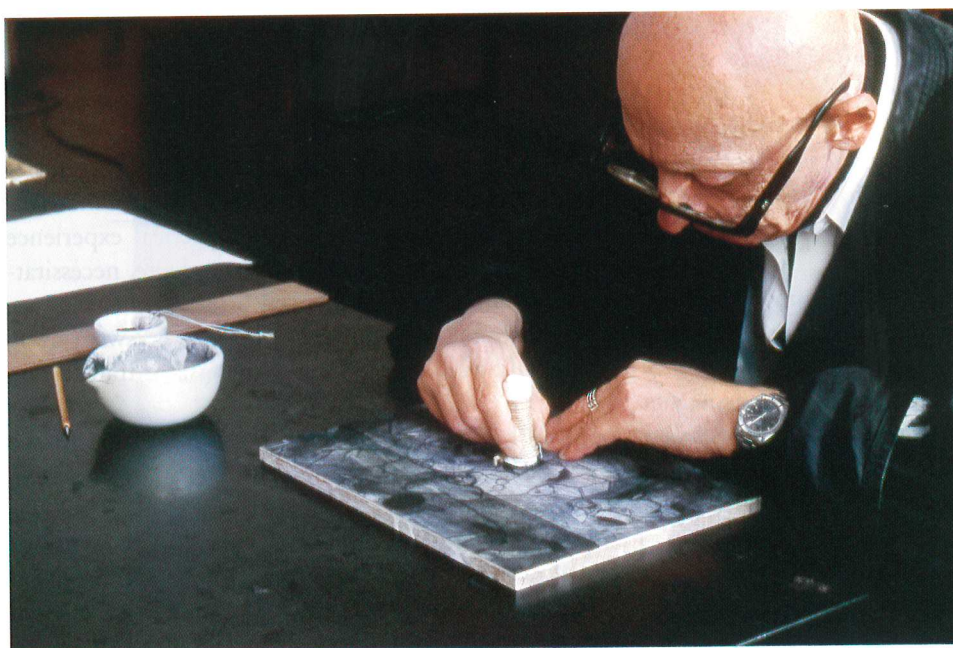
[28] *Wedding Dance* (see note 17).

Fig. 5. Application of pouncing dust with stump (© C. Currie, B. Ghys).

Having joined up the dots, the unbound pouncing dust was removed to prevent smearing during painting. This step is advised by Catherine Perrot in *Le traité de la Miniature* (Paris, 1625): '*Après que l'on a poncé, il faut tirer à la pointe d'argent tous les traits qui sont marquez sur votre vélin <puis on repassera délicatement sur ce vélin avec> une mie de pain, pour empêcher que votre vélin ne soit noirci par cette poudre de charbon*'[29]. In the reconstructions, the right section of each panel was swept clean with a pigeon wing, a traditional tool for cleaning drawings.[30] No remains of pouncing dust remained after sweeping, confirming long-held suspicions that the use of a pounced cartoon is possible without leaving a single trace.[31]

[29] [After you have pounced (the pricked design), it is necessary to draw with the silverpoint all the traces which are marked on your vellum, and afterward go over your vellum softly with a small piece of bread, to prevent that your vellum becomes blackened by this carbon powder], citation and translation in C. BAMBACH, 1999, p. 80 and note 298. It was not possible to refer to the original edition to verify the missing words in C. Bambach's transcription; on the basis of her translation, these are reinstated between brackets.

[30] A pigeon wing is depicted amongst the drawing accessories in *Saint Luke Drawing the Virgin*, Hugo van de Goes, or copy after (Lisbon, Museu Nacional de Arte Antiga, inv. 1459).

[31] Bambach strongly argues this case in regards to Italian Renaissance painting in C. BAMBACH, 1999, p. 79-80. More recently, Hiller von Gaertringen proposed that pounced cartoons were probably used as frequently for panel paintings as they were for wall paintings in the Italian Quattrocento, but that the *spolvero* dots were intentionally erased after drawing (R. HILLER VON GAERTRINGEN, 'The Practice of Erasing Spolvero Dots in Italian Renaissance Panel Paintings. A Hypothesis', in H. VEROUGSTRAETE and R. VAN SCHOUTE eds., *Jérôme Bosch et son entourage et autres études. Le dessin sous-jacent et la technologie dans la peinture*. Colloque XIV, Bruges-Rotterdam, 13-15 septembre 2001, Leuven, 2003, p. 196-206).

The final stage, the application of the paint layer, did not affect the appearance of the drawing in any way. The drawing lines remain intact and unsmeared, as in Brueghel the Younger's underdrawings (fig. 6 a-b).

It can therefore be concluded that pouncing is a strong possibility as the transfer method for the motifs and compositions from Brueghel's workshop where a mechanical method is suspected but no traces of the process remain. Practical experience shows that pouncing is a straightforward and simple technique to execute, necessitating care and precision, but not the talent of an experienced artist. If mistakes are made during the application of the cartoon, the pouncing dust can be swept away and the transfer repeated. Brueghel could well have delegated the task of transferring cartoons to young assistants.

An important question remains. Why are the pouncing dots still visible in the case of the *Battle between Carnival and Lent*? A number of tests were carried out to try to reproduce this result.

One possibility leading to permanent pouncing is that the *imprimatura* layer was still slightly tacky at the moment of design transfer. This scenario was simulated on one test panel by pouncing during the period in which the *imprimatura* remained tacky. After sweeping off excess dust, most — but not all — of the pounced design was still present.

Another possibility is that the artist applied an oiling out layer prior to pouncing and that this was still tacky when the cartoon was applied. This method was tried out in previous tests and the pouncing was shown to be permanent and more even than that in tests with a tacky *imprimatura*, probably due to the lack of pigment in the oil layer.[32]

A further possibility is that an underbound *imprimatura* might cause the pouncing dots to become mechanically trapped in its rougher surface. An intentionally low ratio of linseed oil versus pigment was used to make the *imprimatura* for one of the test panels. The result was negative: no traces of pouncing dust remained after sweeping with a pigeon wing. However, earlier tests with an underbound *imprimatura* — where several different blacks were tried for the pouncing dust — showed that charcoal pouncing disappeared completely upon sweeping and painting but that pouncing using black chalk remained slightly visible.[33]

In the case of the *Carnival and Lent*, the surviving pouncing dots are concentrated in the lower left quadrant, with a few others in the upper right. The distribution of markings is almost certainly random and most likely attributable to a tacky *imprimatura* at the time of design transfer. The degree of tackiness would most probably have varied across the surface of the layer, influenced by fluctuations in thickness and pigment/medium ratio, the absorbency of the chalk/glue ground and the proximity of the panel to a source of heat, light, or air current. The idea of an underbound *imprimatura* is somewhat unlikely; the consequence of this might have

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[32] C. CURRIE, 2003, Appendix 1, p. 257-258.
[33] C. CURRIE, 2003, Appendix 1, p. 256-258.

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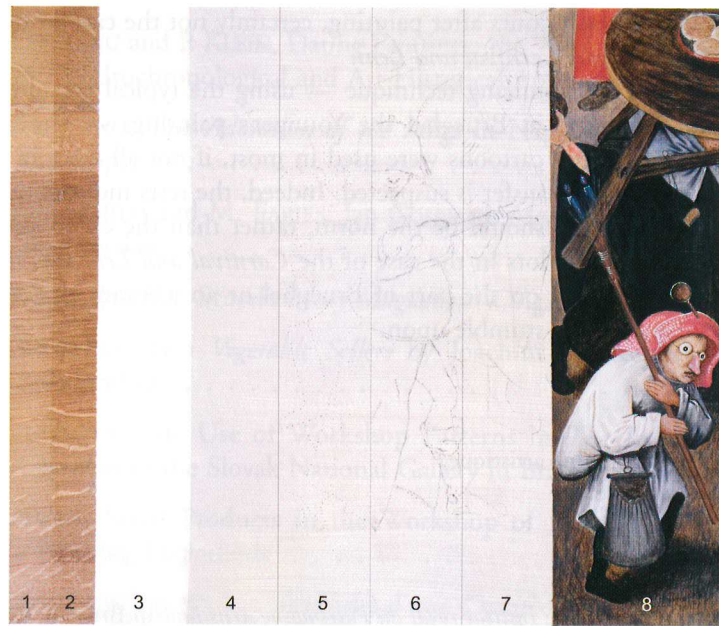howed
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Fig. 6a. Reconstruction of Brueghel the Younger's technique: 1. oak support, 2. rabbit skin glue size, 3. chalk/glue ground, 4. oil-based *imprimatura*, 5. pouncing with ground charcoal using stump, 6. underdrawing with natural black chalk, 7. pouncing dust swept away with pigeon wing, 8. paint layer (© IRPA, Brussels).
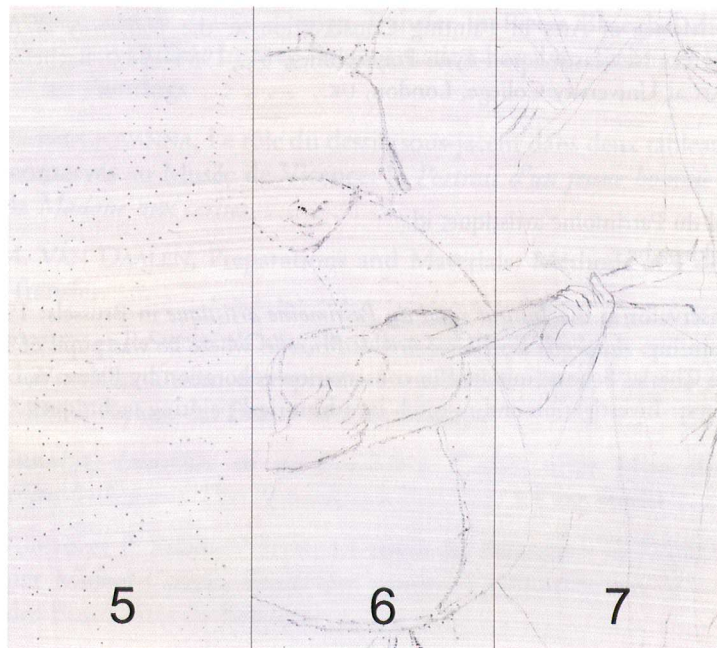

Fig. 6b. Detail of 6a.

been the sinking of the colours after painting, certainly not the case in the superbly preserved *Battle between Carnival and Lent*.

These tests with the pouncing technique — using the typical ground and paint layer structure identified in Brueghel the Younger's paintings — show that it is entirely possible pounced cartoons were used in most, if not all cases in the artist's work where mechanical transfer is suspected. Indeed, the tests indicate that the lack of evidence for pouncing should be the norm, rather than the exception, and that the survival of pouncing dots in the case of the *Carnival and Lent* was in all likelihood due to poor timing on the part of Brueghel or an assistant that the authors were fortunate enough to stumble upon.

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