Materials for art technological source research: theoretical issues

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ABSTRACT Art technological source research can be divided into ‘art technology’ or knowledge concerning the (historical) production of works of art or craft, and ‘source research’, which is the study of sources about art technology. Both are closely related in the sense that knowledge of the one is necessary to understand the other. To learn more about a particular historical technique – and history starts yesterday – any kind of source is supportive in understanding what materials were used, and in what manner. From the opposite viewpoint, to understand one’s sources it is helpful to know about the practice of objects production. A further study of the conceptual part of the object completes the ‘art’ aspect in art technological source research.

RESUMEN La investigación de las fuentes de la tecnología artística se puede dividir en ‘tecnología artística’ o el conocimiento sobre la producción (histórica) de obras de arte o artesanía, e ‘investigación de las fuentes’, que es el estudio de las fuentes sobre tecnología artística. Ambos conceptos están íntimamente relacionados en el sentido de que el conocimiento de uno es necesario para entender el otro. Para aprender más sobre una técnica histórica en particular – y lo histórico empieza ayer – cualquier tipo de fuente ayuda a entender qué materiales fueron utilizados, y de qué manera. Desde el punto de vista contrario, para entender las fuentes que se manejan es conveniente tener conocimientos sobre la práctica de la producción de los objetos. Un estudio más profundo de la parte conceptual del objeto completa el aspecto ‘artístico’ en la investigación de las fuentes de la tecnología artística.

Keywords / Palabras clave art technological source research, theory

Introduction

The purpose of sources, says the historian Prevenier in talking about texts, is to tell about the what, the how and the why (Prevenier 1992). In the case of material and technical subjects it is necessary to know from the sources what materials are used, how these materials are handled, why it was done or to what end. For example, an ink recipe may indicate what ingredients are needed, how to prepare the ink, and how to use the final product, as well as describing the qualities of the product. Next, where, when and by whom is the source compiled? This question, according to Prevenier (1992: 94), is of high importance, because every testimony is the story of an individual, and the individual writes from his own background and experience.

There is a large variety of materials that can be used as sources, but they can be divided into textual sources, audiovisual sources and material sources. Generally speaking, textual sources are documents and audiovisual sources are pictures and sound recordings. Both are direct forms of communication, intended as such and understandable for the trained reader or listener. Material sources are not made for direct communication and they therefore require specialists to research them.

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Textual sources

Textual sources are the most common for the very reason that they are written. Most people start learning reading and writing from around the age of six, a training that lasts for years, making text by far the most widely used method for communication, suitable over long distances and for the long term. In the case of art technology, information about the production of objects can be found in manuals, levies, guild regulations, advertisements, inventories and so on. Texts can be written, printed or digitised, which is done by a particular person or group connected to a place and a period in time. This relation to place and time is quintessential for the further understanding and interpretation of contents and meaning. For example, see the papers in this volume about mediaeval treatises (Kroustallis, pp. xx–xx), Islamic gilding (Barrio Martín, pp. xx–xx) and the 17th-century Spanish pigment trade (Bruquetas Galán, pp. xx–xx). Manuals, in particular, can be either instructive or descriptive, the first giving practical explanations for the student of a particular craft and the second explaining to the interested reader what the craft is about. Manuscript texts may appear in one or more copies, while with printed texts we usually speak of editions. The various copies of a text can be ordered in a so-called stemma
or tree structure, which shows the relations between earlier, later and contemporary versions of manuscripts. Printed texts, generally speaking, are ordered in bibliographies. Digital materials are more mutable and ephemeral, and therefore fit less easily into bibliographic systems. Stemmatia and bibliographies allow the reader to follow the development (or not) of particular recipes and techniques, or order texts by subject, chronology, publisher and so on.

Terminology is one of the elements in the study of texts on art technology that complicates our understanding of the contents. It is the main theme of the paper on the German translation of Spanish treatises (Gramtke, pp. xx–xx) and that on the contradictions between Portuguese contracts for Baroque retables and a contemporary painting manual (Nodal Monar and Calvo Manuel, pp. xx–xx). In heraldry the terms used for the colour green in different languages are: sinople (Spanish), sinople (French), vert (English), sinopel (Dutch) and grün (German). This is the only occasion when the term sinople has the meaning of ‘green’. In all other cases it is used for reds, although the term can relate to such diverse reds as vermilion, red ochre and red lead (Clarke 2001: 32).

Audiovisual sources

Audiovisual sources form a group which brings together all forms of communication other than written or printed texts. They represent what can be seen or heard. Theoretically smell and taste should be incorporated, too, but communication by these senses is little developed in the field of art technology. Visual sources concern still and moving images. Sound is the other part, and it can be combined with imagery. The master explaining a particular technique to his apprentice is a typical case of an audiovisual source. The two communicate by speech and gesture, i.e. the message is conveyed from the master to the apprentice by telling and demonstrating what the latter should do to manipulate the material towards the desired result. Such a source can only be understood by the persons present, unless it is recorded.

Figure 1 Stages of readability
(photo: ICN). (See Plate 1 in the colour plate section.)

Figure 2 Faxis Varro, reproduced as etching in Grivaud de la Vincelle (1819: pl. XXI, fig. 10) (© Universiteit van Amsterdam).

Figure 2 is a reproduction (Grivaud 1819: pl. XXI, fig. 10) of a Roman sepulchral monument, which can be seen as an audiovisual source recording a particular event. In the middle is a woman with a brush in her hand. To the left stands a framed man’s portrait on a tripod easel with a paint box at its feet. To the right is the portrayed man, shaking hands with the woman and exclaiming: ‘Faxis Varro’ (You have made it, Varro). The woman is the painter of the portrait of the man, who congratulates her on the result.

As with textual sources, remarks about person, place and period are applicable here, and audiovisual sources can be instructive or descriptive, too. The understanding of language
is of importance when it concerns oral sources. Visual material is less bound to a language, although symbolism is strongly related to a culture at a particular place and time. Images are copied and printed in successive editions, just as for texts. The concept of artistic imagery is related to ideas about what art is, and what it is not. A picture of a woman with a child will have a socialistic aspect if made by Käthe Kollwitz (1867–1945), while its aspect would certainly be religious when painted by Rogier van der Weyden (1399/1400–1464).

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On the whole it can be said that ‘reading’ images can provide more and better information than texts can ever do. For one thing, you can glance at an image in a fraction of a second, while reading a text is sequential and therefore takes more time. Imagery is more universal and text is more bound to language. Texts and images can overlap, but can also be incongruous or contradictory. Often texts are illustrated to convey the message more strongly, as the present paper, up to a level where the image gives information that is absent from the text. The printshop interior in Figure 3 illustrates a text on intaglio printing. The author briefly sketches the process, referring to the illustration for further details: ‘wie solches die beystehende Figur mit mehrerm zuersehen gibe’ (Garzoni 1641: 366–7).

Understanding a picture is often taken for granted: ‘you can see what it is, can’t you?’ But only by studying a particular discipline can the contents of an image be better understood. It might even be the case that an image could now convey a message not originally intended. The famous Emblemata by Johannes Sambucus (1531–1584) was first published in 1564. It was followed by an extended second edition two years later. Not in the first edition, but present in the second edition of 1566 and the later editions, is an allegory of typographic printing as invented by Germans (Fig. 4): ‘Qvis neget inuentum Germanorum ingeniosum / cartula quo recepit tot monumenta typis?’ (Who does not know the ingenious invention of the Germans, by which paper receives so many monuments by type?). A man is bending over to move a roller over a pile of paper. The lines appearing after the roller has passed depict the freshly printed texts. Clearly the designer has not based his image on actual book printing (Fig. 5) and he did use elements of a different discipline for this woodcut. Looking at the other illustrations in the book shows that the designer was not so much interested in literal depictions but in combining elements from real life in such a way that an image was created that could be well enough understood by his contemporaries. The action of the man in the illustration serves to express the allegory. The purpose of the rest of the image is to guide and support the idea. Realism was not an issue, let alone future source research into 16th-century printing techniques.

The intention of the emblem is clear: it is explained by the verses and the contemporary reader would not have had a problem in relating text and emblem. For the present-day audience to understand the elements of the image, it is necessary to know about the context, and in this case the context is misleading since the modern observer may expect at first to see the interior of a 16th-century shop for printing books. Isn’t that what Sambucus is writing about? To understand the figure and its details, comparison with contemporary and later information is needed.

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A press for printing type and woodcuts has a platen that is moved up and down by means of a screw and a lever (Fig. 5).
The printer pulls the lever attached to the screw towards him and the platen moves downward, thereby forcing a sheet of paper against the inked metal type. Imagery of such presses exists from the end of the 15th century with few differences depicted until well into the 19th century, when the presses were made from metal instead of the earlier wood (Moran 1978: 16–99; Wolf 1990: 418–90).

Closer inspection of the background of Sambucus’s emblem with its details (Fig. 5) and comparison with a later roller press (Fig. 7) makes clear that it is more likely showing implements for intaglio printing. Most conspicuous is the apparatus with the six-armed cross connected to a roller. The few coarse lines to the right of the cross may be interpreted as the horizontal lines depicting the circumferences, and the hatching can be seen as indicating the curving of two rollers with a plank in between. On its left is a table carrying a thin, flat plate and two printing balls, while further to the left are three piles of (printed?) paper. The thin plate must be an engraved copper plate as it is definitely not a typographic printing form with lead type or a woodblock, both of which would be much thicker. In combination with a thin (printing) plate and printing balls, the apparatus with star-wheel and rollers should therefore be interpreted as a roller press for intaglio printing.

**Material sources**

Material sources are the most difficult types to understand. Because they were not intended for direct communication, it takes a specialist in the material or technique to interpret them properly. The most important source is the object itself. In principle it contains all the information one would like to know, both for the materials from which the object is constructed and of the traces left by the tools as handled by its maker, as well as its own artistic concept.

It is rewarding to carry out research into studios, ateliers or workshops with the remains of their activities. These sites, with the spatial contexts of other workshops, social communities and transport routes, bring the workshop to life. The papers about the studios of Marià Fortuny (Admella Baulés *et al.*, pp. *xx–xx*) and Joan Miró (García Fernández-Villa and Darder, pp. *xx–xx*) discuss this. Objects are transported along trade routes, but so too knowledge – in the heads of people – moves along those ways, which is demonstrated in the paper on the dissemination of pre-Eckylian oil painting (Kirby, pp. *xx–xx*).

Their studios also contain realia, the materials, tools and machines in use. Such cases are rare, but ideally the materials would be left over after the production process of particular objects, and the tools and machines used in their construction. But if not, then at least they should be contemporary to the object being researched, and from the same region, the paper on colourmen’s archives showing fine examples of this (Clarke, pp. *xx–xx*). In the absence of realia, modern reference materials and reconstructions can give an idea about historical processes, circumstances and installations, which was the main theme of the first ATSR symposium in 2004, now published as *Art of the Past: Sources and Reconstructions* (Clarke *et al.* 2005). This recurs in the papers in the present volume, concerning historical pigment production (García-Moreno and Thomas, pp. *xx–xx* and San Andrés Moya *et al.*, pp. *xx–xx*), preparation layers (Stols-Witlox, pp. *xx–xx*) and painting techniques (Woudhuysen-Keller, pp. *xx–xx*), especially as related to conservation practices. Important for modern art are the questions posed about the recreation or reconceptualisation of installations and other temporary artworks (García Gómez-Tejedor, pp. *xx–xx*).

The scientific analysis of works of art is of importance for the conservation of the objects. In previous decades this has become self-evident, and this volume gives a number of examples. Next, it allows for a better understanding of documentary material and *vice versa*, by studying documentary material analyses methods proper to the objects being researched. It also allows for more particular questions to be posed, as to what should be researched. The ultimate is researching the materials of the documentary source itself,
Presented here as the analysis of colour samples on a 17th-century Swedish list of pigments for miniature painting (Rönnerstam, pp. xx–xx).

Intaglio printing, the printing of etchings and engravings, is performed by rubbing oil-based ink onto the surface of an etched or engraved plate and into its crevices. Next the surface is cleaned, or ‘wiped’ as it is called, in such a way that the ink is retained in the grooves. In printing the paper is pressed into the grooves where it touches the ink and in that way an impression is made. The depiction by Matthäus Merian the Elder (1593–1650) of a printshop (fig. 3.) shows the various stages of the process. The boy at front left is making ink by grinding oil varnish with pigment. The man front right is inking the plate above a basin with live charcoal, the heat of which makes the ink soft and malleable, in order to drive it into the fine grooves. The man behind him wipes the surface of the plate, first with a cloth and next with his bare hand, a delicate process that takes a lot of practice. Finally the plate is run through the press to make the impression and hung to dry.

The majority of etchings and engravings were and still are printed in black. Comparison with relief printing – the printing of woodcuts and type – shows that for relief printing ink, lampblack was used exclusively. Already Alessio Piemontese (1555: 189) is clear about this: ‘L’Inchiostro poi da stampar lettere, si fa di solo fume di ragia’ (printer’s ink is made with the smoke of rosin only, which is lampblack).

For intaglio ink many black pigments have been tried and used (see the box). These can be divided into charred vegetable and animal materials, sepia being dark brown by nature, and black metal compounds. The choice of the pigment is decided by different factors. Ink for relief printing should cover the block or type in as thin and opaque a layer as possible, offsetting easily on the paper in order to create a high-contrast text or image. Only lampblack and in the present, carbon black, are suitable for this. Ink for intaglio printing should also give a high-contrast image, but has yet more requirements. It is important that the process of inking and wiping the pigment should not wear the plate too much, otherwise the edition from the plate cannot be large enough. Looking at scanning electron microscope (SEM) images of modern dry black pigments and testing inks made from these pigments shows that their qualities are also decided by the size and the shape of the pigment particles.

A carbon black particle is built up of layers of much smaller particles (Fig. 8). This indicates that carbon black is useful for relief printing because in grinding the ink the large particles are crushed, creating a densely coloured ink. For intaglio printing this pigment is too fine because it gives a smudgy and streaky film of ink on the plate, instead of a cleanly wiped surface.

Finely crushed Japanese stone produces an intense black. However, the SEM micrograph shows that even the finest particles are sharply pointed with razor-sharp edges (Fig. 9). It takes little imagination to understand that such material soon wears away the metal plate. Although many kinds of black pigments for intaglio ink are mentioned in the sources, the majority of the blacks used up to 1900 can be understood to be charcoals and bone black. Often so-called Frankfurt black is mentioned, which is made
of charred wine lees. A conclusive rationale for the use of this pigment is neither given in historic sources nor in modern literature. The SEM micrograph shows that spongy matter is left after charring, when the larger particles will be the remains of grape kernels (Fig. 10). Further grinding of this material produces a fine-grained black, which wears away plates only gradually.

**Conclusion**

Art technological source research brings together a variety of skills and approaches. Linguistics and paleography are supportive in understanding texts. Practical experience and familiarity with iconography help in understanding what is depicted in an image. Chemical-physical analysis and codicology are useful in examining materials. It is the holistic approach, as well as a detailed study, of technique and history as well as art, carried out by scrutinising a range of possible sources of information, which allows us to sketch a more complete picture.

**Notes**

1. This paper develops further on the introductory article by the same author in the proceedings of the first ATSR symposium, ‘Style and technique are inseparable’ (Clarke et al. 2005: 1–8) with cordial thanks to Hayo de Boer, ICN for lengthy discussions on the subject matter.

2. The image is reproduced several times in the 17th, 18th and 19th centuries, but the whereabouts of the original stone relief is not known to the author.

3. Johannes Sambucus is the Latinised name of János Zsámboky.

4. Pigment produced by the Kanazawa College of Art, Japan; with my sincere thanks to Yoshio Kamitani, Tsuneo Ueda and Ayumi Yasui.

**References**


Garzoni, T. 1641. Piazza universale, das ist allgemeiner Schawplatz, Markt und Zusammenkunft aller Professionen, Künsten, Geschäften, Händeln und Handwerken … (etc.). Frankfurt am Main: W. Hoffmann.


**Figure 8** SEM micrograph of a carbon black particle. Note the layers of much smaller particles (photo: Ineke Joosten, ICN).

**Figure 9** SEM micrograph of a crushed Japanese black stone, probably lava. Note the sharp points and edges (photo: Ineke Joosten, ICN).

**Figure 10** SEM micrograph of charred wine lees. Note the spongy character of the material (photo: Ineke Joosten, ICN).

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